

HIKE AND BIKE TRAIL

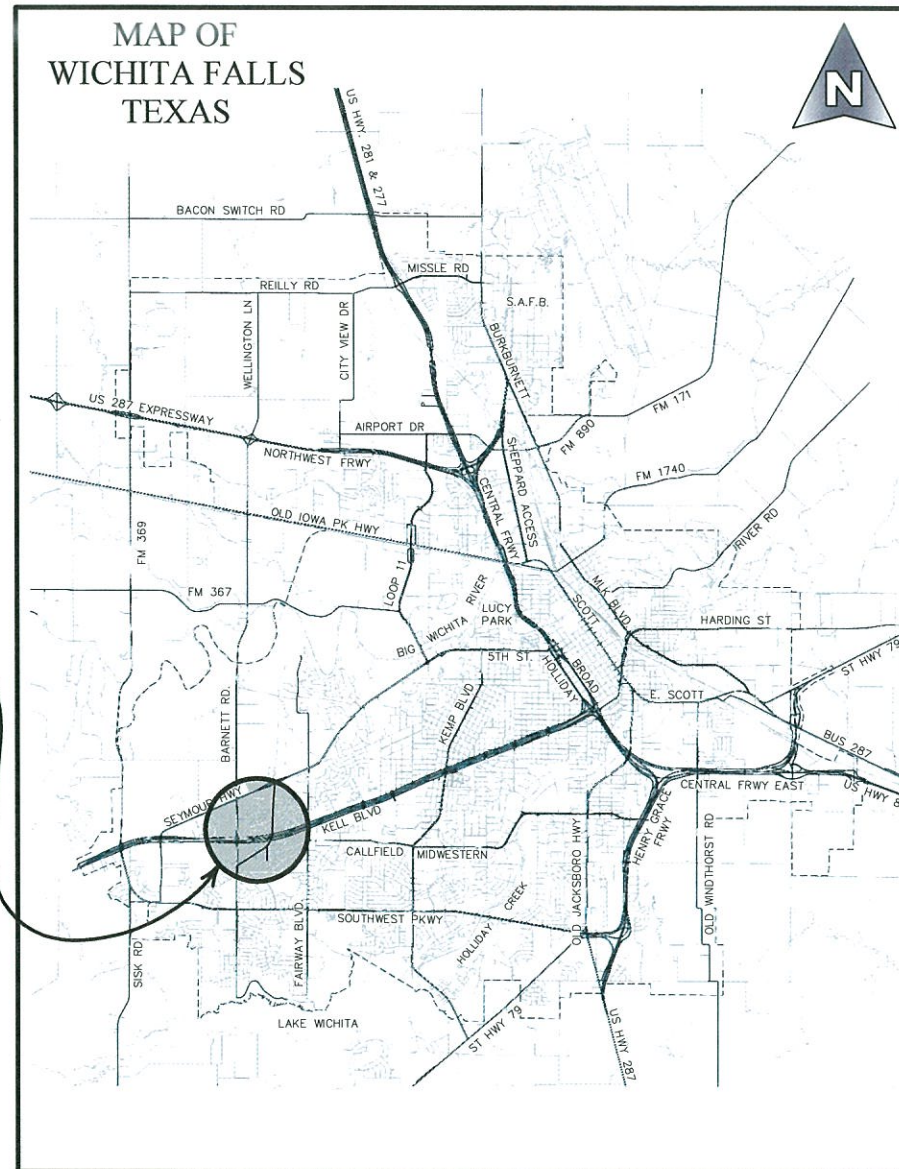
FROM BARNETT ROAD TO SEYMOUR HIGHWAY

FOR THE CONSTRUCTION OF NEW CONCRETE TRAIL AND ASSOCIATED WORK

CWF17-444-11

TxDOT CSJ: 0903-03-115

PROJECT LOCATION



VICINITY MAP

STEPHEN SANTELLANA
MAYOR

DARRON LEIKER
CITY MANAGER



DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISION

APPROVED:

DIRECTOR OF PUBLIC WORKS

12-3-18
DATE

RECOMMENDED:

CITY ENGINEER

11-30-18
DATE

RECOMMENDED:

DEPUTY CITY MANAGER

11-30-18
DATE

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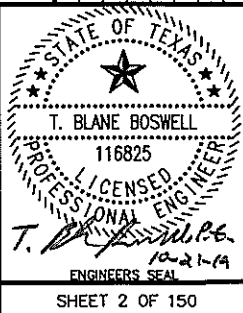
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NO.	DATE	DESCRIPTION	BY



HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11
SHEET INDEX

PROJECT MANAGER: JOSH HARTMANGRUBER
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: JULY 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: SHEET INDEX



[illegible]

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

GENERAL NOTES - SECTION Q

GENERAL NOTES
SECTION Q

- later date, an additional Railroad Protective Liability Insurance Policy shall be required. The policy shall be issued on a standard ISO from CG 00 35 10 93 and include the following:
- Endorsed to include the Pollution Exclusion Amendment (ISO form CG 28 31 10 93)
 - Endorsed to include the Limited Seepage and Pollution Endorsement.
 - Endorsed to include Evacuation Expense Coverage Endorsement.
 - No other endorsements restricting coverage may be added.
 - The original Policy must be provided to BNSF Railway Company prior to performing any work or services.

In lieu of providing a Railroad Protective Liability Policy, Contractor may participate in BNSF Blanket Railroad Protective Liability Insurance Policy available to contractor. The limits of coverage are the same as above. The cost is \$51,871.00.

Other requirements:

Where allowable by law all policies (applying to coverage listed above) shall contain no exclusion for punitive damages and certificates of insurance shall reflect that no exclusion exists.

Insured agrees to waive its right of recovery against City of Wichita Falls and BNSF for all claims and suits against BNSF. In addition, its insurers, through policy endorsement, waive their right of subrogation against City of Wichita Falls and BNSF for all claims and suits. The certificate of insurance must reflect waiver of subrogation endorsement. Insured further waives its right of recovery, and its insurers also waive their right of subrogation against City of Wichita Falls and BNSF for loss of its owner or leased property or property under its care, custody, or control.

Insured insurance policies through policy endorsement must include wording which states that policy shall be primary and non-contributing with respect to any insurance carried by City of Wichita Falls and BNSF. The certificate of insurance must reflect that the above wording is included in evidenced policies.

All policies required above (excluding Workers Compensation and if applicable, Railroad Protective) shall include a severability of interest endorsement and shall name City of Wichita Falls and BNSF as an additional insured with respect to work performed under this agreement. Severability of interest and naming City of Wichita Falls and BNSF as additional insured shall be indicated on the certificate of insurance.

Prior to commencing the Work, Contractor shall furnish to City of Wichita Falls an acceptable certificate(s) of insurance included an original signature of the authorized representative evidencing the required coverage, endorsements, and amendments. The policies) shall contain a provision that obligates the insurance company issuing such policy to notify Licensor in writing at least 30 days prior to any cancellation, non-renewal, and substitution or material alteration. This cancellation provision shall be indicated on the certificate of insurance. In the event of a claim or lawsuit involving Railroad arising out of this agreement, Insured will make available any required policy covering such claim or lawsuit.

SPECIAL WARRANTY: The Contractor shall guarantee all material and workmanship for a period of one (1) year from the date of final acceptance by the Director of Public Works. The guarantee shall specifically include the direct labor cost to replace any faulty material at no cost to the Owner.

If within one year after final acceptance of the work by the OWNER, as evidenced by the final certificate of acceptance or within such longer or shorter period of time as may be prescribed by law or by the terms of any other applicable special warranty on designated equipment or portions of work as

required by the Contract documents, any of the work is found to be defective or not in accordance with the Contract documents, the CONTRACTOR shall correct it promptly after receipt of a written notice from the OWNER to do so. This obligation shall survive termination of the Contract. The OWNER shall give such notice promptly after discovery of the condition.

The CONTRACTOR shall remove from the site all portions of the work which are defective or nonconforming and which have not been corrected unless removal is waived in writing by the OWNER.

Subcontractors' and Manufacturers' Warranties. All subcontractors', manufacturers' and suppliers' warranties and guarantees, express or implied, respecting any part of the work and any materials used therein, shall be obtained and enforced by the CONTRACTOR for the benefit of the OWNER without the necessity of separate transfer or assignment thereof, provided that if directed by the Engineer, the CONTRACTOR shall assign such warranties and guarantees in writing to the OWNER.

Corrected Work Warranty. Any work repaired or replaced, pursuant to this section, shall be subject to the provisions of this section to the same extent as work originally performed.

Rights and Remedies. The rights and remedies of the OWNER provided in this section are in addition to, and do not limit, any rights or remedies afforded to the OWNER by law or any other provision of the Contract documents, or in any way limit the OWNER'S right to recovery of damage due to default under the Contract.

ITEM SPECIFIC NOTES:

Items 1-9. GENERAL REQUIREMENTS AND COVENANTS

For this project, any references to the "Department" or "Commission" shall be replaced with the "City of Wichita Falls, TX (City)"

Item 2. INSTRUCTIONS TO BIDDERS

View plans on-line or download from the web at:
<http://www.wichitafallstx.gov/bids.aspx>

Item 4. SCOPE OF WORK

Attend a preconstruction conference to discuss BNSF Railroad requirements, safety, traffic controls, traffic safety, construction sequences, maintenance of access, drainage controls, illumination, and pollution control measures prior to beginning construction. At the preconstruction conference submit to the Engineer, for his approval, requests for subcontractors. Requests for approval of subcontractor must be approved before subcontractors begin work. At the preconstruction conference, submit to the Engineer for his approval, the Contractor's and subcontractor's work schedule, material sources, written BNSF coordination plan, utility coordination plan, and letters designating the project superintendent, safety officer, and payroll officer. Have a company representative that has received flagger training and furnish a copy of the training certificate at the preconstruction conference. Attendance at the preconstruction conference by the Contractor's superintendent is mandatory.

Maintain access to all commercial and private drives and public roads unless the Engineer approves temporary closure and the affected property owners are notified.

Wichita Falls
Blue Skies Golden Opportunities
TEXAS

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

GENERAL NOTES - SECTION Q

PROJECT MANAGER: ALAN PEREGRINO

DRAWN BY: TW

PROJECT NUMBER: CWF17-444-11

DATE: DEC 2018

SCALE: AS SHOWN

FIELD BOOK:

ACAD: XX

LAYOUT: SECTION Q-2

STATE OF TEXAS

T. BLANE BOSWELL

116825

PROFESSIONAL ENGINEER

T. Blane Boswell, P.E.

10-22-19

ENGINEER'S SEAL

SHEET 4B OF 150

GENERAL NOTES

SECTION Q

Preconstruction Video: A representative of the CONTRACTOR, accompanied by the Project Inspector, shall walk the project limits and record in digital format acceptable to the Owner such as CD or DVD the existing condition of all natural and manmade objects, structures and landscaping in the area. The video shall display the date the video was recorded. **A copy of the video shall be furnished to the PROJECT MANAGER at the Preconstruction Meeting.**

Preconstruction Notices: The CONTRACTOR shall prepare a typewritten notice, which contains the following:

- (a) The CONTRACTOR's name, address, and telephone number;
- (b) The name of the job superintendent.
- (c) Phone numbers where the CONTRACTOR or his superintendent can be reached during the day and at night;
- (d) A general description of the work that is to be performed, the construction procedure that will be used, and the anticipated length of time that will be required to complete each phase of the construction.

The CONTRACTOR shall deliver copies of this notice to the PROJECT MANAGER and to each residence or business that will be affected by the planned construction a minimum of 48 hours before beginning work in any area.

Item 5. CONTROL OF THE WORK

Coordinates are surface values based on Texas State Plane Coordinate System, Texas North Central 4202, North American Datum 1983 (NAD83), 1993 adjustment, using GEOID99 or GEOID12A model, NAVD88. Use control points provided in plans.

Locate and reference all manholes and valves within the construction area with station and offset. Each manhole and valve shall be identified by its owner (CWF, AT&T, ATMOS, etc). No roadwork will begin until this list has been submitted. All valves and manhole covers have to be accessible at all times, therefore; temporary material stock piles, etc. cannot be placed over these valves or covers.

CONTRACTOR shall provide for all construction staking from vertical and horizontal control points established by the City and shown on the plans. In accordance with generally accepted standards, he shall establish and be responsible for the correctness of alignment, elevation and position of all construction required by the contract. The CONTRACTOR shall notify the City three working days in advance of the need for the establishment of the survey control points, which will be located one time only. Construction staking shall be considered as incidental work, and the cost thereof shall be subsidiary to the various bid items of the contract.

Item 6. CONTROL OF MATERIALS

Comply with Buy America provisions.

Furnish Material Safety Data Sheets (MSDS) for all materials delivered within the project limits.

Verify material quantities and dimensions before ordering materials.

Item 7. LEGAL RELATIONS AND RESPONSIBILITIES

The total disturbed area for this project is 6.70 acres. The disturbed area in this project includes: the project limits in the contract and Contractor Project Specific Locations (PSLs), on or off ROW, within one mile of the project limits. The contract will further establish the authorization requirements for storm water discharges. The Contractor will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain any required authorization from the TCEQ for any Contractor PSLs

for construction support activities on or off ROW. When the total area disturbed for all projects in the contract and PSLs within one mile of the project limits exceeds five acres, provide a copy of the Contractor NOI for PSLs on the ROW to the Engineer.

All electrical work will be performed in accordance with Item 7.18 in the Texas Department of Transportation Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges November 2014.

ITEM 8. PROSECUTION AND PROGRESS

Working days will be computed and charged in accordance with Article 8.3.1.4 Standard Workweek.

Coordinate and update the work schedule with the Engineer. Perform work requiring inspection or testing during a normal 8-hour day if at all possible (i.e. concrete pours, soil density tests, etc.). Notify the Engineer 24 hours in advance of any work requiring inspection or testing. Do not begin work before sunrise and ensure that all machines are off the road by sunset unless a nighttime work plan has been approved in writing by the engineer.

WEATHER DAYS: The number of adverse weather days shall be determined on a monthly basis from the first calendar day to the last calendar day of each month. An adverse weather day shall be a day in which inclement weather caused the Contractor to be unable to perform work less than 7 of the normal working hours within the day (including weekends and holidays only if work is scheduled or attempted) and which delayed the Contractor's work critical to the timely completion of the Project. Adverse weather day claims/requests shall be project and work type specific. If the Contractor is not scheduled to work on any given day (i.e. weekends and holidays), that day shall not automatically be granted as an adverse weather day. The number of claimed/requested adverse weather days will be reviewed and evaluated by the Project Engineer/Manager and Project Inspector. The Project Inspectors Daily Logs shall be the Log of Record. The Contractor shall be entitled to a time extension equal to the number of justifiable adverse weather days as deemed by the Project Engineer/Manager. The Contractor shall submit weather day claims/requests, in writing, with each monthly pay request. Failure to submit claims/requests in accordance with this specification will result in no extension of time being granted for that period.

Item 100. PREPARING RIGHT OF WAY

Removal of obstructions included in this item include, but are not limited to, removal of trees and hedges, abandoned sign foundations, walls/columns, fencing, pipes, designated sections of train rail and any other obstructions that are not specifically paid for under other items. Remove trees and underbrush as required for construction unless marked as to remain. Deposit removed sections of train rail at BNSF designated location on BNSF property. All other debris resulting from these operations will become the property of the Contractor and should be disposed of at an approved site outside of the project limits.

Item 160. TOPSOIL


Remove and stockpile 6" of topsoil from areas designated for pavement, excavation and embankment. After construction is complete, place the stockpiled topsoil to a depth of 6" adjacent to the edge of trail and on slopes to the finished grade elevation on all areas disturbed during construction. In the event that there is not sufficient topsoil existing, contractor shall provide additional topsoil to satisfy this item. This item shall be paid for per trail station.

Item 164. SEEDING FOR EROSION CONTROL

Item 7154-6042 will be governed by the requirements of item 164 – SEEDING FOR EROSION CONTROL.

REVISIONS

NO.	DATE	DESCRIPTION	BY



Wichita Falls
Blue Skies, Golden Opportunities
TEXAS

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

GENERAL NOTES - SECTION Q

PROJECT MANAGER: ALAN PEREGRINO

DRAWN BY: TW

PROJECT NUMBER: CWF17-444-11


DATE: DEC 2018

SCALE: AS SHOWN

FIELD BOOK:

ACAD: XX

LAYOUT: SECTION Q-3



STATE OF TEXAS
T. BLANE BOSWELL
116825
PROFESSIONAL ENGINEER
10-22-19

SHEET 4C OF 150

GENERAL NOTES

SECTION Q

Use the following seed distribution for permanent vegetative establishment:

- | | |
|----------------------|-----|
| 1. Buffalograss | 40% |
| 2. Green Sprangletop | 13% |
| 3. Blue Grama | 10% |
| 4. Sideoats Grama | 10% |
| 5. Hairy Vetch | 10% |
| 6. Little Bluestem | 7% |
| 7. Indiangrass | 5% |
| 8. Sand Lovegrass | 5% |

The percentages listed are by weight at a seeding rate of the resulting mix at 15 lbs/acre in a hydroseeded application.

This mix will be planted between April 10th and June 10th.

If unable to plant by June 10th, apply the cool weather seed as follows; a 50/50 mix of Canada Wildrye and Western Wheatgrass hydroseeded at a rate of 10 lbs/acre between October 1st and December 15th for this application, and follow up with the permanent mix after April 10th hydroseeded at a rate of 10 lbs/acre.

Fertilizer will be subsidiary to this item. Vegetative watering shall be paid under Item 168.

Item 168. VEGETATIVE WATERING

Use of City Water for Construction (Water Meters on Fire Hydrants):

The Code of Ordinances of the City of Wichita Falls prohibits anyone except the Fire Department and Public Works Department from drawing water from a fire hydrant unless specifically authorized by the Utilities Operations Manager to do so. The City recognizes the short term need of contractors and selected other persons to take water from a fire hydrant, therefore a hydrant meter can be provided under the following terms:

1. Refer to Section 106-129 of the City Code of Ordinance for the cost associated to the fire hydrants meters.
2. The Contractor will incur normal water usage charge when the water is to be used on a project under contract with the City of Wichita Falls.
3. Initial application to install a meter is to be made in Room 402, Memorial Auditorium. Subsequently, orders to install, move or pick up a meter are to be in writing on the standard form and submitted to Utility Collections (Room 302, Memorial Auditorium). Meters will be set, relocated or removed by Public Works personnel only.
4. The responsible Contractor will be charged for repairs to damages caused by improper use or neglect. The Contractor is responsible for security of the meter and for proper winterization during cold weather.
5. Water will be drawn from a fire hydrant through the meter only; straight hook ups are not allowed. Hoses and other straight connections found on the hydrant will be removed and retained by the City. A straight connection may be grounds for filing a complaint in the Municipal Court.
6. The potential for cross-connection is of particular concern to the City of Wichita Falls. Water may not be taken from a fire hydrant into any type tank or container unless that tank or container has a fixed, permanent air-gap installed or a testable double check valve is attached to the meter by the Contractor. The air-gap must be twice the diameter of the intake hose or pipe, and the hose or pipe must be permanently affixed above the overflow level of the tank or container. Each tank container or testable double check valve must be inspected by the Plumbing Inspector of the City of Wichita Falls, and a permit must be issued for the specific

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tank container or testable double check valve to be used. A tank container or testable double check valve not approved and permitted by the Inspection Department will not be used to take water from a City fire hydrant.

7. The meter may not be used on multiple projects at the same time. The meter may only be used for City-funded and inspected projects.
8. Failure to comply with the above requirements may result in removal of the meter and cancellation of the account.
9. This project will not be accepted or final payment made until the meter is returned.

Item 360. CONCRETE PAVEMENT

This Item is used for payment of the typical 6" trail section.

Contraction joints shall be sawed as soon as concrete strength will allow, within eight hour to 24 hour maximum after final finish. Troweled contraction joints will not be allowed.

Construct trail to ensure that abrupt changes in trail elevation do not exceed ¼ inch, cross slope does not exceed 2%, curb ramp grade does not exceed 8.3%, and flares adjacent to the ramp do not exceed 10% slope.

Type 2 curing materials only will be used.

Utilize Surface Test Type A with a 10 ft. straightedge to measure Ride Quality.

Self-propelled paving equipment will not be required on this project. Trail can be placed by conventionally formed concrete or by extruded or slip formed concrete. Hand finishing is allowed for any method of construction.

Metal side forms will not be required. Wooden forms, if used, will be required to meet all conditions required of metal forms.

Reinforcing Steel Inserting Equipment will not be required on this project.

Carpet Drag and Tining texturing equipment will not be required on this project. Finish exposed surfaces to a uniform transverse medium broom finish surface.

Self-propelled curing and grinding equipment will not be required on this project.

Date imprinting will not be required on this project.

Paving and Quality Control Plan will not be required on this project.

Pavement thickness testing as outlined in Section 360.4.L will not be required on this project.

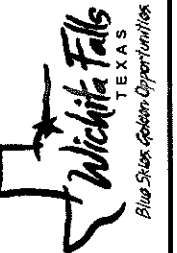
Deficient thickness price adjustments will be waived for this project.

Item 416. DRILL SHAFT

This item shall be used for the 2' X 2' X 3' illumination foundations described on page 107. Each application paid as 3" of 24" drill shaft. Incorporate these foundations into the trail footing wall as shown.

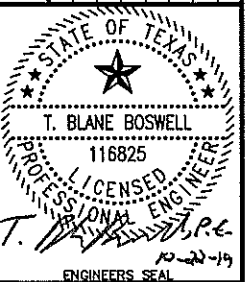
Q-8

NO.	DATE	DESCRIPTION	BY



HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11
GENERAL NOTES - SECTION Q

PROJECT MANAGER: ALAN PEREGRINO
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: SECTION Q-4



GENERAL NOTES
SECTION Q

Install ground rod in each illumination foundation or bond anchor bolt to rebar cage as shown on RID(2)-17.

Item 423. RETAINING WALLS

Unless otherwise noted in the plans, the top of the leveling pad is located 1 foot below the finished grade.

Supply drainage aggregate meeting the requirements of this item for use as filter material with the retaining wall.

Item 432. RIPRAP

Concrete riprap shall have an 8 inch toe at all inflow and outfall perimeters.

Provide Class B Concrete for riprap. No welded wire reinforcement will be allowed. Fiber mesh concrete admixture will not be allowed as an alternative to reinforcing steel.

Locations and quantities may be varied as directed by the Engineer to accommodate field conditions.

RIPRAP (MOW STRIP)(4 IN) shall be used for mow strip under guardrail and chain link fence.

Item 450. RAILING

Prepare and submit shop drawings for approval prior to beginning manufacture of handrail.

Item 465. INLETS

INLET(COMP)(DROP)(TY 2) shall be used to pay for the 2'x2' drop inlet at Sta 78+15.51.

Item 479. ADJUSTING INLETS

This Item used for modifications to existing inlet at Sta 5+23. Payment shall be full compensation for all material, labor, and tools necessary to remove the existing inlet top, extend walls to support the proposed trail, install 18" RCP, tapered headwall, 2' area inlet, concrete apron, ring and cover and all incidentals required to complete this modification.

Item 506. TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS

Contractor shall prepare and submit the Notice of Intent (NOI) prior to construction activities.

An Inspector will perform a regularly scheduled SWP3 inspection every 7 calendar days. Failure to address items noted on the SW3P inspection report within two report cycles may result in the Department stopping all construction operations, exclusive of time charges, or withholding that month's estimate until the SW3P deficiencies are corrected unless the Engineer determines that the area is too wet to correct SW3P deficiencies.

Water quality certification from the Texas Commission on Environmental Quality (TCEQ) is a requirement of Section 404 NWP# 14, and Section 401. TxDOT has committed to using the erosion control measures (also known as best management practices (BMP)) shown in the SW3P layout sheets and the SW3P narrative sheet. However, if one of the erosion control measures proves ineffective, the Engineer may choose a more appropriate measure for the site condition.

Verify locations and dimensions of BMP's with the Engineer before placement. BMP locations indicated on the plans are approximate and may be adjusted as necessary by the Engineer.

All erosion control measures must be installed and maintained in accordance with the plans, manufacturer specifications, and good engineering practices. If periodic inspections or other information

indicates an erosion control measure has been used inappropriately or incorrectly, replace or modify the control for the site situations as directed by the Engineer.

If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize off-site impacts. Remove fugitive sediment from streets or highways immediately to prevent them from being washed into sewers by the next rain event and/or posing a safety hazard to the public.

Prevent litter, construction debris, and construction chemicals exposed to storm water from becoming a pollutant source for storm water discharges (e.g., screening outfalls, trash picked up daily, etc.).

Update the SW3P as necessary to remain consistent with any changes applicable to protecting surface water resources. This may relate to updating the sediment and erosion control site plans or site permits, or storm water management site plans or site permits approved by state, tribal, or local officials from which written notice is received.

Remove sediments from sediment controlling BMP's when design capacity has been reduced by 50%.

In accordance with EO 13112 on invasive species and the executive memorandum on beneficial landscaping, limit landscaping to seeding and replanting the right-of-way with native species of plants where possible.

Make every effort to preserve vegetation where it does not compromise safety or substantially interfere with project construction. Trim rather than remove trees where possible.

Avoid the taking of migratory birds, their young, and their nests.

Limit impacts to water of the United States to minimum necessary to accomplish project. Do not locate haul roads, stock piles, staging areas, or other PSLs in waters of the United States. Do not discharge solid materials, including building material, into water of the United States, except as authorized by a nationwide or individual US Army Corps of Engineers permit issued under section 404 of the Clean Water Act as noted on EPIC plan sheet.

In the event that archaeological sites are encountered in the project area during any phase of this project, a TxDOT archaeologist will be contacted to take necessary steps to investigate such findings in accordance with section 106 of the National Preservation Act.

Item 530. DRIVEWAYS

The two 10' x 2' truncated domes adjacent to the driveway at Sta. 5+59 and 6+27 shall be subsidiary to the driveway item. The sidewalk with the truncated domes shall be constructed flush with and across the driveway.

Item 610. ROADWAY ILLUMINATION ASSEMBLY

This item shall conform to the details in the plans. Prepare and submit shop drawings to the Engineer for approval prior to construction.

Provide lamps from the pre-qualified Materials Producers List, Category is "Roadway Illumination and Electrical Supplies" located on the Construction Division's (CST) web site.

Wichita Falls
Blue Streak Golden Opportunity
TEXAS

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

GENERAL NOTES - SECTION Q

PROJECT MANAGER: ALAN PEREGRINO
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: SECTION Q-5

STATE OF TEXAS
T. BLANE BOSWELL
116825
PROFESSIONAL ENGINEER
T. Boswell, P.E.
10-22-19
ENGINEER'S SEAL
SHEET 4E OF 150

GENERAL NOTES
SECTION Q

Item 628. ELECTRICAL SERVICES

Relocate the existing overhead electrical service for the signals at Barnett and Johnson. Mount the existing meter and service enclosure on a new steel pole per detail for Service Support Ty SP (U) per detail on ED(7) – 14. The new foundation for the relocated service will be paid under Item 416. Provide new safety switch, underground conduit and conductor from the power pole to the relocated service.

Provide safety switch for all electrical services.

Item 636. ALUMINUM SIGNS

This item shall be used for the non-standard signs denoted as BNSF-1 in the signing detail sheet. This item will be paid for by the square foot and will require approval of the blank design by the engineer prior to installation.

This item shall be used to pay for the W11-15 48" X 48" signs attached to the traffic signal pole at station 41+80.00.

Item 1002. LANDSCAPE AMENITY (BENCH)

This item shall include the bench and concrete bench pad as shown in the plans. This will be full compensation for all material, tools and equipment used for the construction and installation of this item.

Item 5064. ADJUST FIRE HYDRANT

This item shall be used to unbolt, rotate and reconnect the existing fire line riser at Sta 5+39.

TRAFFIC CONTROL PLAN (TCP)

The traffic control plan for this project includes the plans, the Texas Manual on Uniform Traffic Control Devices, Traffic Division standard sheets, and as required by the Engineer. Any variation must be approved in writing.

Erect signs in locations not obstructing the traveling public's view of the normal roadway signing or necessary sight distance at intersections and curves.

The Contractor's superintendent and person responsible for TCP compliance must be available by local telephone 24 hours a day. This person must be able to respond to the project within 45 minutes to immediately correct any deficiencies which may occur.

The contractor's person responsible for TCP compliance may be required to accompany department personnel once a month on at least one daytime inspection and one nighttime inspection of the traffic control devices used on the project.

Work shall not be permitted without adequate traffic control devices in place.
Replace all damaged traffic control devices immediately. Remove any damaged traffic control devices from the project within 24 hours.

END

Q-11

Wichita Falls
Blue Sticks Green Opportunities
TEXAS

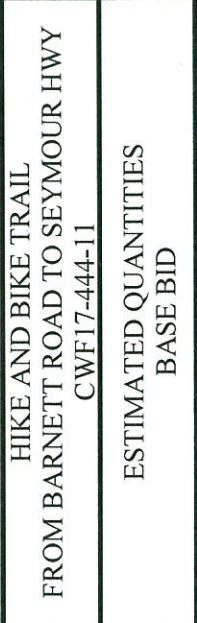
HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

GENERAL NOTES - SECTION Q

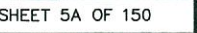
PROJECT MANAGER: ALAN PEREGRINO
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: SECTION Q-6

STATE OF TEXAS
T. BLANE BOSWELL
116825
PROFESSIONAL ENGINEER
T. Boswell
12-22-18
ENGINEERS SEAL

SHEET 4F OF 150

[illegible]

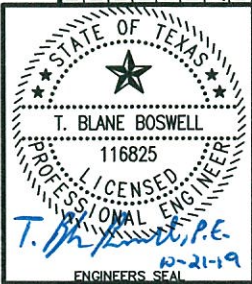
PROJECT MANAGER: ALAN PEREGRINO
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: JULY 2019
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: QUANTITIES



BASE BID

[illegible]ESTIMATED QUANTITIES
BASE BID

PROJECT MANAGER: ALAN PEREGRINO
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: JULY 2019
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: QUANTITIES-2



ESTIMATED QUANTITIES
BASE BID

LOCATION	DRAINAGE ITEMS				UTILITY ITEMS	SIGNAL ITEMS		ILLUMINATION ITEMS					
	466 6003	466 6095	466 6150	466 6178	7016 6065	416 6031	686 6031	416 6001	416 6002	610 6116	610 6120	618 6016	618 6023
	HEADWALL (CH - FW - 0) (DIA= 18 IN)	HEADWALL (CH - PW - 0) (DIA= 18 IN)	WINGWALL (FW - 0) (HW=3 FT)	WINGWALL (PW - 1) (HW=3 FT)	ADJUST EXISTING MANHOLE	DRILL SHAFT (TRF SIG POLE) (30 IN)	INS TRF SIG PL AM(S)1 ARM(28')LUM	DRILL SHAFT (18 IN)	DRILL SHAFT (24 IN)	IN RD IL (TY SA) 20S-4 (150W EQ) LED	IN RD IL (TY SA) 20S-4 (250W EQ) LED	CONDT (PVC) (SCH 40) (1")	CONDT (PVC) (SCH 40) (2")
	EA	EA	EA	EA	EA	LF	EA	LF	LF	EA	EA	LF	LF
0+00 TO 6+57													
6+57 TO 11+50								20			4	490	
11+50 TO 16+75								20			4	525	
16+75 TO 22+00								25			5	405	
22+00 TO 27+25								20			4	525	
27+25 TO 32+60								25			5	535	
32+60 TO 36+04								20		4		515	10
40+91 TO 43+00						8	1	20			4	425	
43+00 TO 48+25								25		5		525	
48+25 TO 53+50								20		4		525	
53+50 TO 58+75								25		5		525	
58+75 TO 64+00			1	1				20		4		528	30
64+00 TO 68+50								20		4		450	
68+50 TO 72+75	1	1						10	3	1	2	300	
72+75 TO 77+25	1	1							15		5	450	
77+25 TO END	1	1			2			10	9		5	455	10
B.E.N SPUR 0+00 TO 6+96													
PROJECT TOTALS	3	3	1	1	2	8	1	280	27	27	38	7178	50

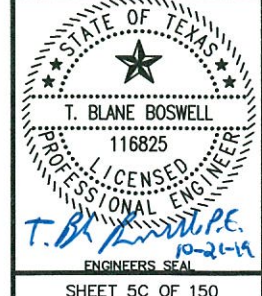
NO.	DATE	DESCRIPTION	BY



HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

ESTIMATED QUANTITIES
BASE BID

PROJECT MANAGER: ALAN PEREGRINO
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: JULY 2019
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: QUANTITIES-3



	TED QUANTITIES
	BASE BID

LOCATION	ILLUMINATION ITEMS						SIGNING ITEMS			PAVEMENT MARKING ITEMS			
	620 6005	620 6006	620 6007	620 6008	624 6002	628 6318	636 6001	644 6001	644 6068	666 6047	668 6085	678 6008	678 6016
	ELEC CONDR (NO.10) BARE	ELEC CONDR (NO.10) INSULATED	ELEC CONDR (NO.8) BARE	ELEC CONDR (NO.8) INSULATED	GROUND BOX TY A (122311)W/A PRON	ELC SRV TY C 120/240 060(NS)SS(E)SF(O)	ALUMINUM SIGNS (TY A)	IN SM RD SN SUP&AM TY10BWG(1) SA(P)	RELOCATE SM RD SN SUP&AM TY 10BWG	REFL PAV MRK TY I (W)24"(SLD)090MIL)	PREFAB PAV MRK TY C (W) (WORD)	PAV SURF PREP FOR MRK (24")	PAV SURF PREP FOR MRK (WORD)
	LF	LF	LF	LF	EA	EA	SF	EA	EA	LF	EA	LF	EA
0+00 TO 6+57													
6+57 TO 11+50			512.5	1025			3	1					
11+50 TO 16+75			545	1090			3						
16+75 TO 22+00			425	850			3						
22+00 TO 27+25			545	1090			3						
27+25 TO 32+60			558	1116			3						
32+60 TO 36+04	342.5	698	220	440	1	1	3						
40+91 TO 43+00	447.5	895					35	4		104	8	104	8
43+00 TO 48+25			547.5	1095			3						
48+25 TO 53+50			545	1090			3						
53+50 TO 58+75			550	1100			3						
58+75 TO 64+00	242.5	485	370.5	741	1	1	3						
64+00 TO 68+50	470	940					3						
68+50 TO 72+75	310	620					3						
72+75 TO 77+25	475	950					3						
77+25 TO END	502.5	1005			1	1	3		2				
B.E.N SPUR 0+00 TO 6+96													
PROJECT TOTALS	2790	5593	4818.5	9637	3	3	77	5	2	104	8	104	8

		PROJECT MANAGER: ALAN PEREGRINO DRAWN BY: TW PROJECT NUMBER: CWF17-444-11 DATE: JULY 2019 SCALE: AS SHOWN FIELD BOOK: ACAD: XX LAYOUT: QUANTITIES-4		HIKE AND BIKE TRAIL FROM BARNETT ROAD TO SEYMOUR HWY CWF17-444-11				NO. DATE DESCRIPTION BY R E V I S I O N S	
				ESTIMATED QUANTITIES BASE BID					

ATED QUANTITIES	
<hr/>	
BASE BID	

	EROSION CONTROL ITEMS										LANDSCAPE ITEMS		
LOCATION	160 6002	169 6001	506 6002	506 6011	506 6020	506 6024	506 6038	506 6039	506 6041	506 6043	168 6001	1002 6026	7154 6042
	FURNISHING AND PLACING TOPSOIL (6")	SOIL RETENTION BLANKETS (CL 1) (TY A)	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)	VEGETATIVE WATERING	LANDSCAPE AMENITY (BENCH)	SEEDING, HYDROMULCH
	STA	SY	LF	LF	SY	SY	LF	LF	LF	LF	MG	EA	SY
0+00 TO 6+57													
6+57 TO 11+50	4.93	84							90	90	28.93		800
11+50 TO 16+75	5.25		15	15					30	30	38.8		1073
16+75 TO 22+00	5.25								15	15	31.64		875
22+00 TO 27+25	5.25								15	15	31.64		875
27+25 TO 32+60	5.35								15	15	40.97		1133
32+60 TO 36+04	3.44				84	84			15	15	41.1		1137
40+91 TO 43+00	2.09										13.25		366
43+00 TO 48+25	5.25										41.76		1155
48+25 TO 53+50	5.25								15	15	37.96		1050
53+50 TO 58+75	5.25								15	15	37.96		1050
58+75 TO 64+00	5.25		30	30			240	240			43.35		1199
64+00 TO 68+50	4.5										32.58		901
68+50 TO 72+75	4.25										41.26		1141
72+75 TO 77+25	4.5										39.09		1081
77+25 TO END	4.18				86	86					38.36	1	1061
B.E.N SPUR 0+00 TO 6+96					83	83							
PROJECT TOTALS	69.99	84	45	45	253	253	240	240	210	210	538.65	1	14897

LEGEND			
EXISTING		PROPOSED	
	FENCE		POWER POLE
	SANITARY SEWER LINE		MAILBOX
	WATER LINE		STREET SIGN
	WATER LINE (TO BE ABANDONED)		SANITARY SEWER MANHOLE
	ELECTRIC LINE		STORM DRAIN MANHOLE
	TELEPHONE LINE		WATER VALVE
	GAS LINE		LIGHT POLE
	STORM DRAIN		TELEPHONE BOX
	RIGHT OF WAY		IRRIGATION BOX
	TELEVISION CABLE		ELECTRICAL METER
	BORING REQUIRED		WATER METER
			GAS METER
			GAS VALVE
			SHRUB
			POLE
			TREE
			SPRINKLER HEAD
			FIRE HYDRANT
			CLEAN OUT
			TELEVISION BOX
			SURVEY POINT
			WATERLINE
			PLUG
			TEE / TAPPING SADDLE
			FIRE HYDRANT
			GATE VALVE
			CROSS
			SEWER LINE
			SANITARY SEWER MANHOLE
			SANITARY SEWER CLEANOUT
			SEWER PLUG

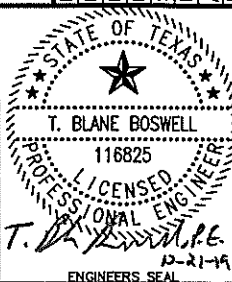
ESTIMATED QUANTITIES
KELL BLVD. ADD / ALT. #1

	REMOVAL ITEMS	ROADWAY ITEMS			DRAINAGE ITEMS		EROSION CONTROL ITEMS	LANDSCAPE ITEMS		
LOCATION	100 6002	110 6004	132 6002	360 6028	432 6031	462 6168	160 6002	168 6001	1002 6026	7154 6042
	PREPARING ROW	EXCAVATION (ROADWAY AND CHANNEL)	EMBANKMENT (FINAL)(DENS CONT)(TY A)	CONC PAV (JOINT REINF) (6")	RIPRAP (STONE PROTECTION) (12 IN)	SIDEWALK FLUME	FURNISHING AND PLACING TOPSOIL (6")	VEGETATIVE WATERING	LANDSCAPE AMENITY (BENCH)	SEEDING, HYDROMUL CH
	STA	CY	CY	SY	CY	EA	STA	MG	EA	SY
36+04 TO 40+91	4.87	50	36	711	3.7	1	4.87	53.91	2	1491
PROJECT TOTALS	4.87	50	36	711	3.7	1	4.87	53.91	2	1491

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

ESTIMATED QUANTITIES
KELL BLVD. ADD / ALT. #1

DRAWN BY: TW
 PROJECT NUMBER: CWF17-444-11
 DATE: JULY 2019
 SCALE: AS SHOWN
 FIELD BOOK:
 ACAD: XX

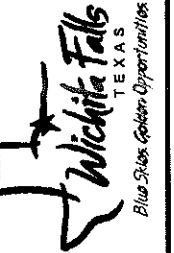


NO.	DATE	DESCRIPTION	BY
1	10/1/19	10/1/19	10/1/19

ESTIMATED QUANTITIES
BARNETT RD. ADD / ALT. #2

	REMOVAL ITEMS			ROADWAY ITEMS								DRAINAGE ITEMS	
LOCATION	100 6002	104 6022	104 6028	110 6004	132 6002	360 6028	529 6008	530 6004	531 6003	531 6004	531 6008	464 6003	479 6002
	PREPARING ROW	REMOVING CONC (CURB AND GUTTER)	REMOVING CONC (MISC)	EXCAVATION (ROADWAY AND CHANNEL)	EMBANKMENT (FINAL)(DENS CONT)(TY A)	CONC PAV (JOINT REINF) (6")	CONC CURB & GUTTER (TY II)	DRIVEWAYS (CONC)	CONC SIDEWALKS (6 IN)	CURB RAMPS (TY 1)	CURB RAMPS (TY 5)	RC PIPE (CL III)(18 IN)	ADJUSTING INLETS
	STA	LF	SY	CY	CY	SY	LF	SY	SY	EA	EA	LF	EA
0+00 TO 6+57	6.57	31.6	366	75	8	511	33.6	175	73	2	1	4	1
PROJECT TOTALS	6.57	31.6	366	75	8	511	33.6	175	73	2	1	4	1

	UTILITY ITEMS				ILLUMINATION ITEMS		SIGNING ITEMS	PAVEMENT MARKING ITEMS			EROSION CONTROL ITEMS		
LOCATION	5064 6001	7016 6065	7056 6064	7058 6050	416 6002	628 6001	644 6068	666 6047	677 6007	678 6008	160 6002	506 6041	506 6043
	ADJUST FIRE HYDRANT	ADJUST EXISTING MANHOLE	ADJUST EXIST WATER VALVE	ADJUST AND/OR RELOCATE WATER METER BOX	DRILL SHAFT (24 IN)	RELOCATE ELECTRICAL SERVICES	RELOCATE SM RD SN SUP&AM TY 10BWG	REFL PAV MRK TY 1 (W) 24 IN (SLD) (090 MIL)	ELIM EXT PAV MRK & MRKS (24 IN)	PAV SURF PREP FOR MRK (24 IN)	FURNISHING AND PLACING TOPSOIL (6")	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
	EA	EA	EA	EA	LF	EA	EA	LF	LF	LF	STA	LF	LF
0+00 TO 6+57	1	1	1	2	3	1	1	530	166	530	6.57	35	35
PROJECT TOTALS	1	1	1	2	3	1	1	530	166	530	6.57	35	35

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HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

ESTIMATED QUANTITIES
BARNETT RD. ADD / ALT. #2

PROJECT MANAGER: ALAN PEREGRINO
DRAWN BY: TW

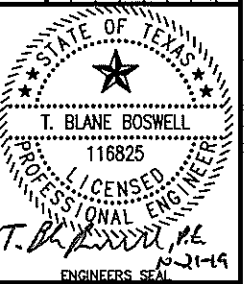
PROJECT NUMBER: CWF17-444-11

DATE: JULY 2019

SCALE: AS SHOWN
FIELD BOOK:

ACAD: XX

LAYOUT: Add_Alt -2



ESTIMATED QUANTITIES
BIG ED NEAL ADD / ALT. #3

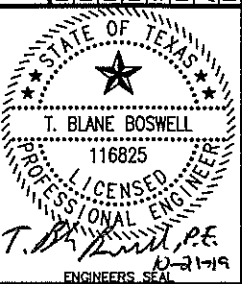
	ROADWAY ITEMS					UTILITY ITEMS	PAVEMENT MARKING ITEMS		EROSION CONTROL ITEMS	LANDSCAPE ITEMS	
LOCATION	110 6004	132 6002	360 6028	531 6004	531 6013	7056 6064	668 6085	678 6016	160 6002	168 6001	7154 6042
	EXCAVATION (ROADWAY AND CHANNEL)	EMBANKMENT (FINAL)(DENS CONT)(TY A)	CONC PAV (JOINT REINF) (6")	CURB RAMPS (TY 1)	CURB RAMPS (TY 10)	ADJUST EXIST WATER VALVE	PREFAB PAV MRK TY C (W) (WORD)	PAV SURF PREP FOR MRK (WORD)	FURNISHING AND PLACING TOPSOIL (6")	VEGETATIVE WATERING	SEEDING, HYDROMULCH
	CY	CY	SY	EA	EA	EA	EA	EA	STA	MG	SY
B.E.N SPUR 0+00 TO 6+96	85	6	786	1	1	2	3	3	6.96	19.78	547
PROJECT TOTALS	85	6	786	1	1	2	3	3	6.96	19.78	547

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

ESTIMATED QUANTITIES
BIG ED NEAL ADD / ALT.#3

NO. DATE DESCRIPTION

PROJECT MANAGER: ALAN PEREGRINO
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: JULY 2019
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: Add_Alt -3



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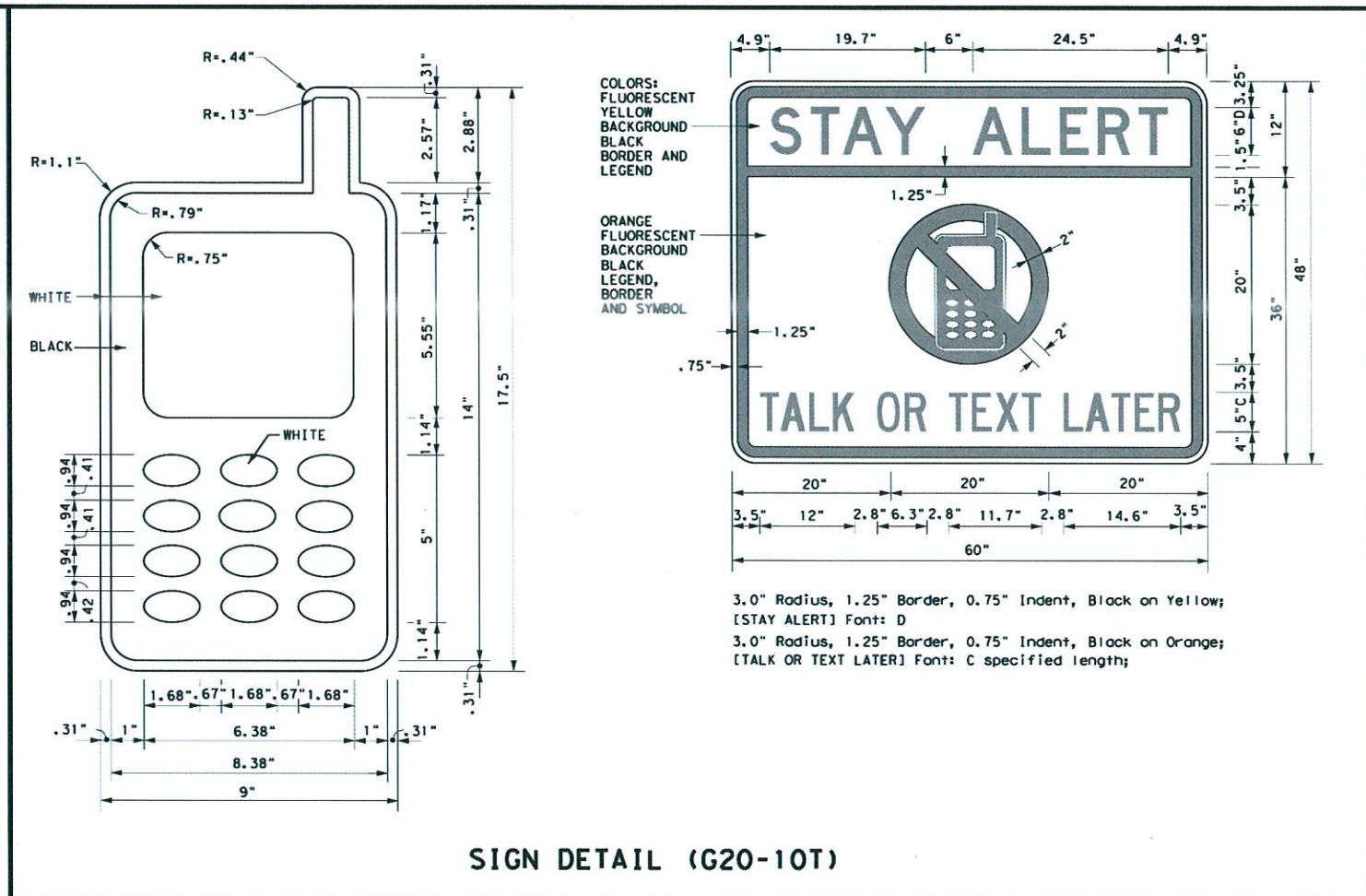
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FILE:

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

- 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).
- The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.
- 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.
- The Engineer has the final decision on the location of all traffic control devices.
- 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:

- 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," or equivalent revisions, and labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.

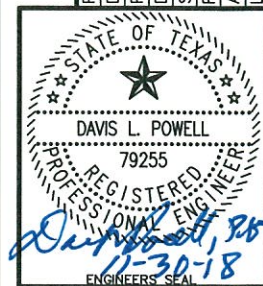


Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found on-line at the web address given below or by contacting:

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

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

SHEET 1 OF 12		Traffic Operations Division Standard	
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS			
BC(1)-14			
FILE: bc-14.dgn	DN: TxDOT	CR: TxDOT	DR: TxDOT
© TxDOT November 2002	CONF	SECT	JOB
REVISIONS			
4-03 5-10 8-14			
9-07 7-13			
DIST	COUNTY	SHEET NO.	



HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11
BARRICADE AND CONSTRUCTION - 1
BC(1) - 14

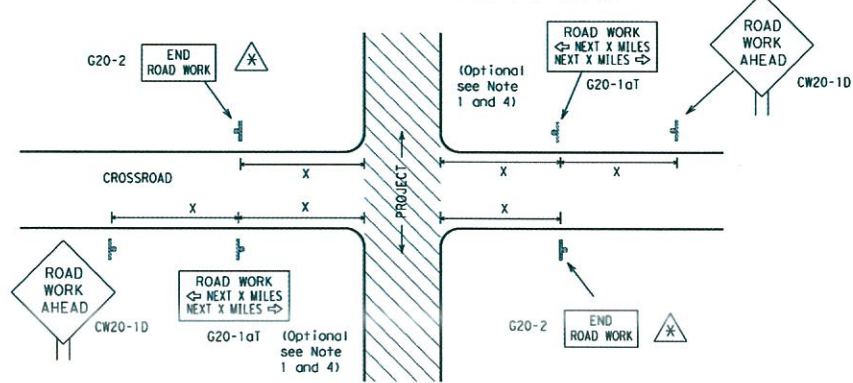
PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: BC(1)-14

NO.	DATE	DESCRIPTION	BY



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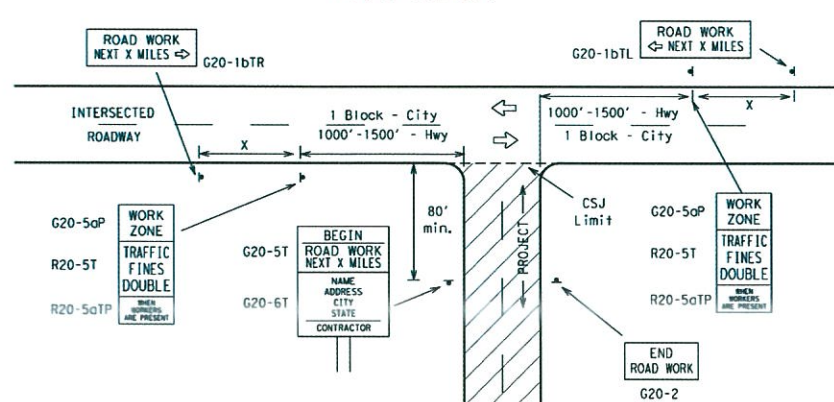
TYPICAL LOCATION OF CROSSROAD SIGNS



△ May be mounted on back of "ROAD WORK AHEAD" (CW20-1D) sign with approval of Engineer. (See Note 2 below)

- The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D) sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
- The Engineer may use the reduced size 36" x 36" "ROAD WORK AHEAD" (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK" (G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume. This information shall be shown in the plans.
- 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.
- The "ROAD WORK NEXT X MILES" (G20-1aT) sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
- Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
- 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

- 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.
- If construction closes the road at a T-intersection the Contractor shall place the "CONTRACTOR NAME" (G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow (G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR) signs shall be replaced by the detour signing called for in the plans.

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING^{1,5,6}

Sign Number or Series	SIZE		SPACING	
	Conventional Road	Expressway/ Freeway	Posted Speed MPH	Sign Spacing "X" Feet (Approx.)
CW20 ⁴	48" x 48"	48" x 48"	30	120
CW21			35	160
CW22			40	240
CW23			45	320
CW25	36" x 36"	48" x 48"	50	400
CW1, CW2, CW7, CW8, CW9, CW11, CW14			55	500 ²
			60	600 ²
			65	700 ²
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	70	800 ²
			75	900 ²
			80	1000 ²
			*	*

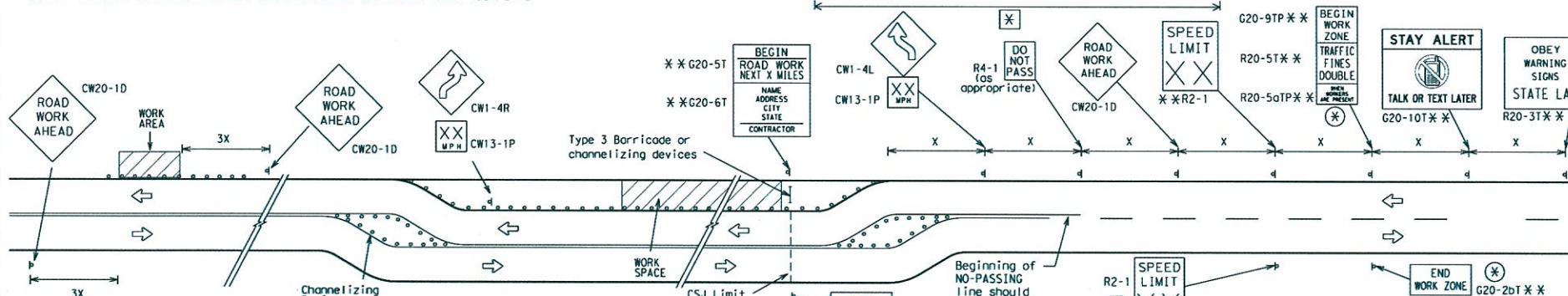
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

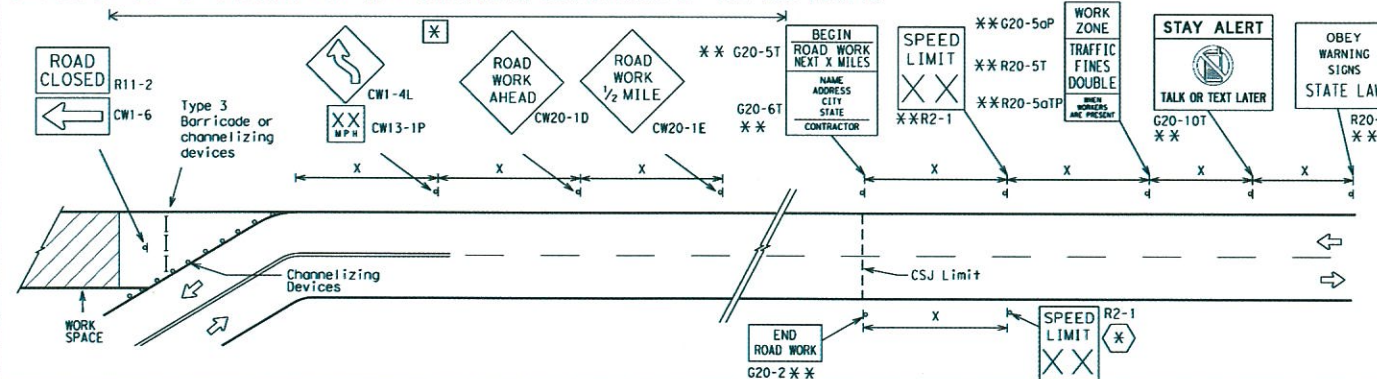
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



NOTES

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

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

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

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

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

LEGEND

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

SHEET 2 OF 12

Texas Department of Transportation
Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

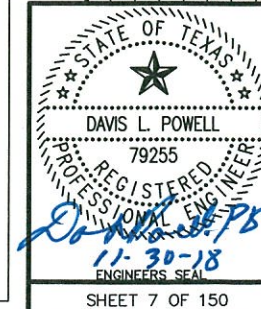
BC(2)-14

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CONT	SECT	JOB	HIGHWAY	
REV	DATE	BY	CHK	DATE
9-07	8-14			
7-13				

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

BARRICADE AND CONSTRUCTION - 2
BC(2) - 14

PROJECT MANAGER: TW
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK: ACAD: XX
LAYOUT: BC(2)-14



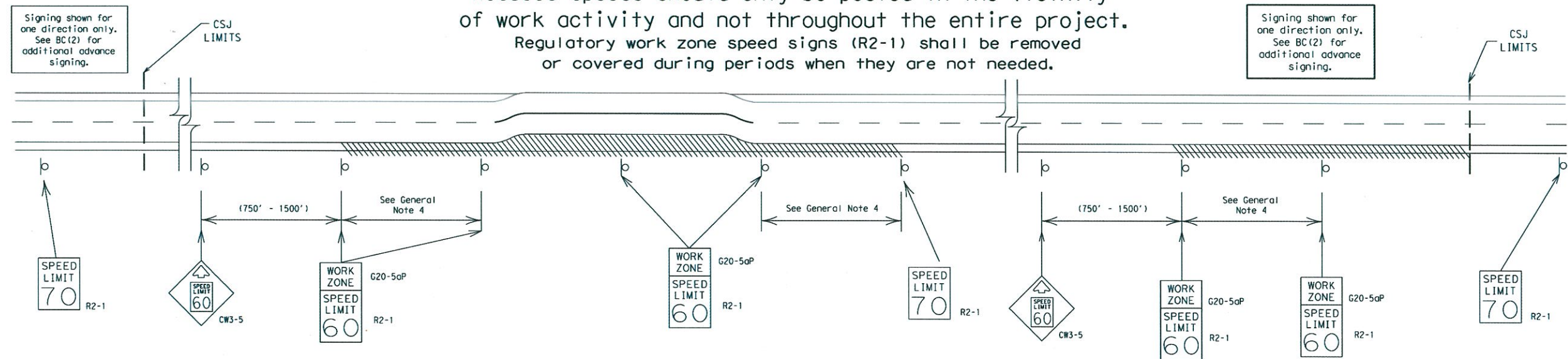
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DATE:
FILE:

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:

- rough road or damaged pavement surface
- substantial alteration of roadway geometrics (diversions)
- construction detours
- grade
- width
- other conditions readily apparent to the driver

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

SHORT TERM WORK ZONE SPEED LIMITS

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

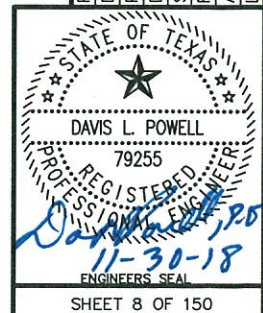
Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered. (See Removing or Covering on BC(4)).

GENERAL NOTES

- Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- 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
- Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
- Fabrication, erection and maintenance of the "ADVANCE SPEED LIMIT" (CW3-5) sign, "WORK ZONE" (G20-5aP) plaque and the "SPEED LIMIT" (R2-1) signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
- Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
- 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.
- Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
- For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

SHEET 3 OF 12

		Traffic Operations Division Standard	
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT			
BC(3) - 14			
FILE: bc_14.dgn	DATE: 11/29/2018	BY: TW	CHECKED: TW
REVISIONS	NO. 1	DATE	DESCRIPTION
9-07	8-14		
7-13			
DIST	COUNTY	SHEET NO.	



HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

BARRICADE AND CONSTRUCTION - 3
BC(3) - 14

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: BC(3)-14

NO.	DATE	DESCRIPTION	BY



\\Antares2\Share\EngDrafters\Terry Walters\Land Projects\Land Projects 2017\Trail by the Railroad\Draw\trail.dwg, Bc(4)-14, 11/29/2018 1:34:08 PM

✖ ✖ 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

Support shall not protrude above sign

Support shall not protrude above sign

Sign supports shall extend more than 1/2 way up the back of the sign substrate.

FRONT ELEVATION
Wood, metal or
Fiber Reinforced Plastic

OR

Nails shall NOT be allowed.

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

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 MUTCD.



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.

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

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.)

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.

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

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 CW2TC2 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 joining the sign face.


1. All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
2. White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
3. Orange sheeting, meeting the requirements of DMS-8300 Type B₁ or Type C₁, shall be used for rigid signs with orange backgrounds.

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.


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

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

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

 Texas Department of Transportation

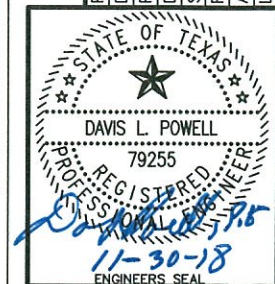
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9-07 8-14				
7-13	DIST		COUNTY	SHEET NO.

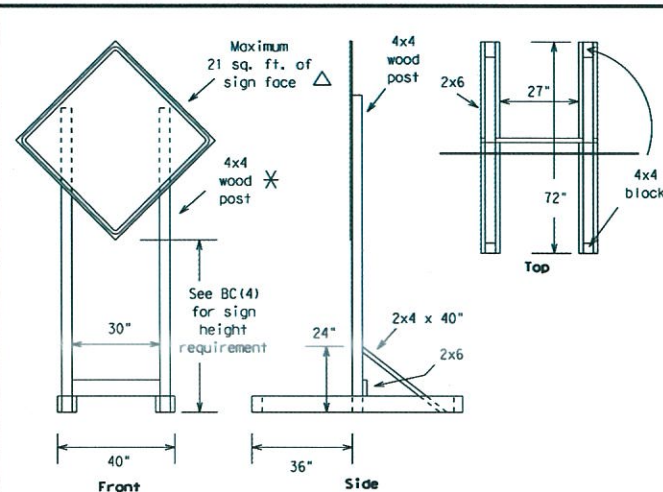
BARRICADE AND CONSTRUCTION - 4
BC (4) - 14

Wichita Falls
TEXAS
Blue Skies, Green Grass, Red Dirt

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: C
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: BC(4)-14

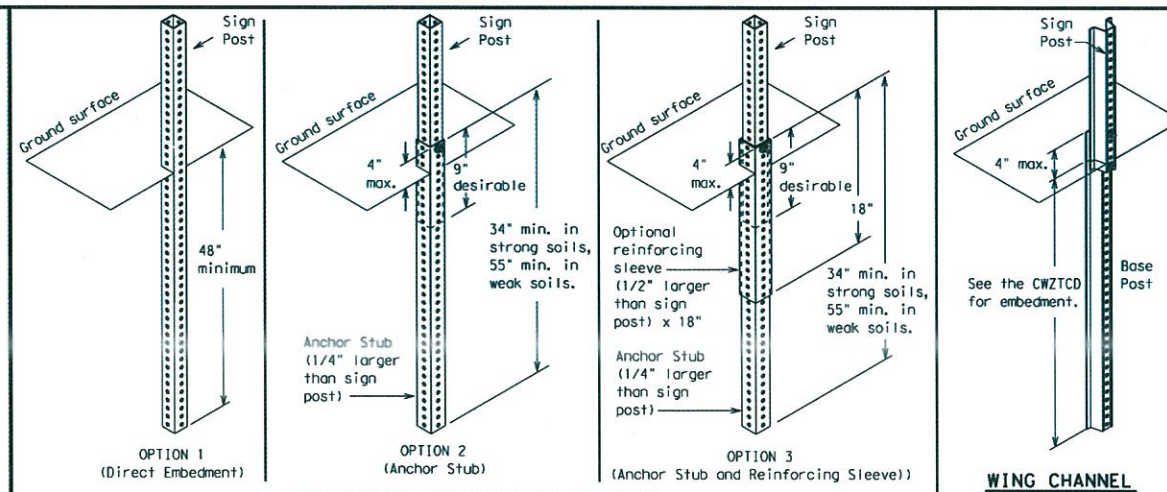
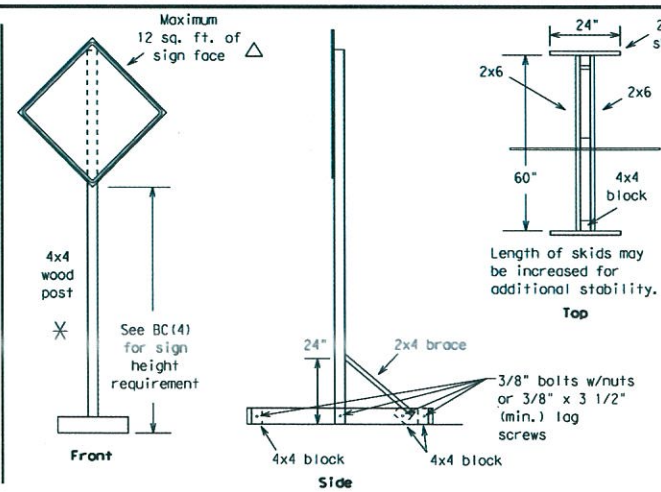


SHEET 9 OF 150



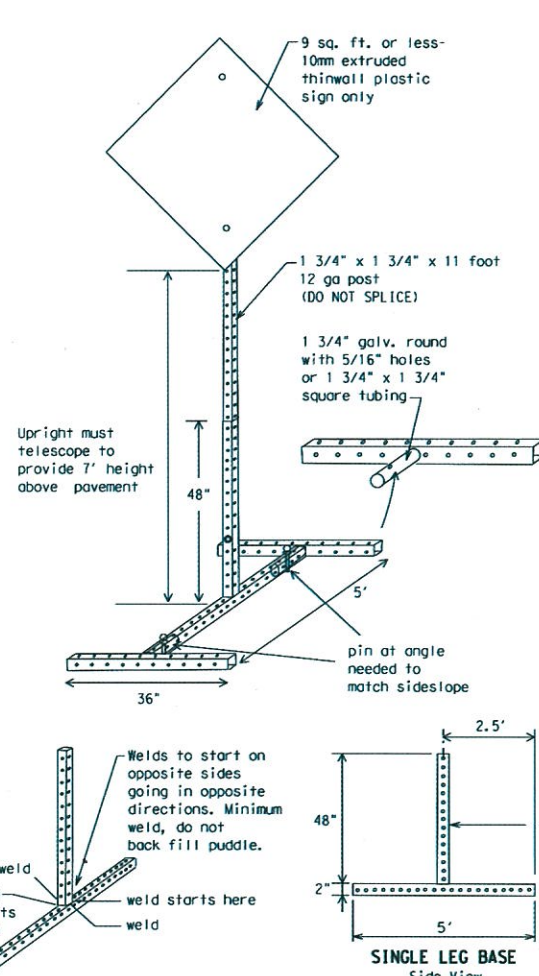
SKID MOUNTED WOOD SIGN SUPPORTS

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

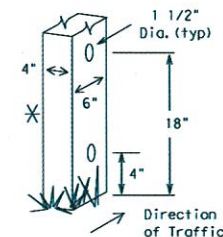
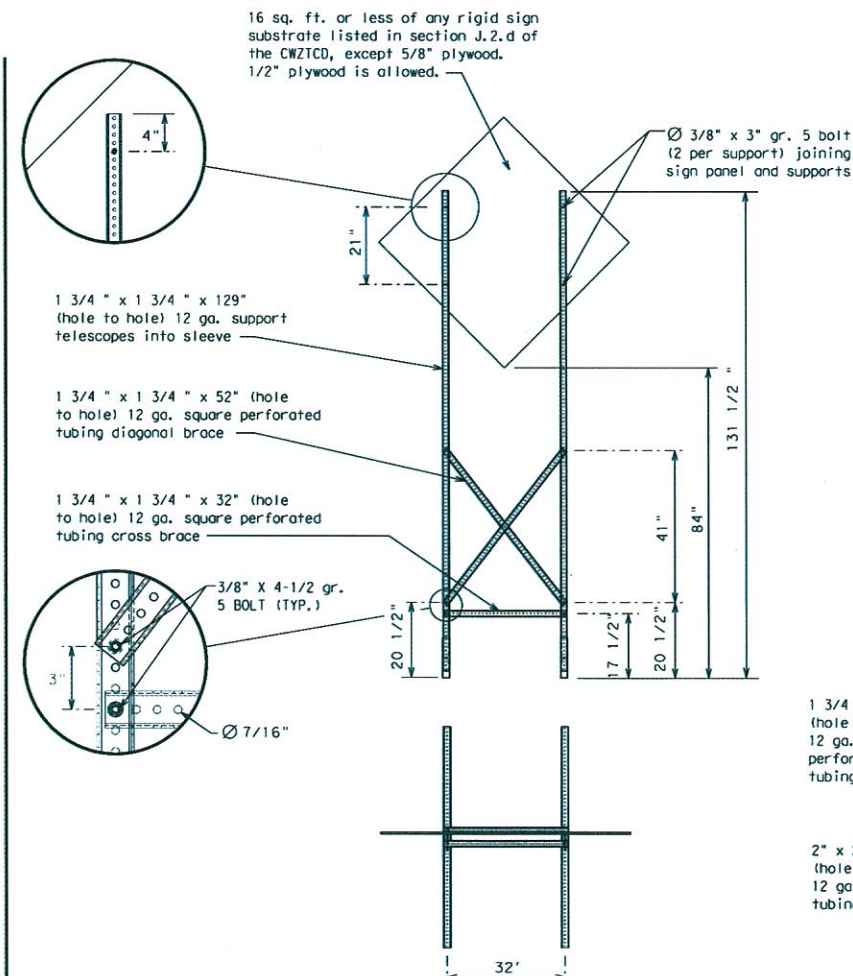


GROUND MOUNTED SIGN SUPPORTS

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

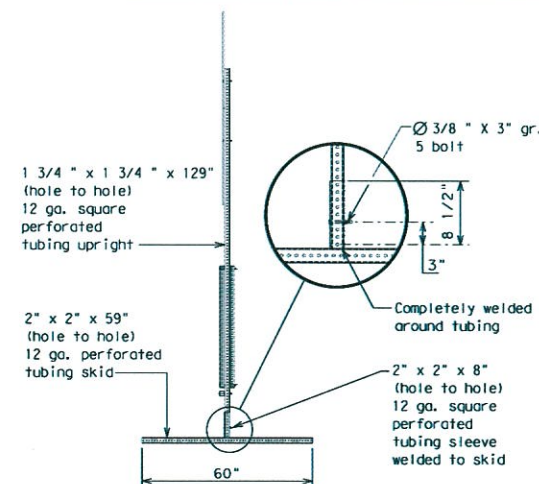


SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS



WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS

Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Holes 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



WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

SHEET 5 OF 12



Texas Department of Transportation

**Traffic
Operations
Division
Standard**

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC (5) - 14

FILE:	bc-14.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	X
© TxDOT	November 2007	CONT	SECT	JOB		HIGHWAY			
REVISIONS									
9-07	8-14	DIST	COUNTY				SHEET NO.		
7-13									

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

BARRICADE AND CONSTRUCTION - 5
BC (5) - 14

PROJECT MANAGER:

DRAWN BY: TW

PROJECT NUMBER: C
DATE: DEC 2018

DATE: DEC 2018
SCALE: AS SHOWN

FIELD BOOK:

ACAD: XX
LAYOUT: BC(5)-14

STATE OF TEXAS
★
DAVIS L. POWELL
79255
REGISTERED PROFESSIONAL ENGINEER
11-30-18
ENGINEERS SEAL

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DATE: FILE:

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

PORTABLE CHANGEABLE MESSAGE SIGNS

- The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
- 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.
- 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.
- Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
- Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
- When in use the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
- 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.
- 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. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
- 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.
- Do not use the word "Danger" in message.
- Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
- Do not display messages that scroll horizontally or vertically across the face of the sign.
- The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMDOT.
- PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
- Each line of text should be centered on the message board rather than left or right justified.
- If disabled, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Major	MAJ
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Best Route	BEST RTE	Minor	MNR
Boulevard	BLVD	Monday	MON
Bridge	BRDG	Normal	NORM
Cannot	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking	PKNG
CROSSING	XING	Road	RD
Detour Route	DETOUR RTE	Right Lane	RT LN
Do Not	DONT	Saturday	SAT
East	E	Service Road	SERV RD
Eastbound	(route) E	Shoulder	SHLDR
Emergency	EMER	Slippery	SLIP
Emergency Vehicle	EMER VEH	South	S
Entrance, Enter	ENT	Southbound	(route) S
Express Lane	EXP LN	Speed	SPD
Expressway	EXPWY	Street	ST
XXXX Feet	XXXX FT	Sunday	SUN
Fog Ahead	FOG AHD	Telephone	PHONE
Freeway	FRWY, FWY	Temporary	TEMP
Freeway Blocked	FWY BLKD	Thursday	THURS
Friday	FRI	To Downtown	TO DWTN
Hazardous Driving	HAZ DRIVING	Traffic	TRAF
Hazardous Material	HAZMAT	Travelers	TRVLRS
High-Occupancy	HOV	Tuesday	TUES
Vehicle	VEH	Time Minutes	TIME MIN
Highway	HWY	Upper Level	UPR LEVEL
Hour(s)	HR, HRS	Vehicles (s)	VEH, VEHS
Information	INFO	Warning	WARN
It Is	ITS	Wednesday	WED
Junction	JCT	Weight Limit	WT LIMIT
Left	LFT	West	W
Left Lane	LFT LN	Westbound	(route) W
Lane Closed	LN CLOSED	Wet Pavement	WET PVMT
Lower Level	LWR LEVEL	Will Not	WONT
Maintenance	MAINT		

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES
(The Engineer may approve other messages not specifically covered here.)

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

- Only 1 or 2 phases are to be used on a PCMS.
- The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
- A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
- A Location Phase is necessary only if a distance or location is not included in the first phase selected.
- 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.
- 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.

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

FULL MATRIX PCMS SIGNS

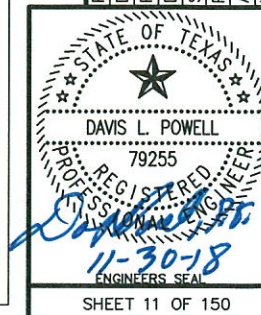
- When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
- When symbol signs, such as the "Flagger Symbol" (CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
- 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.
- A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

WORDING ALTERNATIVES

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

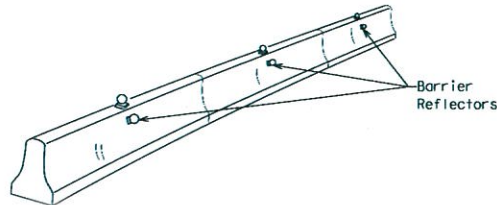
SHEET 6 OF 12

Texas Department of Transportation		Traffic Operations Division Standard	
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)			
BC (6) - 14			
FILE: bc-14.dgn	DATE: 11/29/2018	CHK: TxDOT	CHK: TxDOT
© TxDOT November 2002	COM: SECT	JOB: HIGHWAY	REVISIONS
9-07 8-14	DIST: COUNTY: SHEET NO.		
7-13			



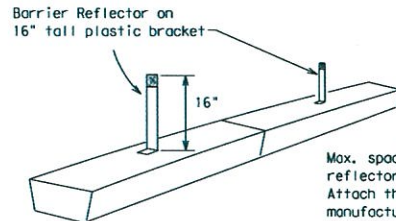
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(11).
- Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



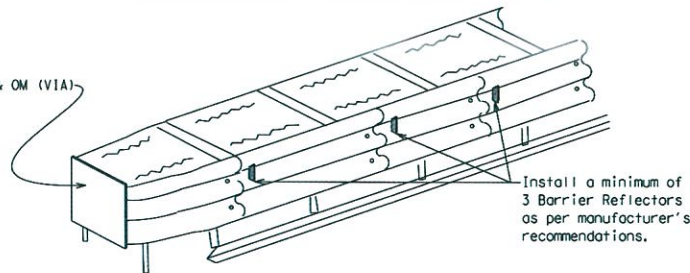
CONCRETE TRAFFIC BARRIER (CTB)

- 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.
- 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.
- When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
- Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
- Maximum spacing of Barrier Reflectors is forty (40) feet.
- Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
- Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
- Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
- Single slope barriers shall be delineated as shown on the above detail.



LOW PROFILE CONCRETE BARRIER (LPCB)

See D & OM (VIA)



DELINEATION OF END TREATMENTS

END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS

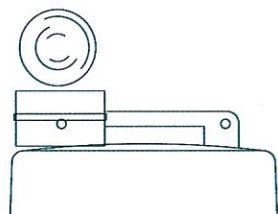
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B_L or C_L Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
- 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".
- The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
- 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.
- 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.
- The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

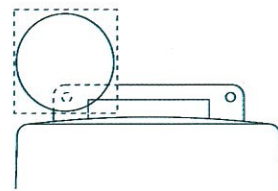
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing 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.
- 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.
- Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
- Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
- 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

- 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.
- 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.
- The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
- Round reflectors shall be fully reflectorized, including the area where attached to the drum.
- 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.
- The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type B or Type C.
- When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
- The warning reflector should be mounted on the side of the handle nearest approaching traffic.
- The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.



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

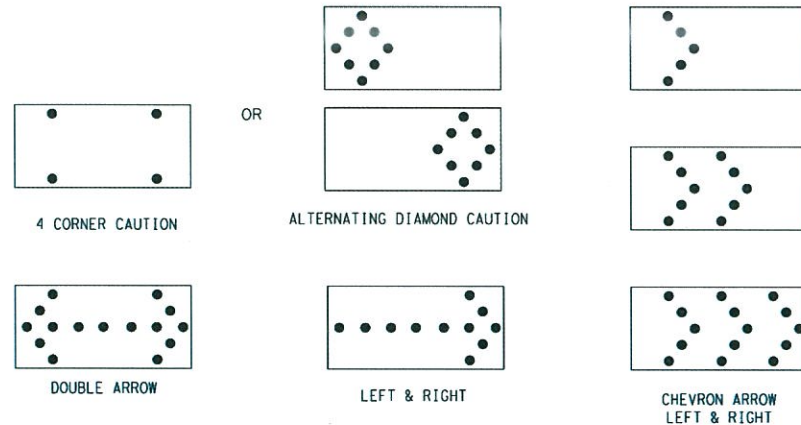


Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

DATE: FILE:

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

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



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

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

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

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

FLASHING ARROW BOARDS

SHEET 7 OF 12

TRUCK-MOUNTED ATTENUATORS

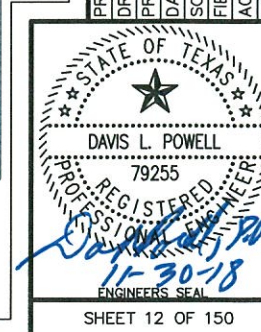
- Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350) or the Manual for Assessing Safety Hardware (MASH).
- Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
- Refer to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



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

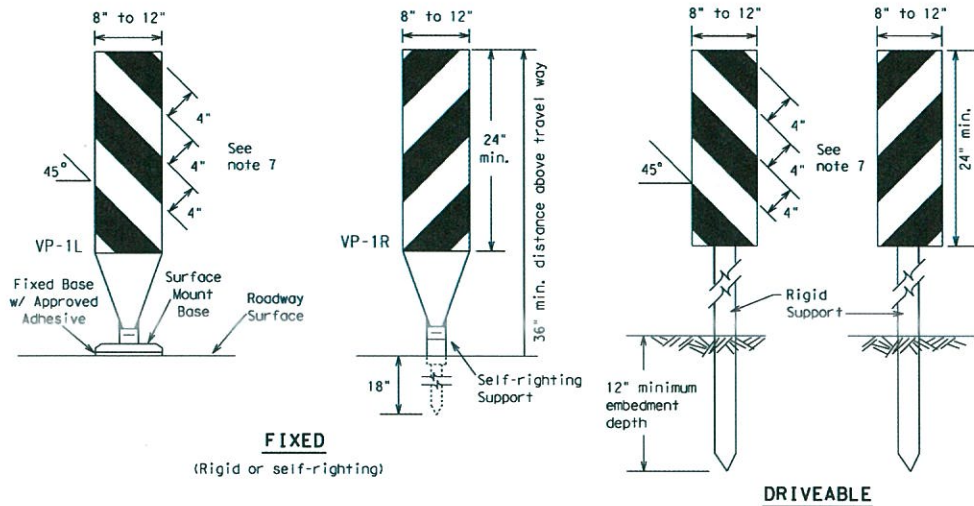
BC (7) - 14

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9-07 8-14				
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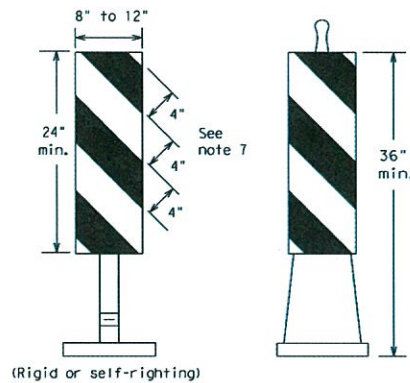


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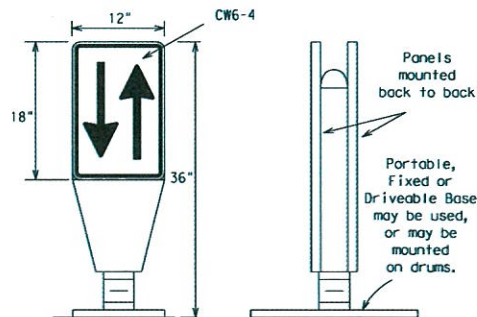
FIXED
(Rigid or self-righting)



PORTABLE

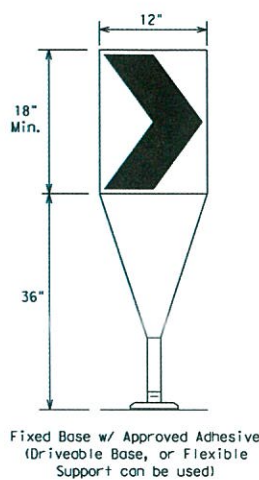
VERTICAL PANELS (VPs)

- Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
- 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.
- 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.
- VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
- Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- Sheeting for the VP's shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
- Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.



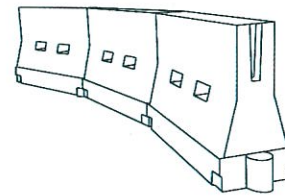
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

- 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.
- The OTLD may be used in combination with 42" cones or VPs.
- Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
- The OTLD shall be orange with a black non-reflective legend. Sheeting for the OTLD shall be retroreflective Type B_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.



- The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
- 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.
- 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.
- To be effective, the chevron should be visible for at least 500 feet.
- Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
- For Long Term Stationary use on tapers or transitions on freeways and divided highways self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

CHEVRONS



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

- 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.
- 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.
- 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.
- 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.
- When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

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

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

GENERAL NOTES

- 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).
- 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.
- 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).
- 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.
- Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
- 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.
- 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.

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (9) - 14

FILE: bc-14.dgn	EN: 1x00'	CH: 1x00'	DR: 1x00'	CR: 1x00'
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				
9-07 8-14				
7-13				
	DIST	COUNTY		SHEET NO.

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

BARRICADE AND CONSTRUCTION - 9

BC (9) - 14

PROJECT MANAGER:

DRAWN BY: TW

PROJECT NUMBER: CWF17-444-11

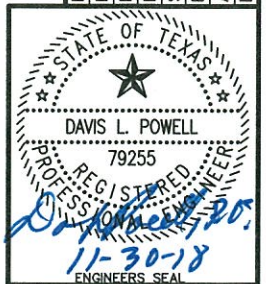
DATE: DEC 2018

SCALE: AS SHOWN

FIELD BOOK:

ACAD: XX

LAYOUT: BC(9)-14



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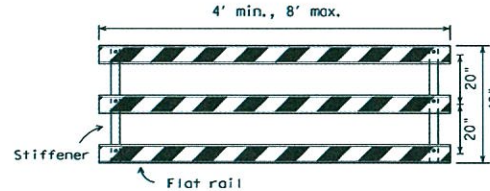
TYPE 3 BARRICADES

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

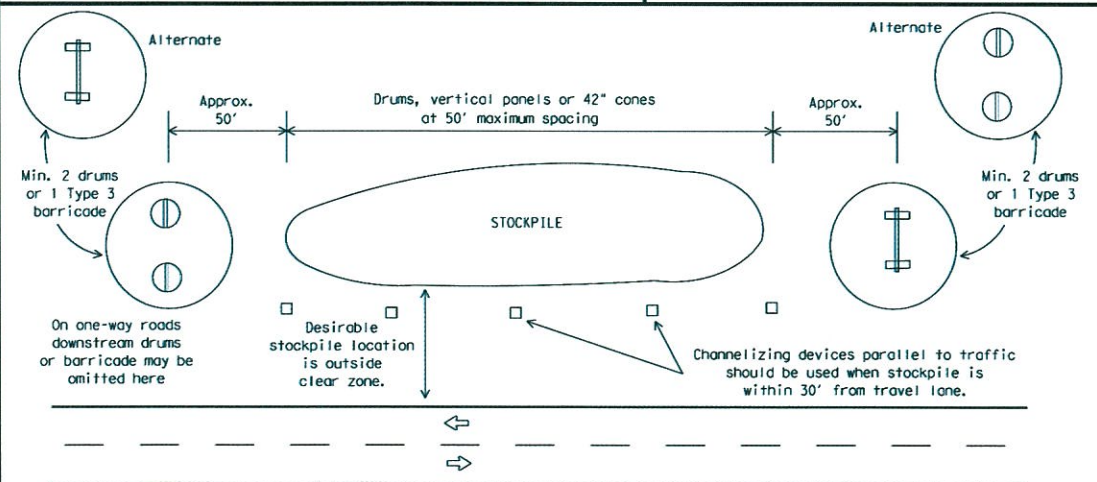
Barricades shall NOT be used as a sign support.



TYPICAL STRIPING DETAIL FOR BARRICADE RAIL

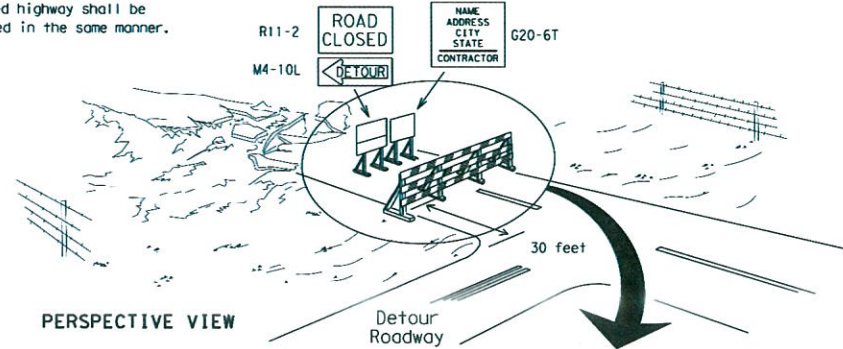


TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

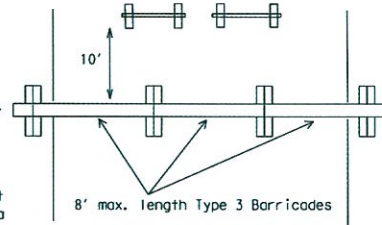
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

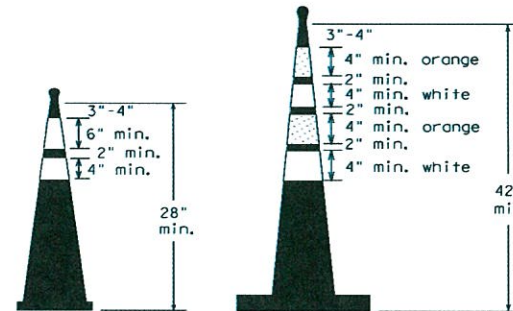
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.

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



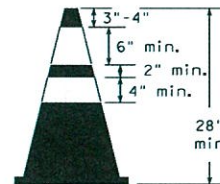
PLAN VIEW

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



Two-Piece cones

CONES



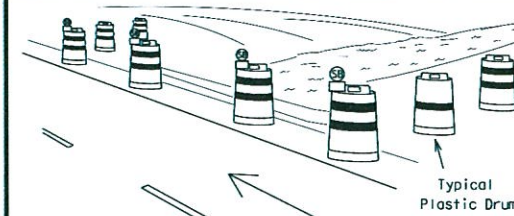
One-Piece cones



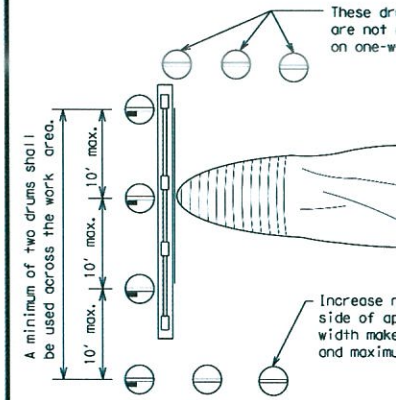
Tubular Marker

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



PERSPECTIVE VIEW



PLAN VIEW

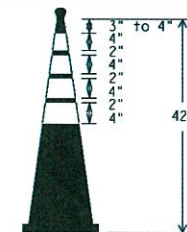
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

1. Where positive redirection 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.

LEGEND

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

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



EDGE LINE 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 A conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
4. The base must weigh a minimum of 30 lbs.

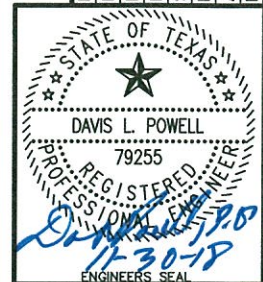
SHEET 10 OF 12

Texas Department of Transportation		Traffic Operations Division Standard	
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES			
BC (10) - 14			
FILE: bc-14.dgn	DATE: 11/20/2017	BY: TWD	CHECKED: TWD
REVISIONS: 9-07 8-14 7-13	DATE: 11/20/2017	BY: TWD	CHECKED: TWD
DIST: COUNTY: SHEET NO.		SHEET NO.	

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

BARRICADE AND CONSTRUCTION - 10
BC (10) - 14

PROJECT MANAGER: TWD
DRAWN BY: TWD
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK: ACAD: XX
LAYOUT: BC(10)-14



DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by the State of Texas or the Department of Transportation for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

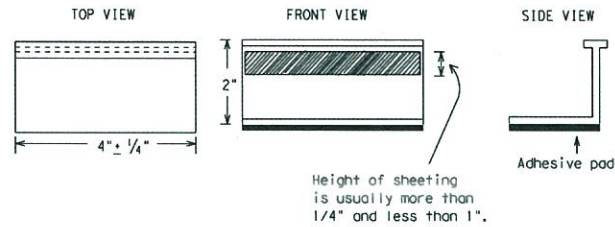
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

DEPARTMENTAL MATERIAL SPECIFICATIONS

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

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

SHEET 11 OF 12

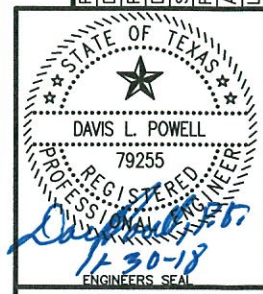


Traffic
Operations
Division
Standard

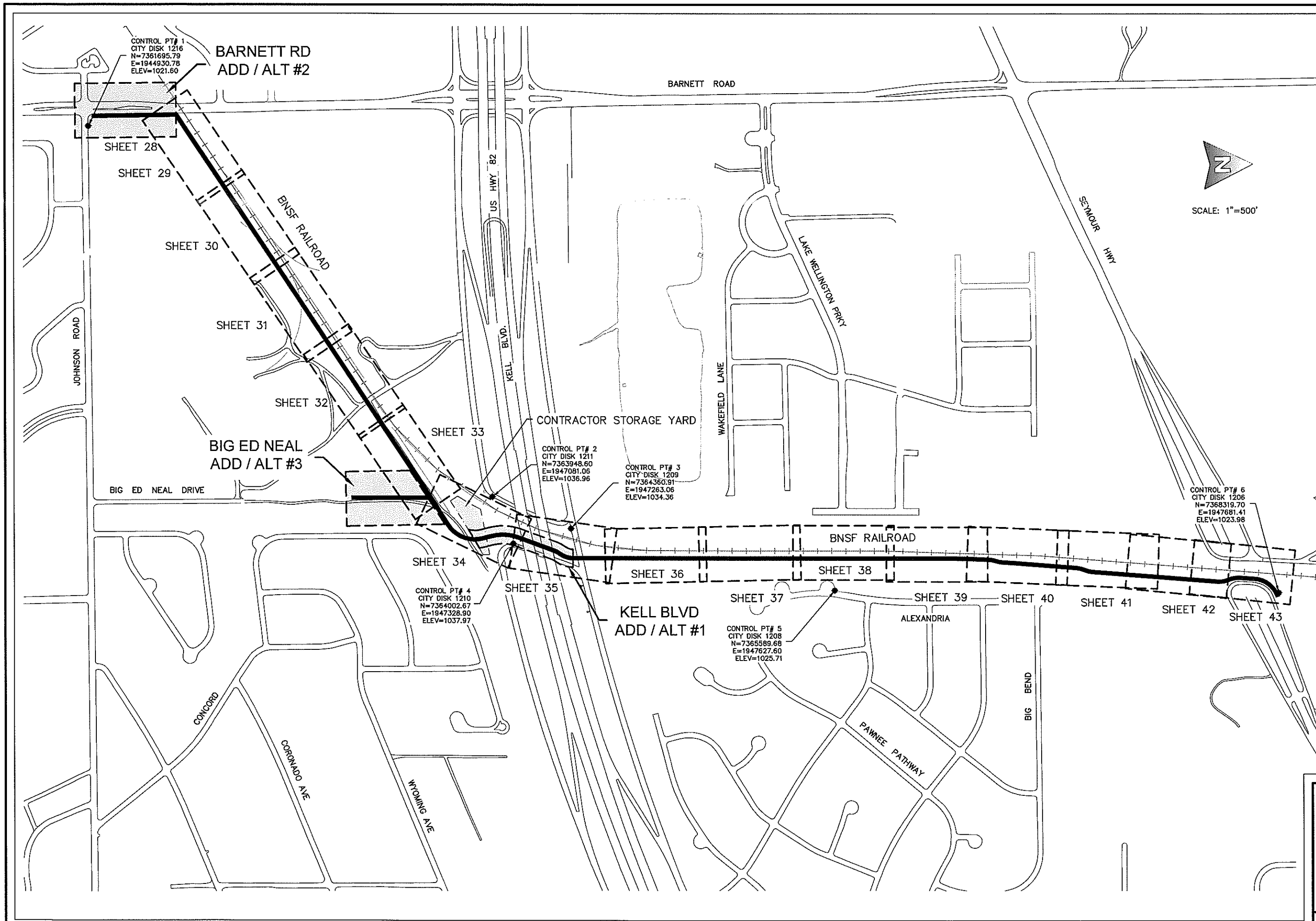
BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14


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2-98 9-07	DIST: 1	COUNTY: 1	SHEET NO: 1	
11-02 7-13				
11-02 8-14				



SHEET 16 OF 150



REVISIONS			
NO.	DATE	DESCRIPTION	BY

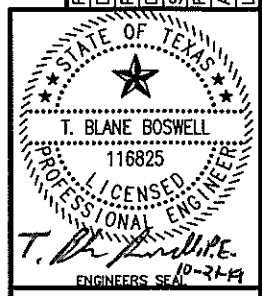


Wichita Falls
TEXAS
Blue Skies Golden Opportunities

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

SITE PLAN

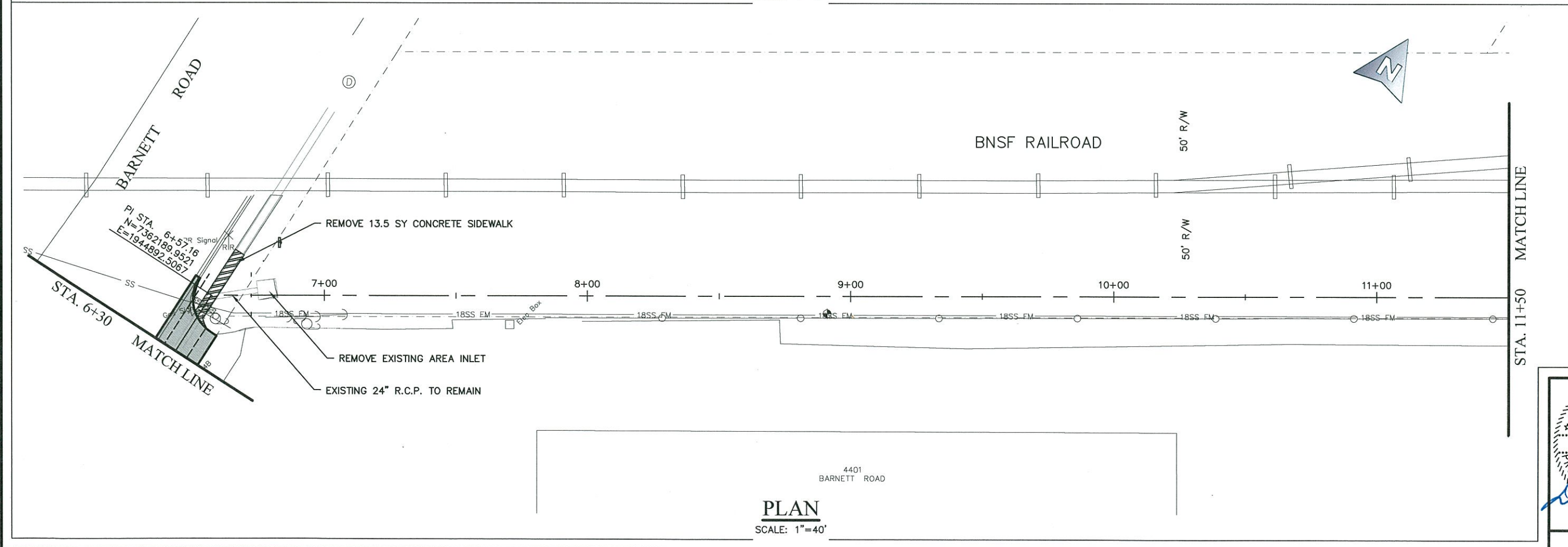
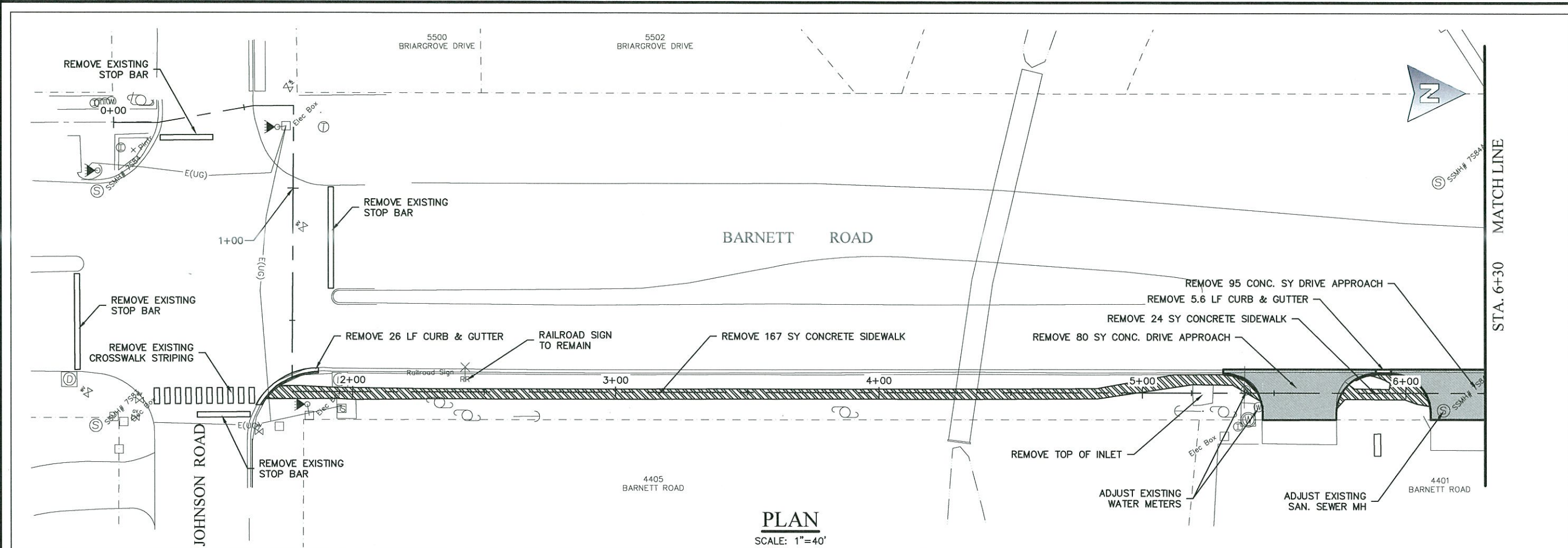
PROJECT MANAGER: ALAN PEREGRINO
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: JULY 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: SITE PLAN




STATE OF TEXAS
T. BLANE BOSWELL
116825
LICENSED PROFESSIONAL ENGINEER
T. Blane Boswell
ENGINEERS SEALED 10-24-19

SHEET 18 OF 150

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REVISIONS			
NO.	DATE	DESCRIPTION	BY




Wichita Falls
TEXAS
Blue Skies. Golden Opportunities.

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

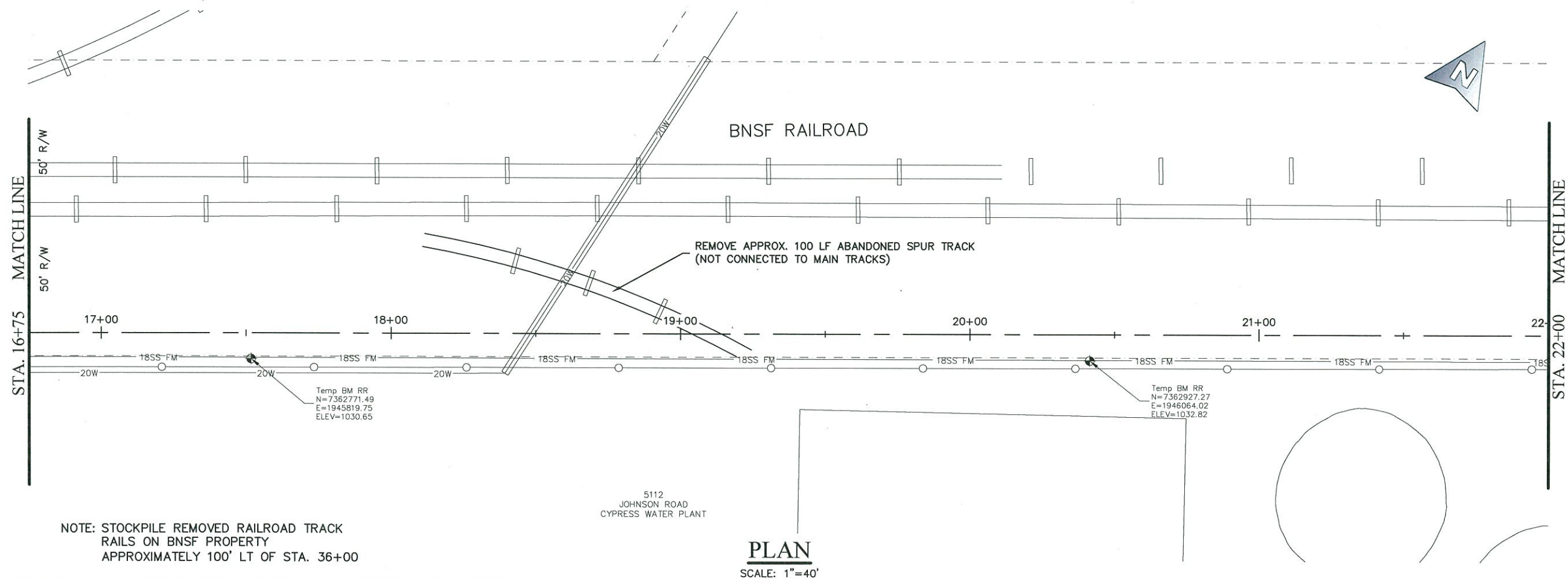
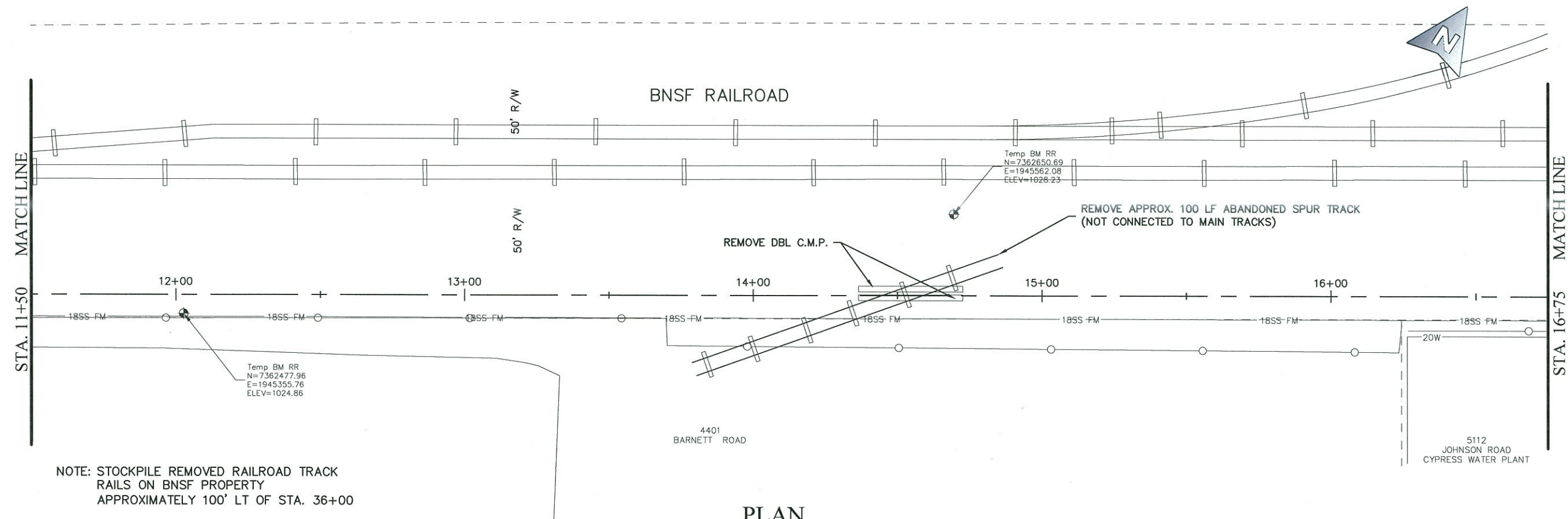
DEMOLITION - 1
STA. 0+00 TO STA. 11+50

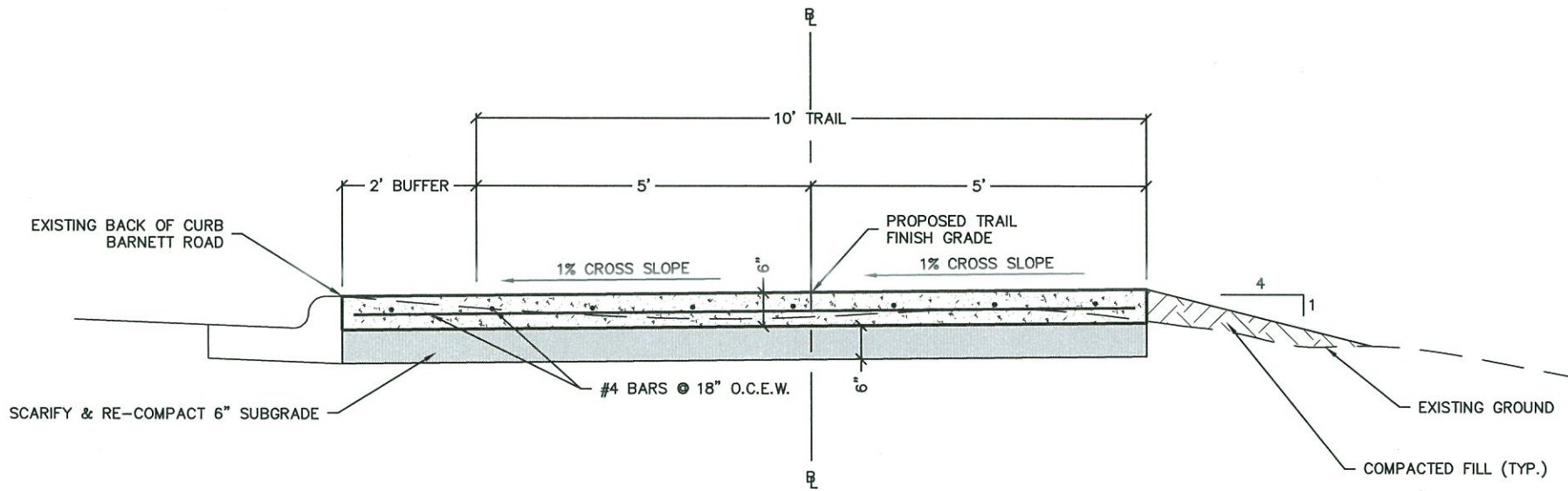
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PROJECT NUMBER: CWF17-444-11	DATE: DEC 2018
SCALE: AS SHOWN	FIELD BOOK:
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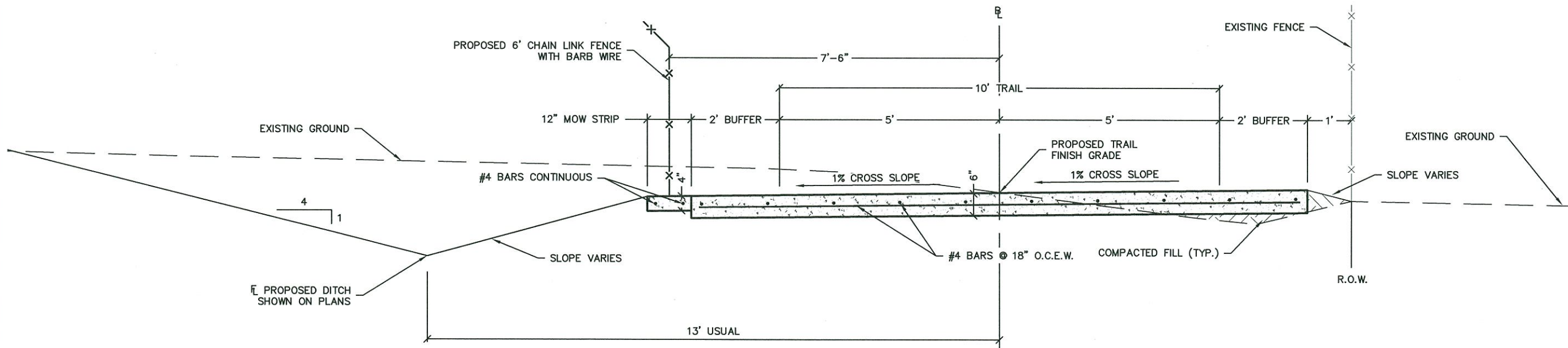
STATE OF TEXAS
DAVIS L. POWELL
79255
REGISTERED PROFESSIONAL ENGINEER
11-30-18
ENGINEERS SEAL

SHEET 19 OF 150





TYPICAL CONCRETE TRAIL SECTION
TYPE "A"
 NOT TO SCALE



TYPICAL CONCRETE TRAIL SECTION
TYPE "B"

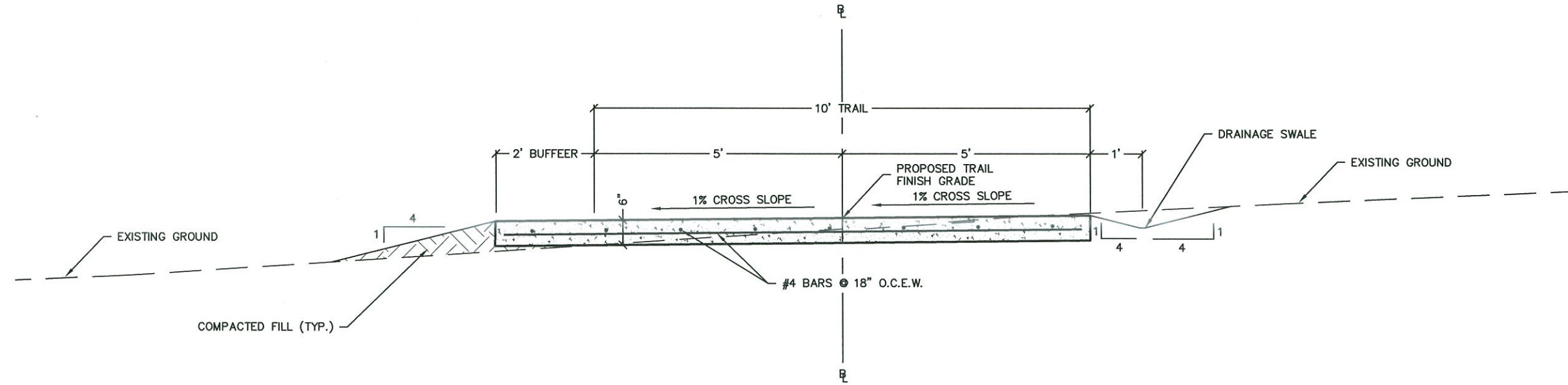
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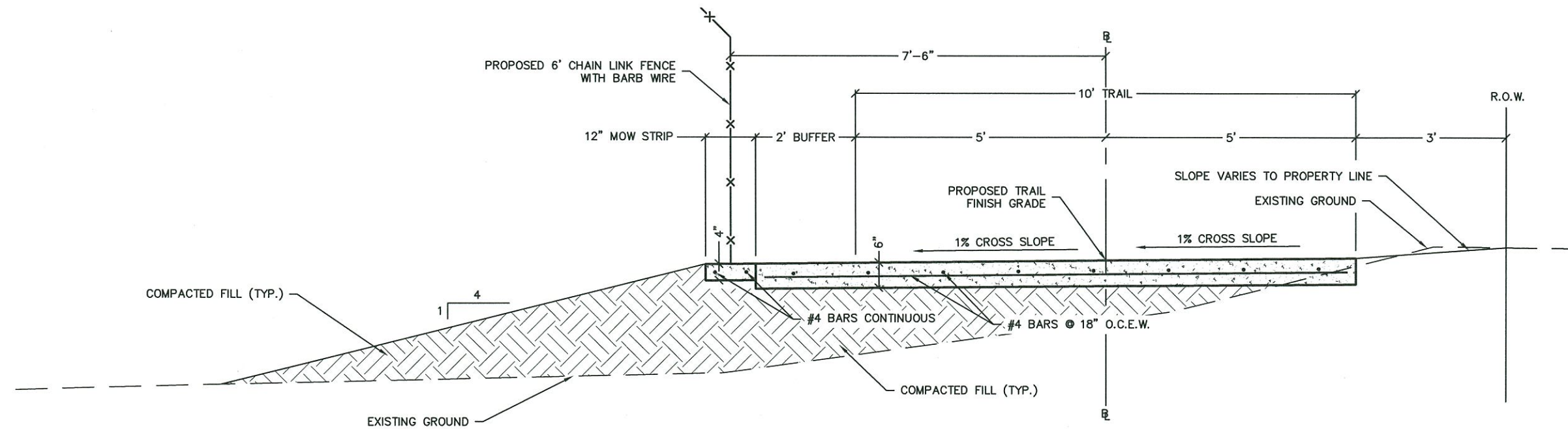
HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
 CWF17-444-11

PROJECT MANAGER:
 DRAWN BY: TW
 PROJECT NUMBER: CWF17-444-11
 DATE: DEC 2018
 SCALE: AS SHOWN
 FIELD BOOK:
 ACAD: XX
 LAYOUT: SECTIONS-1





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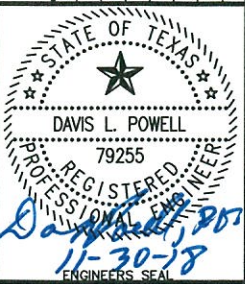


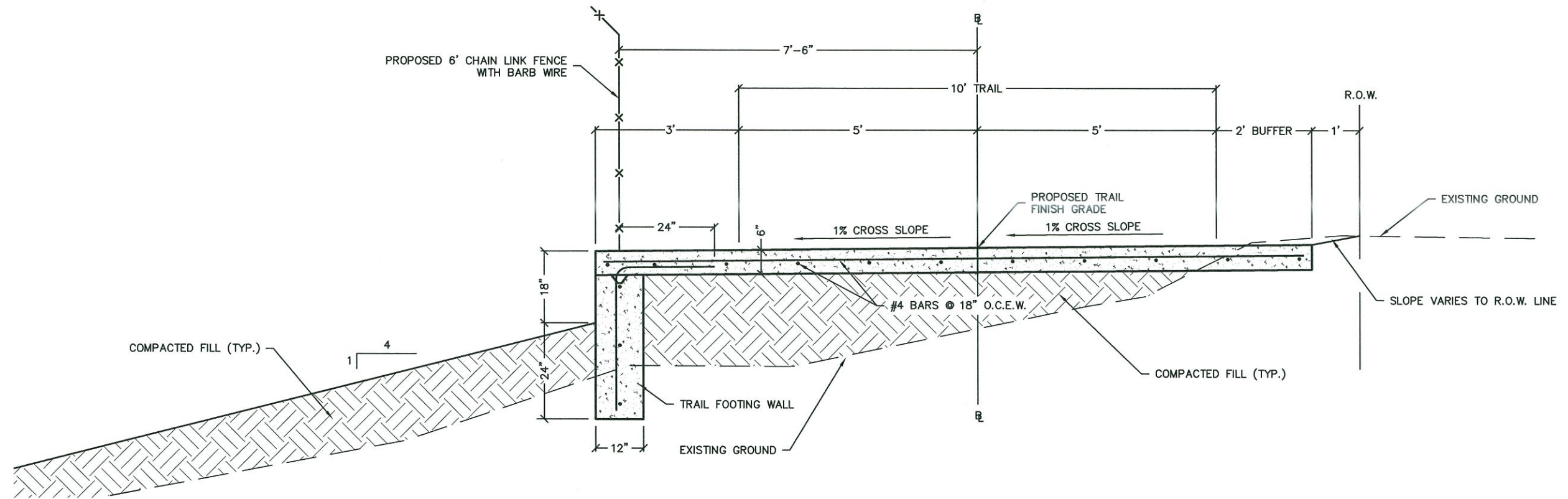
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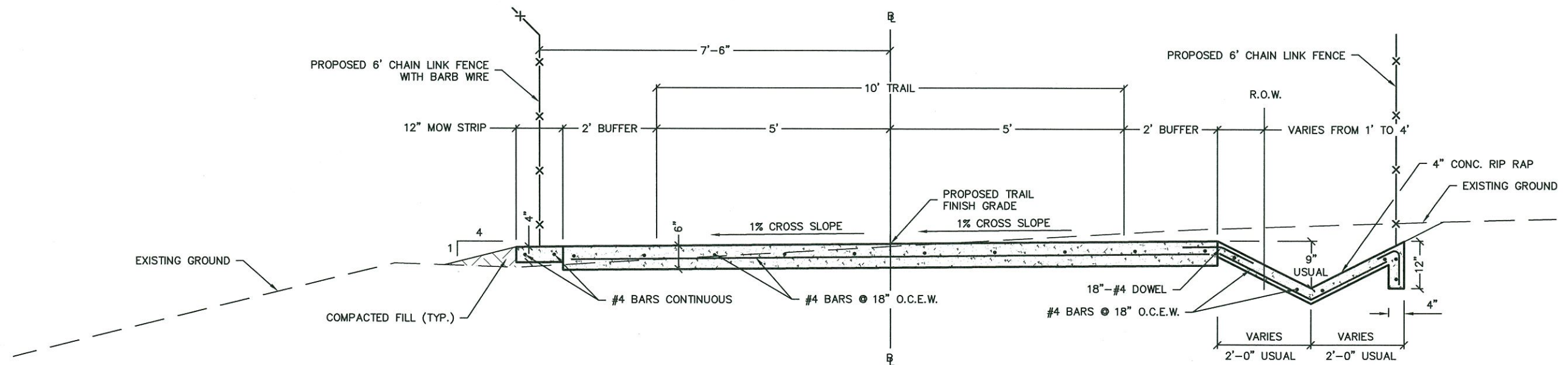
HIKE AND BIKE TRAIL
 FROM BARNETT ROAD TO SEYMOUR HWY
 CWF17-444-11
 TRAIL SECTIONS - 3

PROJECT MANAGER: TW
 DRAWN BY: TW
 PROJECT NUMBER: CWF17-444-11
 DATE: DEC 2018
 SCALE: AS SHOWN
 FIELD BOOK:
 ACAD: XX
 LAYOUT: SECTIONS-3





TYPICAL CONCRETE TRAIL SECTION
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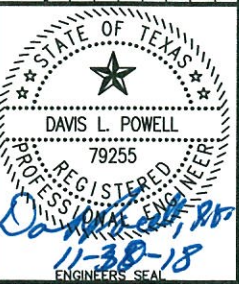
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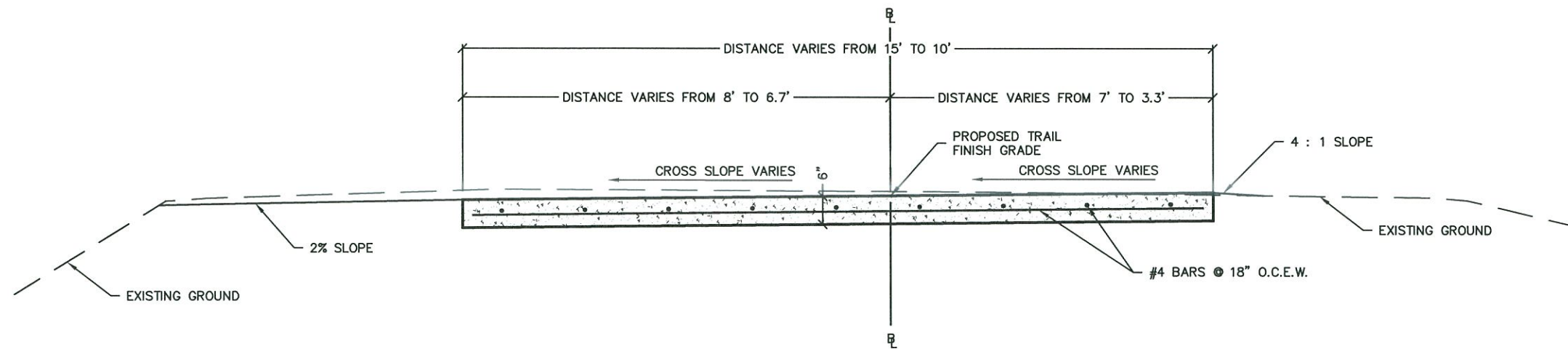


HIKE AND BIKE TRAIL
 FROM BARNETT ROAD TO SEYMOUR HWY
 CWF17-444-11

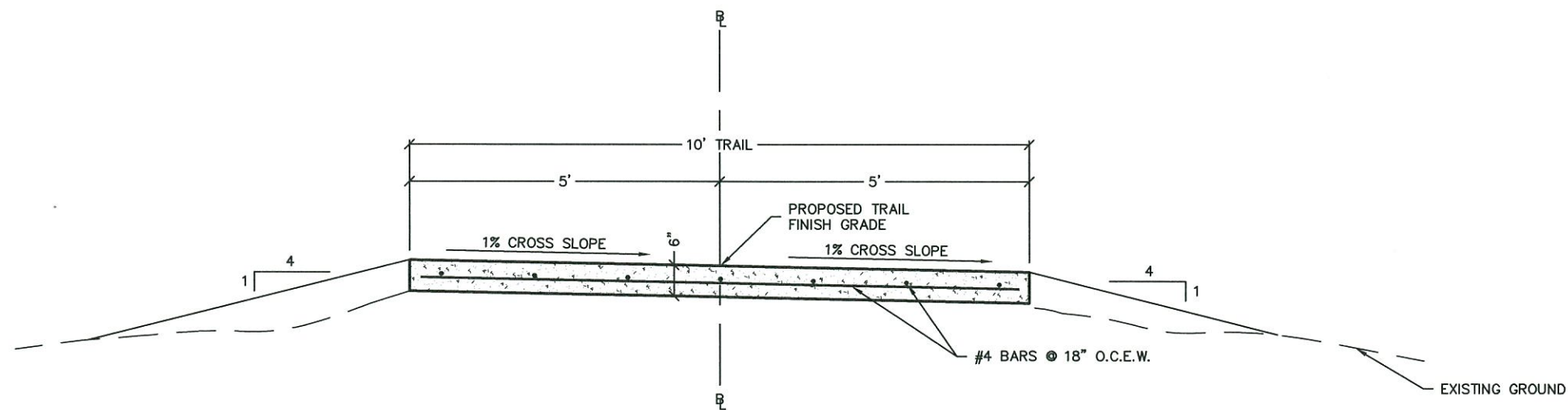
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 DRAWN BY: TW
 PROJECT NUMBER: CWF17-444-11
 DATE: DEC 2018
 SCALE: AS SHOWN
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 ACAD: XX
 LAYOUT: SECTIONS-4





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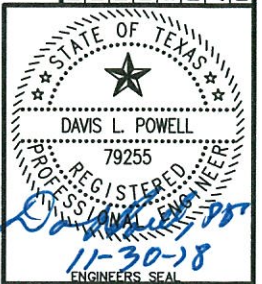


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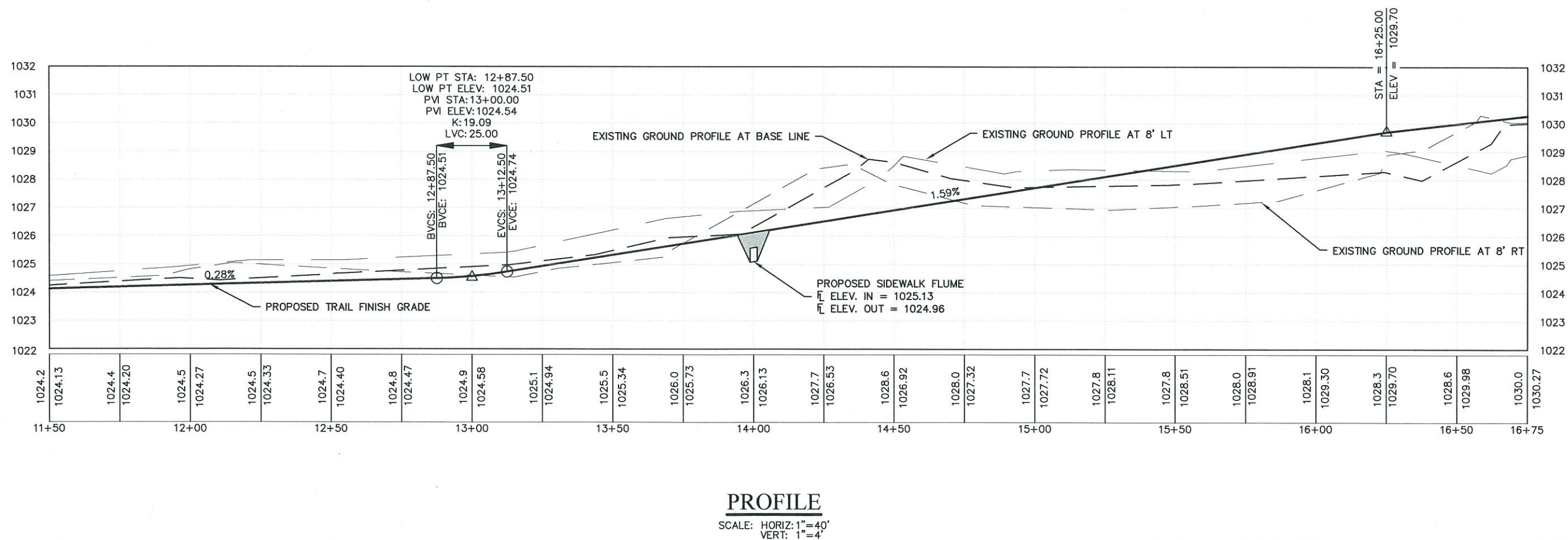
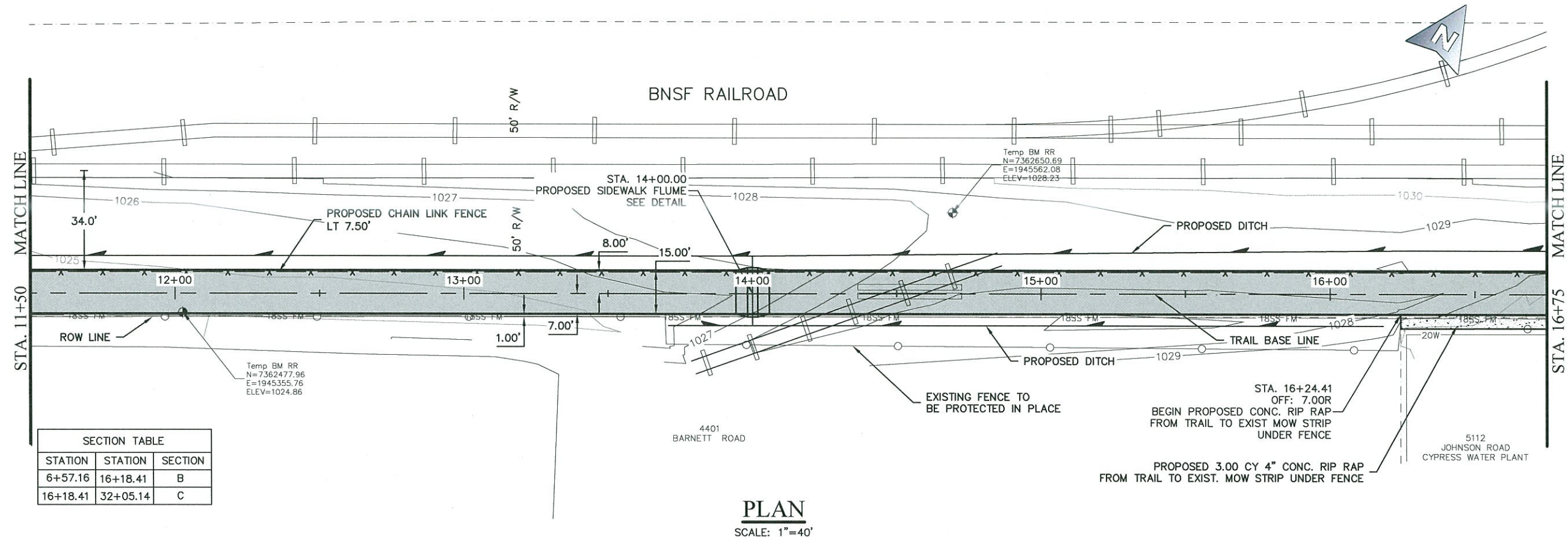
HIKE AND BIKE TRAIL
 FROM BARNETT ROAD TO SEYMOUR HWY
 CWF17-444-11

TRAIL SECTIONS - 6

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 PROJECT NUMBER: CWF17-444-11
 DATE: DEC 2018
 SCALE: AS SHOWN
 FIELD BOOK:
 ACAD: XX
 LAYOUT: SECTIONS-6



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Wichita Falls
TEXAS
Blue Skies Golden Opportunities

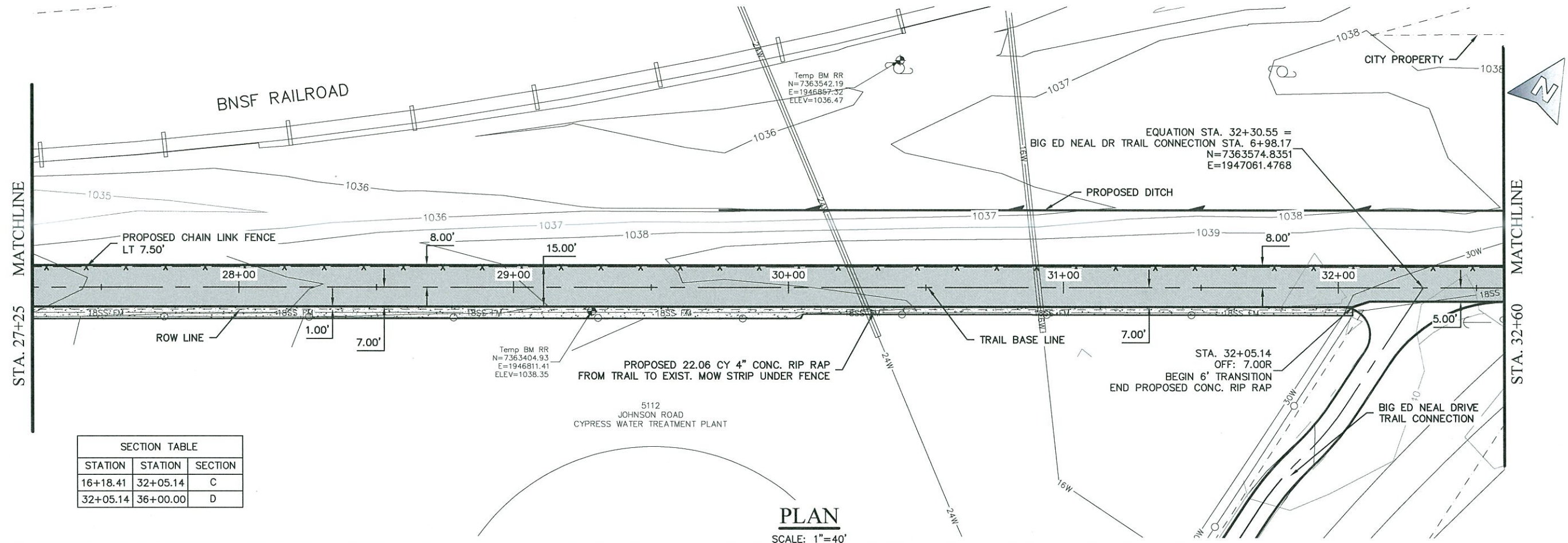
HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11
PLAN & PROFILE - 3
STA. 11+50 TO STA. 16+75

PROJECT MANAGER:
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DATE: DEC 2018
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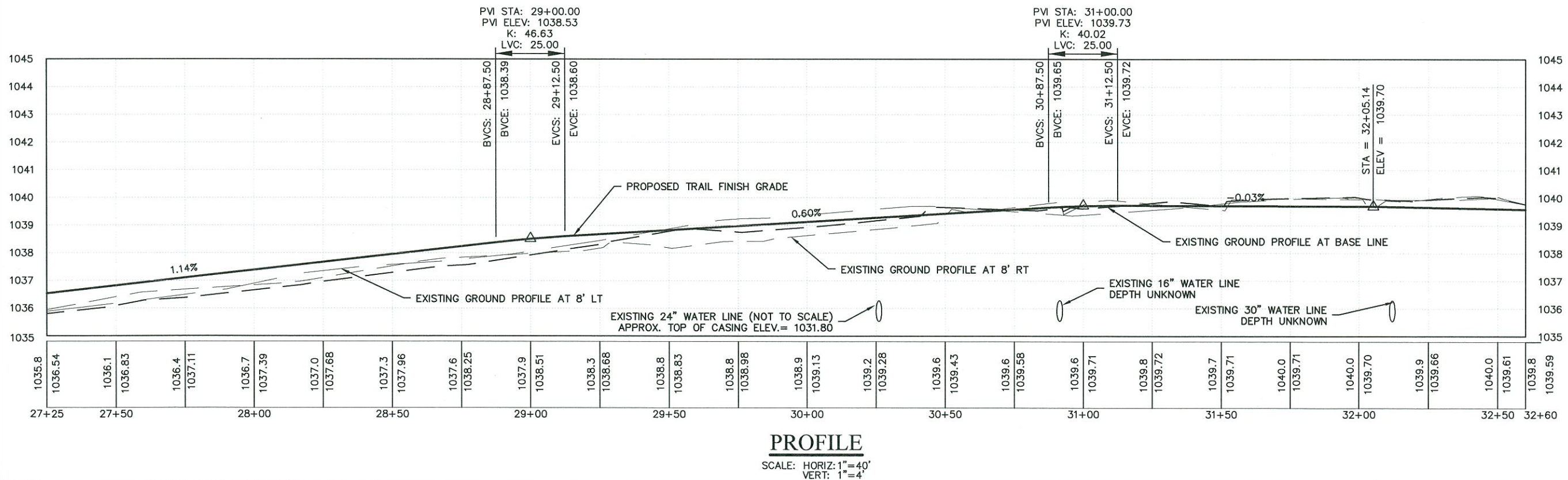
STATE OF TEXAS
DAVIS L. POWELL
79255
REGISTERED
PROFESSIONAL ENGINEER
11-30-18
ENGINEERS SEAL

SHEET 30 OF 150

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SECTION TABLE		
STATION	STATION	SECTION
16+18.41	32+05.14	C
32+05.14	36+00.00	D



HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

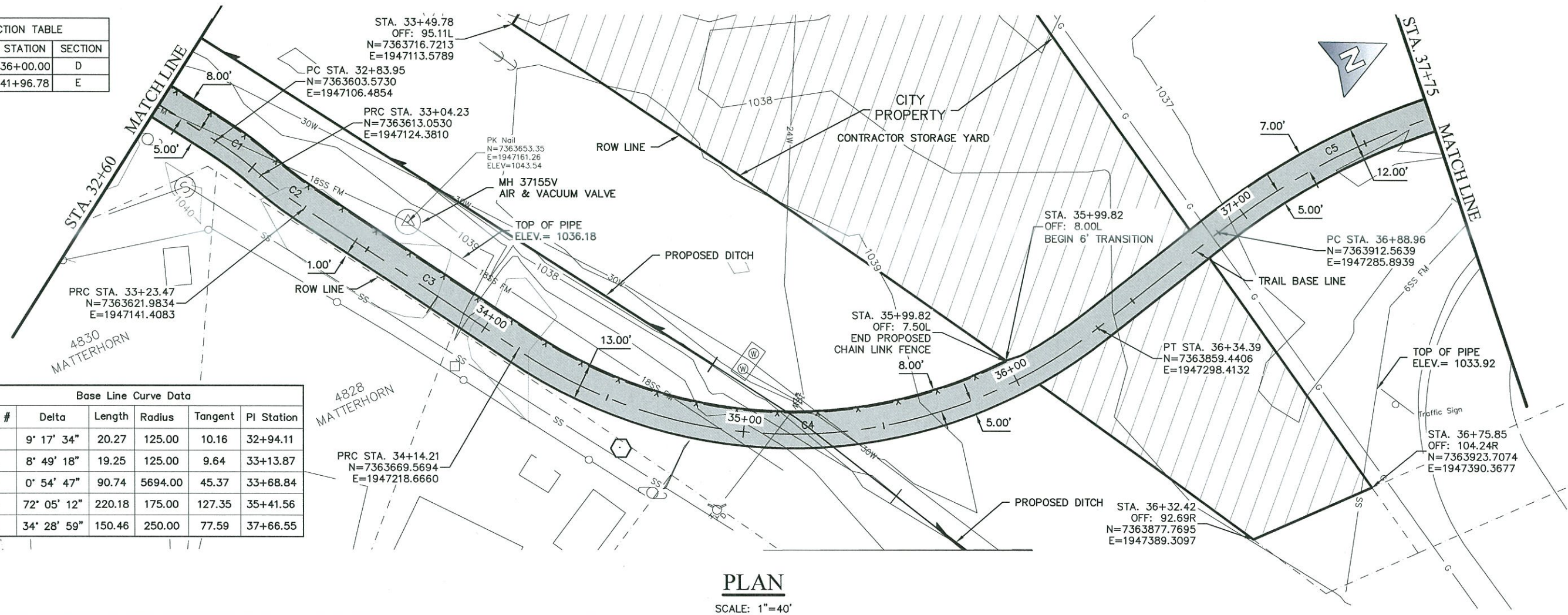
PLAN & PROFILE - 6
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DATE: DEC 2018
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LAYOUT: 27+25

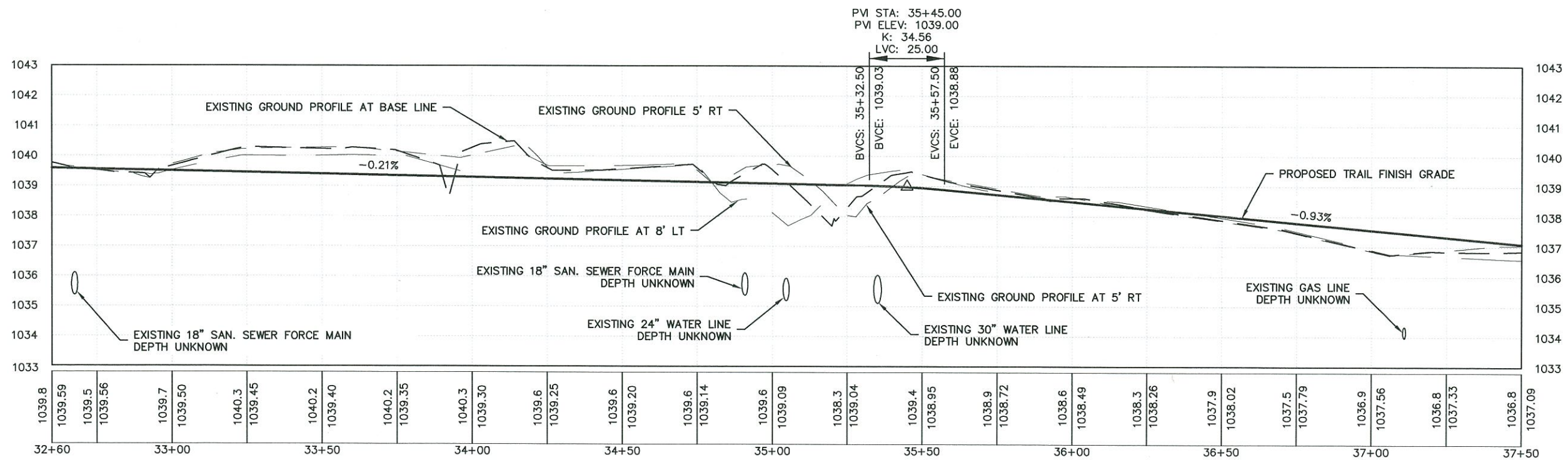


SECTION TABLE		
STATION	STATION	SECTION
32+05.14	36+00.00	D
36+00.00	41+96.78	E

Base Line Curve Data					
Curve #	Delta	Length	Radius	Tangent	PI Station
C1	9° 17' 34"	20.27	125.00	10.16	32+94.11
C2	8° 49' 18"	19.25	125.00	9.64	33+13.87
C3	0° 54' 47"	90.74	5694.00	45.37	33+68.84
C4	72° 05' 12"	220.18	175.00	127.35	35+41.56
C5	34° 28' 59"	150.46	250.00	77.59	37+66.55



PLAN
SCALE: 1"=40'



PROFILE
SCALE: HORIZ: 1"=40'
VERT: 1"=4'

NO.	DATE	DESCRIPTION	BY



HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11
PLAN & PROFILE - 7
STA. 32+60 TO STA. 37+50

PROJECT MANAGER:	DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11	DATE: DEC 2018
SCALE: AS SHOWN	FIELD BOOK:
ACAD: XX	LAYOUT: 32+60

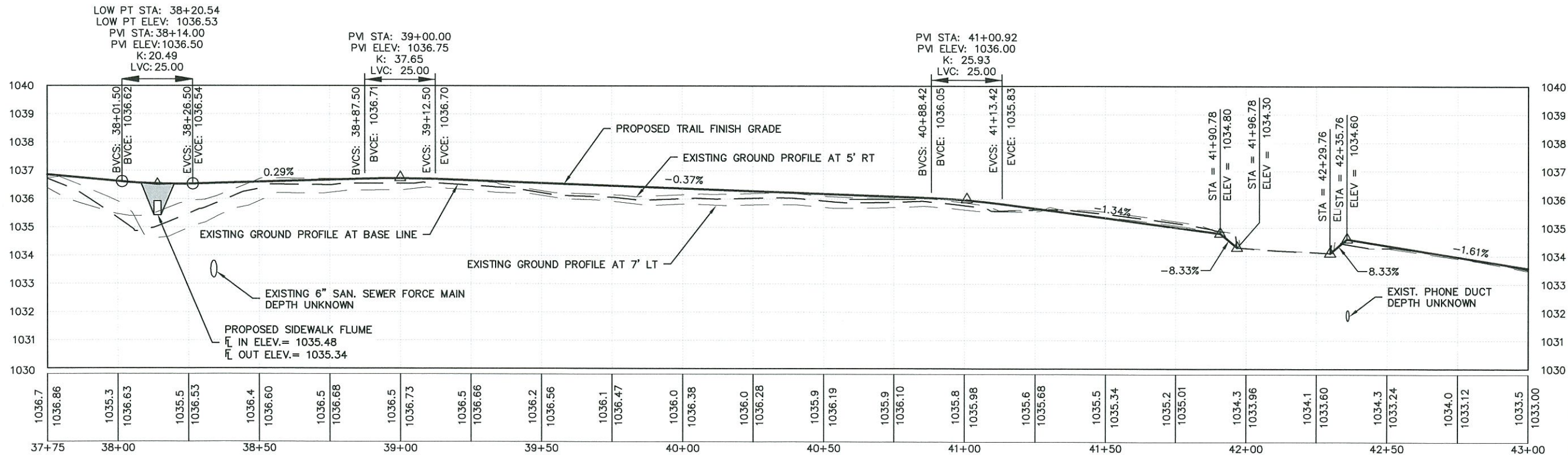


\\Antares2\Share\Eng\Graders\Terry Walters\Land Projects\Trail by the Railroad\DWG\trail.dwg, 37+75, 11/29/2018 3:19:22 PM

SECTION TABLE		
STATION	STATION	SECTION
36+00.00	41+96.78	E
42+29.75	69+40.00	F

Base Line Curve Data					
Curve #	Delta	Length	Radius	Tangent	PI Station
C5	34° 28' 59"	150.46	250.00	77.59	37+66.55
C6	16° 59' 17"	37.06	125.00	18.67	40+73.04
C7	37° 02' 57"	80.83	125.00	41.88	41+33.32

PLAN
SCALE: 1"=40'

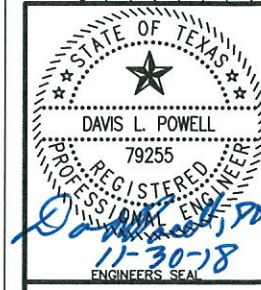


PROFILE
SCALE: HORIZ: 1"=40'
VERT: 1"=4'

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

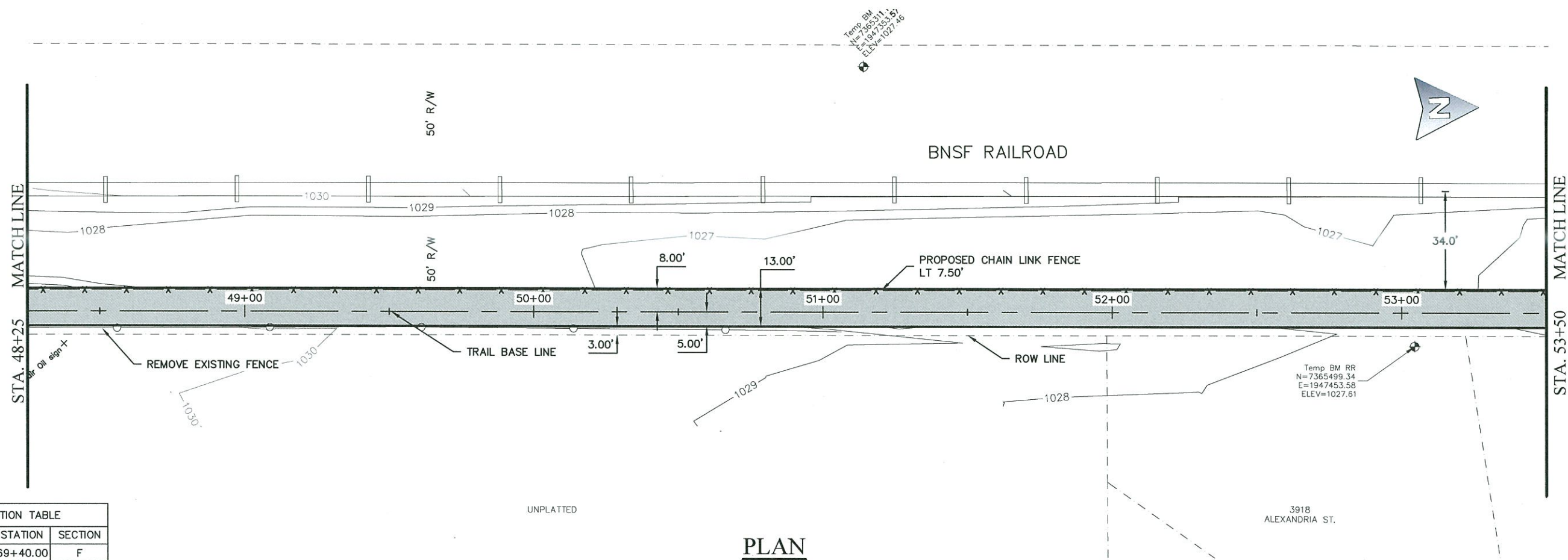
PLAN & PROFILE - 8
STA. 37+75 TO STA. 43+00

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: 37+75

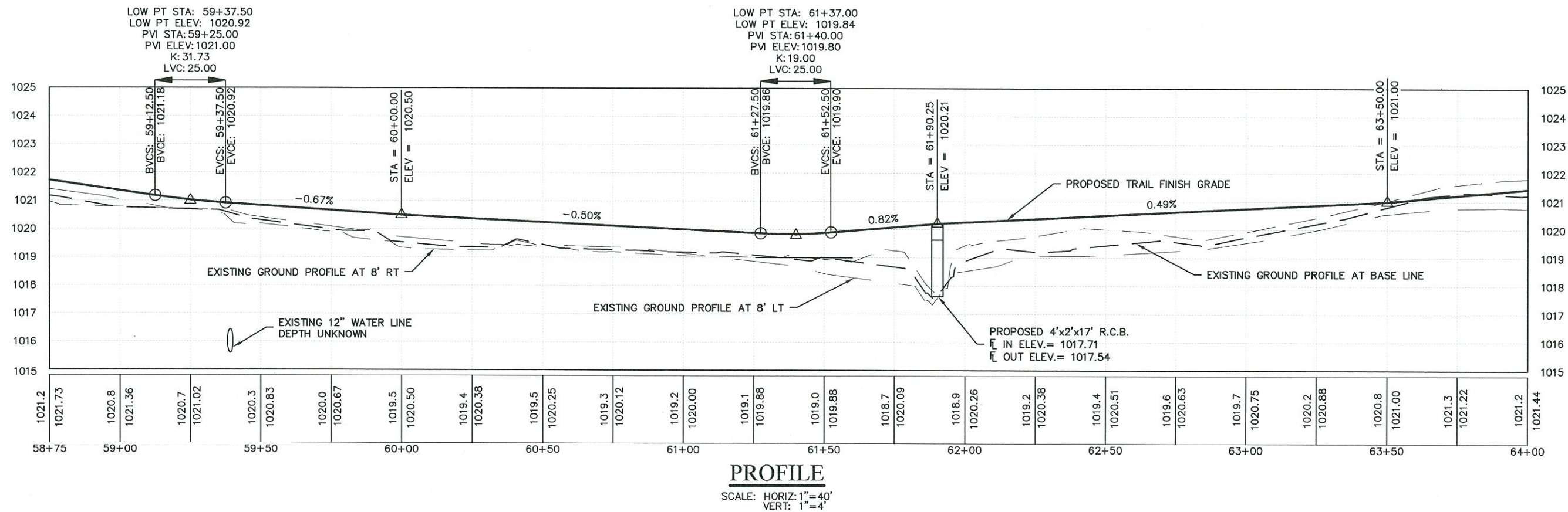
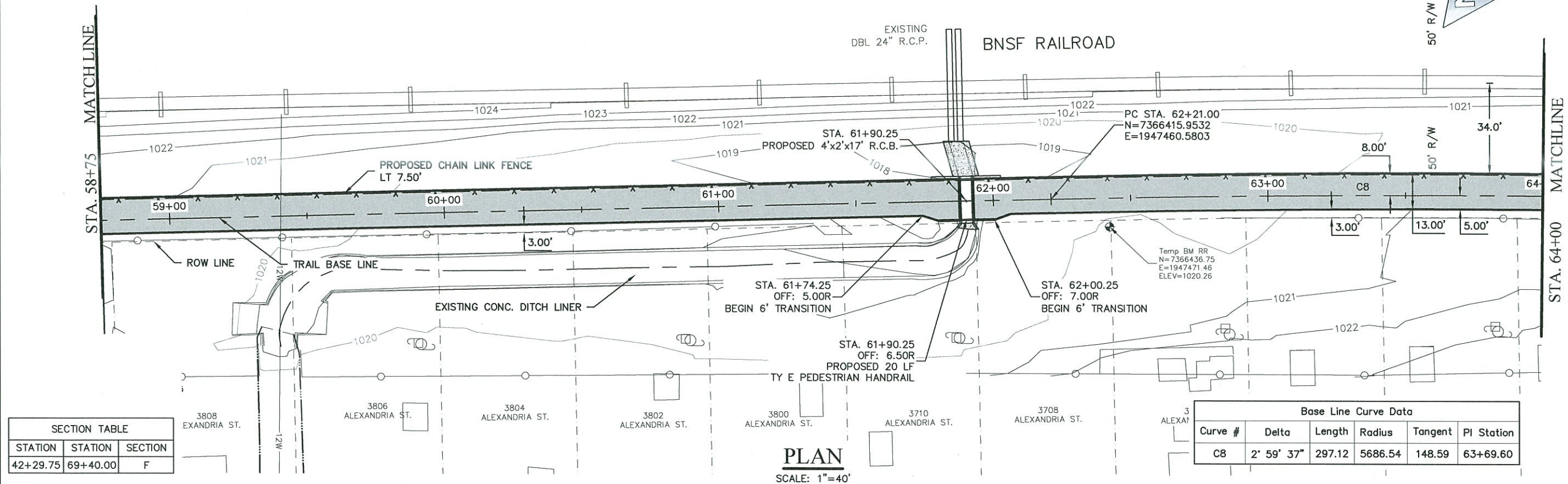


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SECTION TABLE		
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42+29.75	69+40.00	F



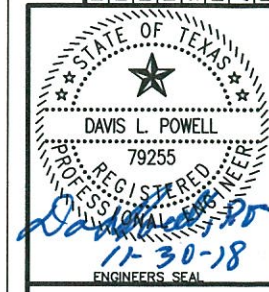
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HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

PLAN & PROFILE - 12
STA. 58+75 TO STA. 64+00

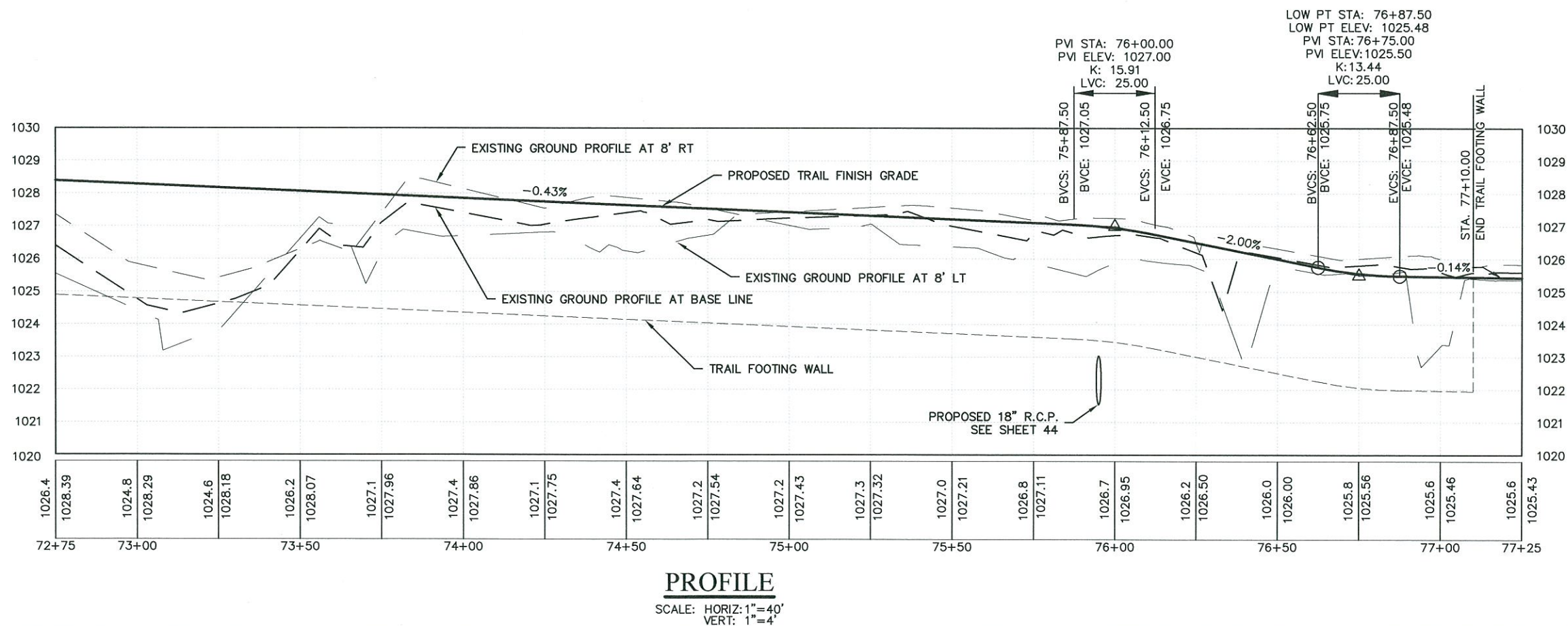
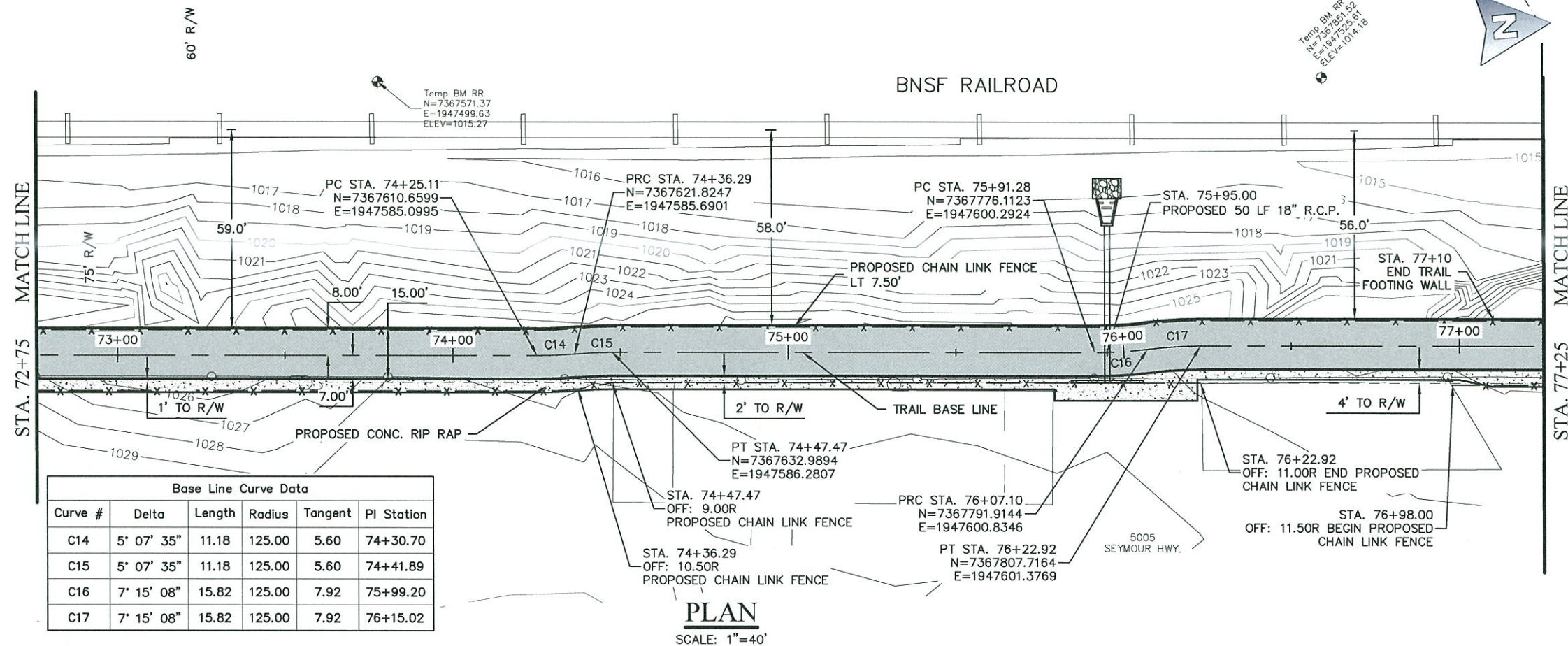
PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: 58+75



\\Antares2\Share\Eng\Drawings\Terry Walters\Land Projects\2017\Trail by the Railroad\DWG\Trail.dwg, 72+75, 11/29/2018 3:14:43 PM

SECTION TABLE		
STATION	STATION	SECTION
71+75.00	77+10.00	I
77+10.00	77+80.00	H

Base Line Curve Data					
Curve #	Delta	Length	Radius	Tangent	PI Station
C14	5° 07' 35"	11.18	125.00	5.60	74+30.70
C15	5° 07' 35"	11.18	125.00	5.60	74+41.89
C16	7° 15' 08"	15.82	125.00	7.92	75+99.20
C17	7° 15' 08"	15.82	125.00	7.92	76+15.02



HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

PLAN & PROFILE - 15
S5TA. 72+75 TO STA. 77+25

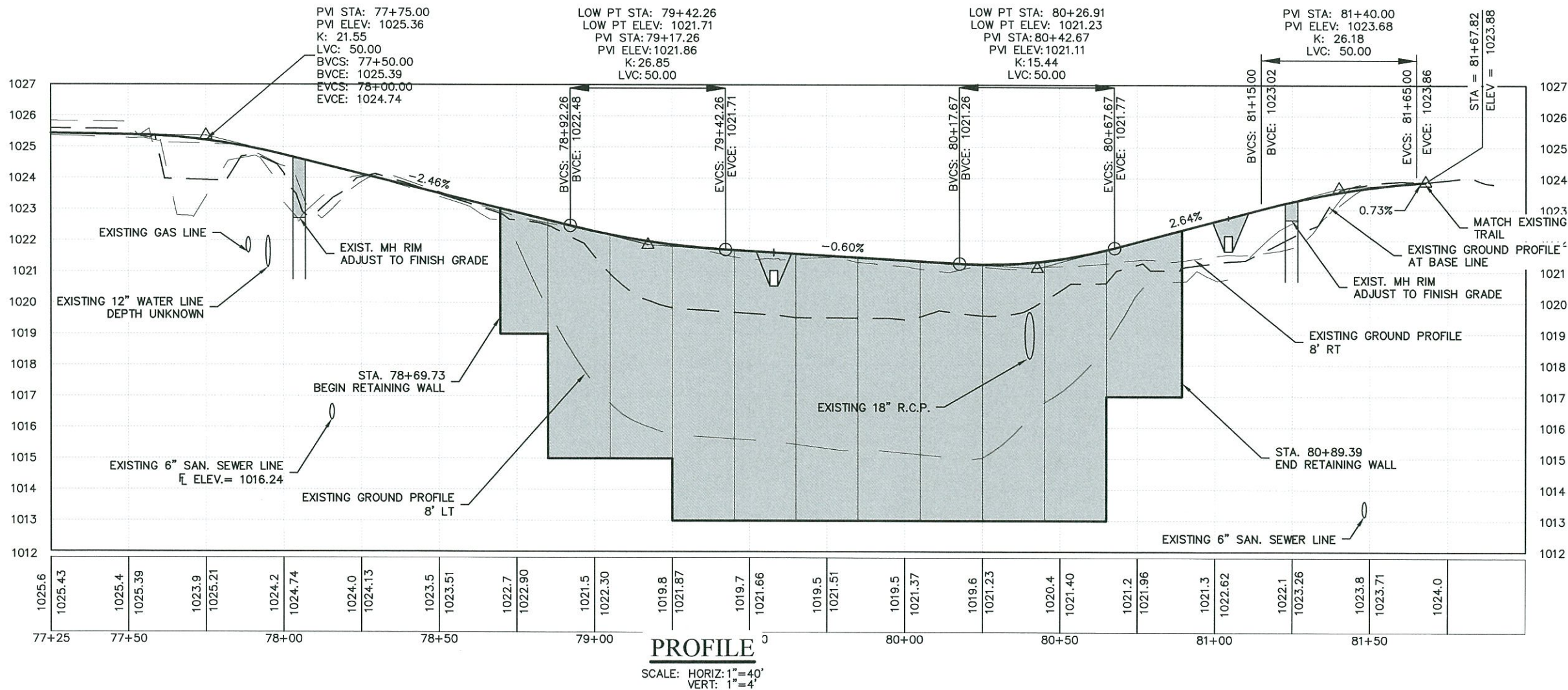
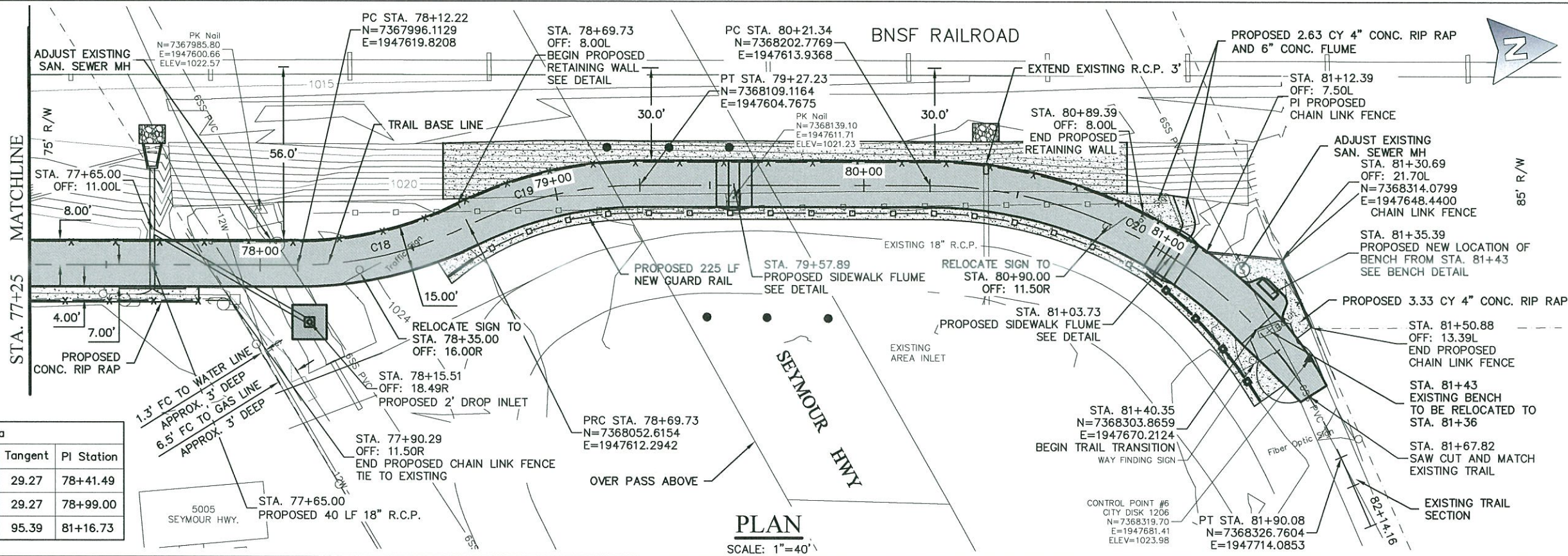
PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: 72+75



\\Anares2\Share\Eng\Drawings\Terry Walters\Land Projects\Land Projects\Trail.dwg, 7/1/25, 11/29/2018 3:34:50 PM

SECTION TABLE		
STATION	STATION	SECTION
77+10.00	77+80.00	H
77+80.00	78+69.73	B
78+69.73	80+90.00	J
80+90.00	81+12.39	B
81+12.39	81+67.82	K

Base Line Curve Data					
Curve #	Delta	Length	Radius	Tangent	PI Station
C18	26° 21' 34"	57.51	125.00	29.27	78+41.49
C19	26° 21' 31"	57.51	125.00	29.27	78+99.00
C20	66° 40' 36"	168.74	145.00	95.39	81+16.73



HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY

CWF17-444-11

PLAN & PROFILE - 16

STA. 77+25 TO END

PROJECT MANAGER:

DRAWN BY: TW

PROJECT NUMBER: CWF17-444-11

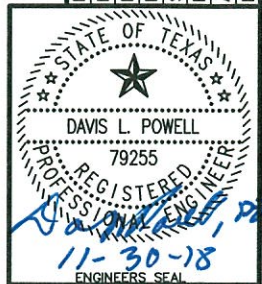
DATE: DEC 2018

SCALE: AS SHOWN

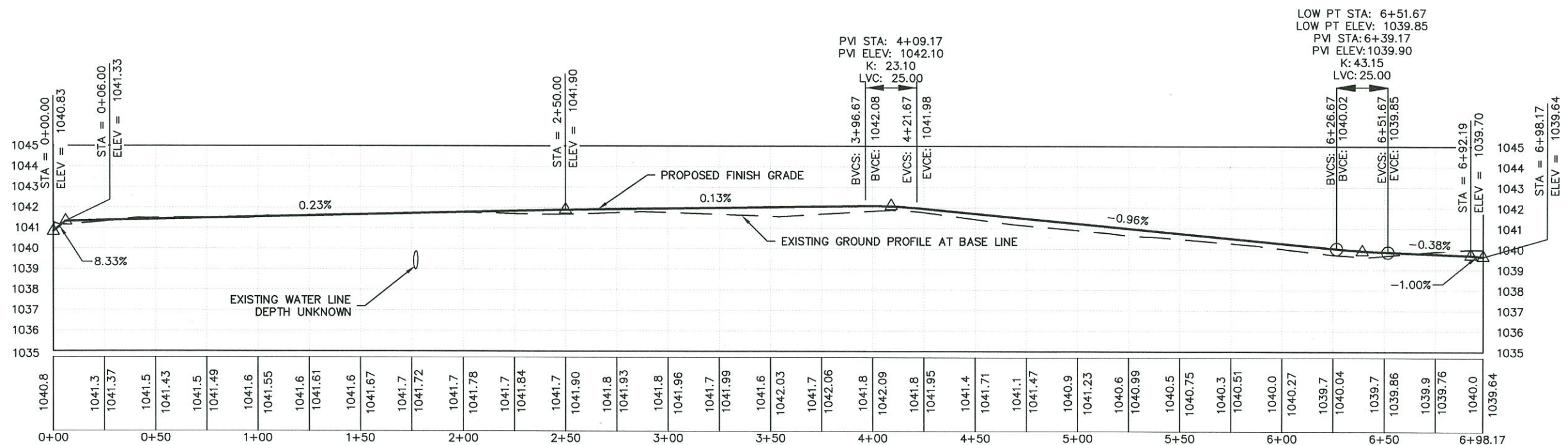
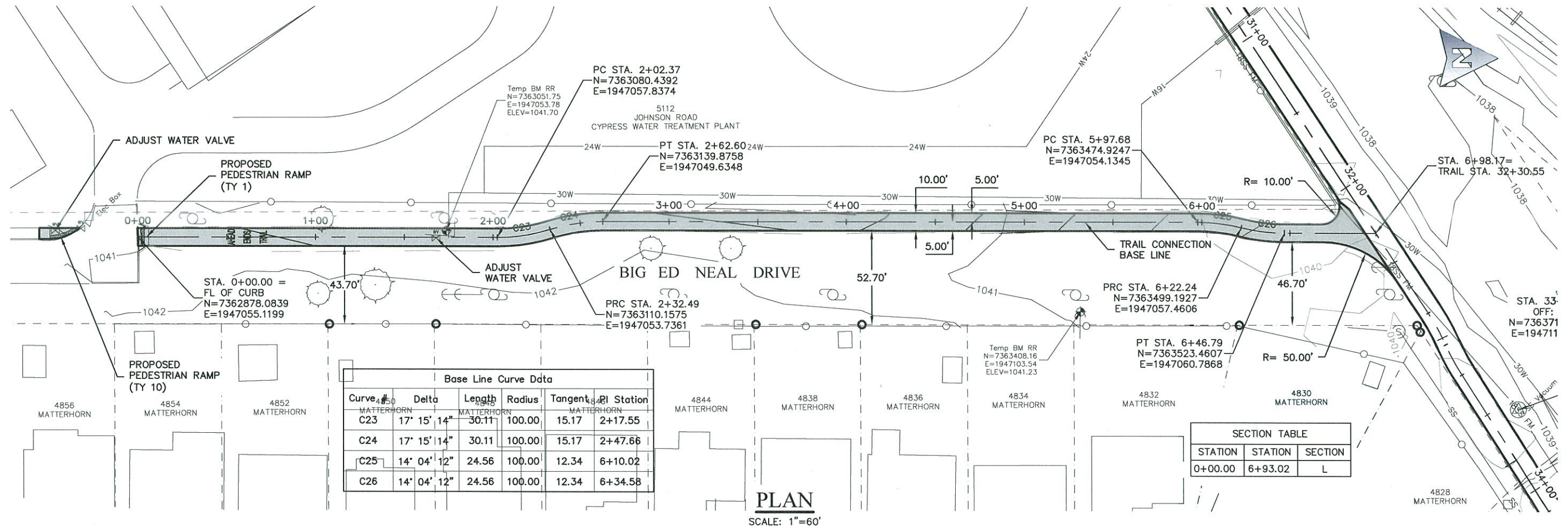
FIELD BOOK:

ACAD: XX

LAYOUT: 77+25



\\Antares2\Share\Eng\Drawings\Land Projects\Trail by the Railroad\DWG\trail.dwg, Ed Neal, 11/29/2018 4:01:21 PM



PROFILE

SCALE: HORIZ: 1"=60'
VERT: 1"=6'

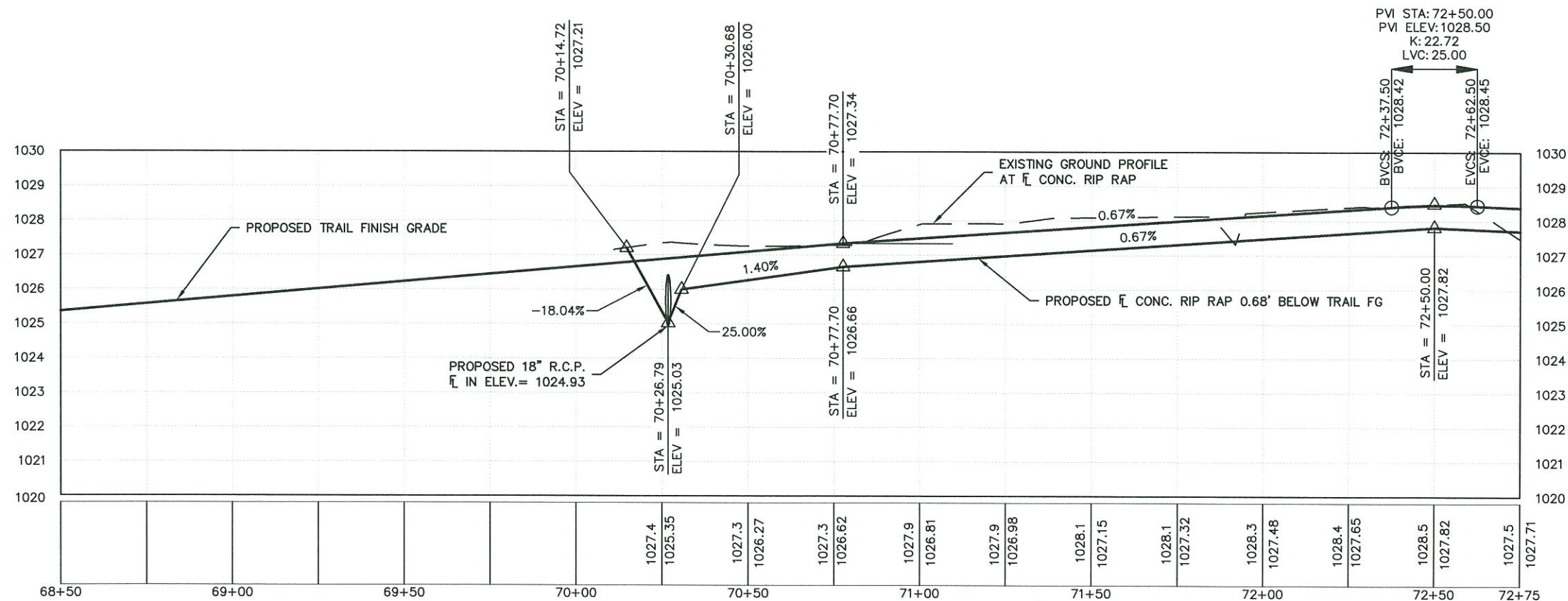
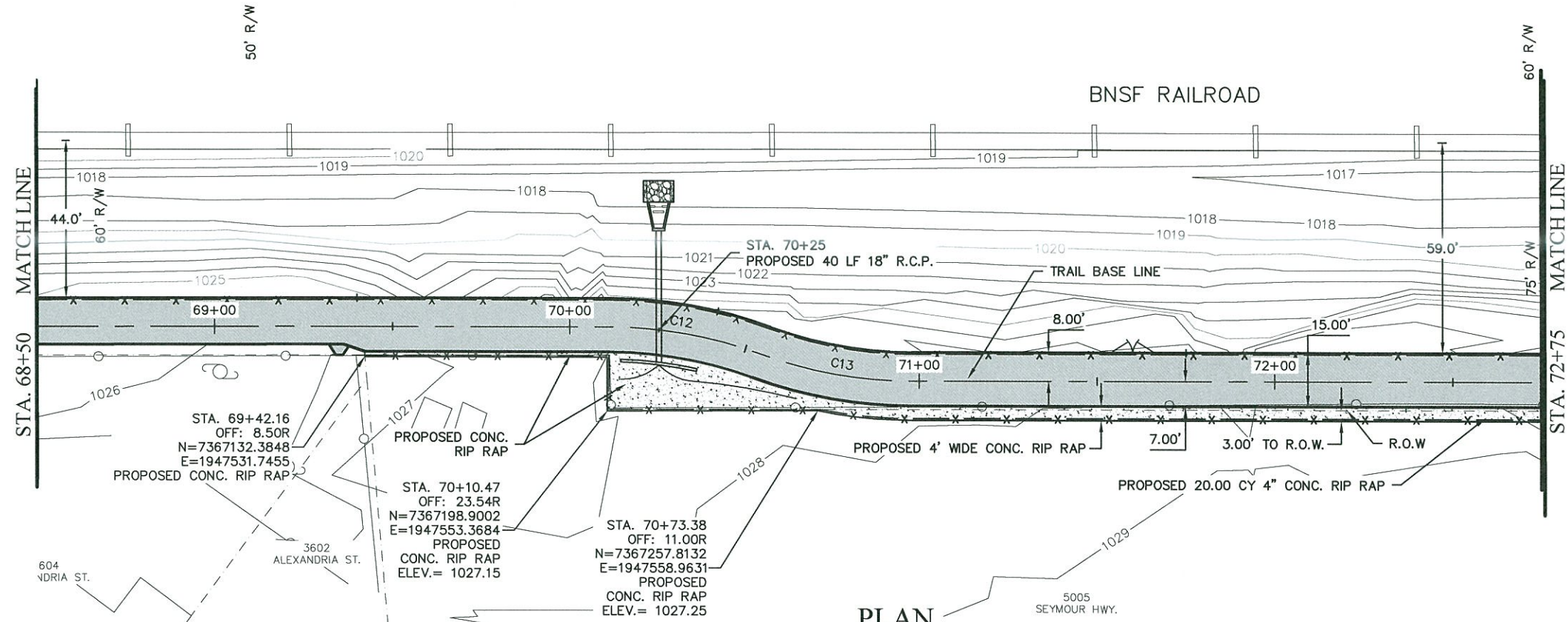
HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

BIG ED NEAL TRAIL CONNECTION
PLAN & PROFILE

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: ED NEAL



\\Anares2\Share\Eng\Drawings\Land Projects\Land Projects\Trail by the Railroad\Drawings\Trail.dwg, Rip Rap-1, 11/29/2018 4:13:59 PM



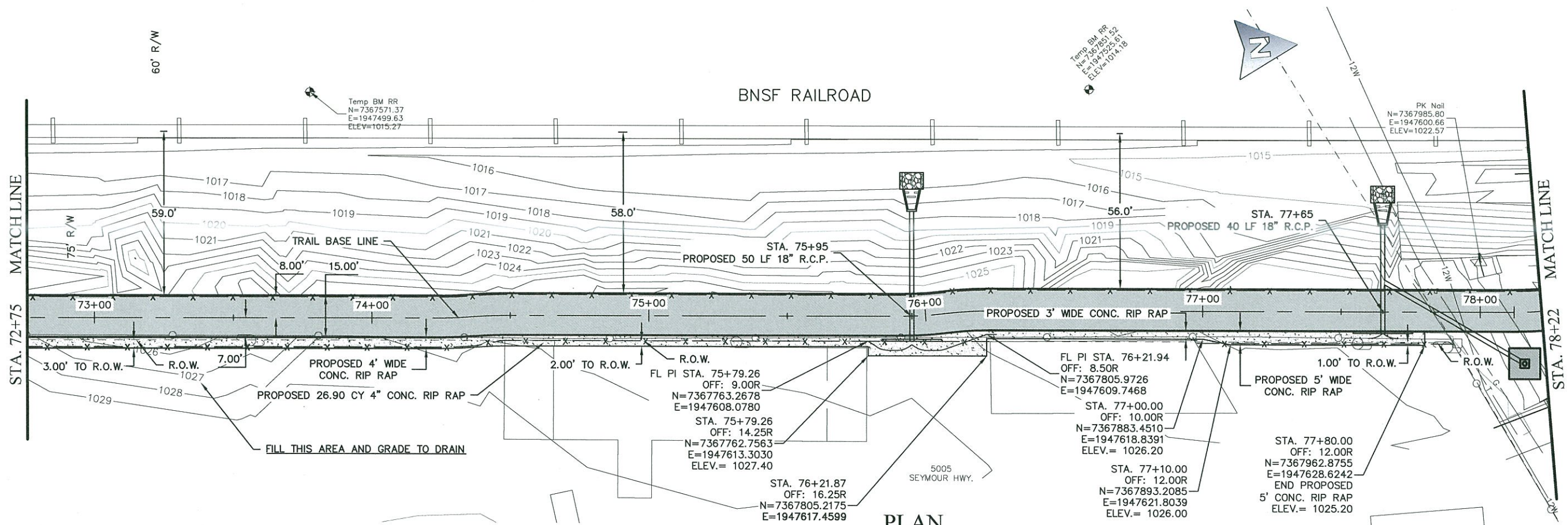
HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

CONCRETE RIP RAP
PLAN & PROFILE - 1

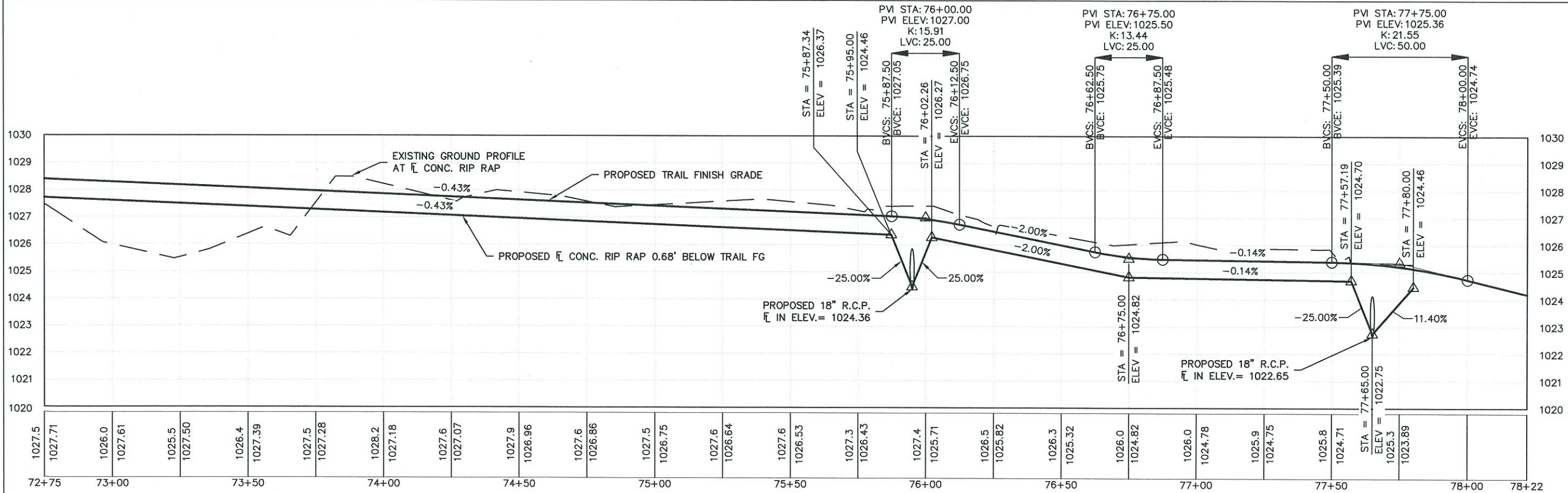
PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: RIP RAP-1



\\Antares2\Share\Eng\Drawings\Land Projects\Trail by the Railroad\DWG\Trail.dwg, Rip Rap-2, 11/29/2018 4:19:38 PM



PLAN
SCALE: 1"=40'



PROFILE
SCALE: HORIZ: 1"=40'
VERT: 1"=4'

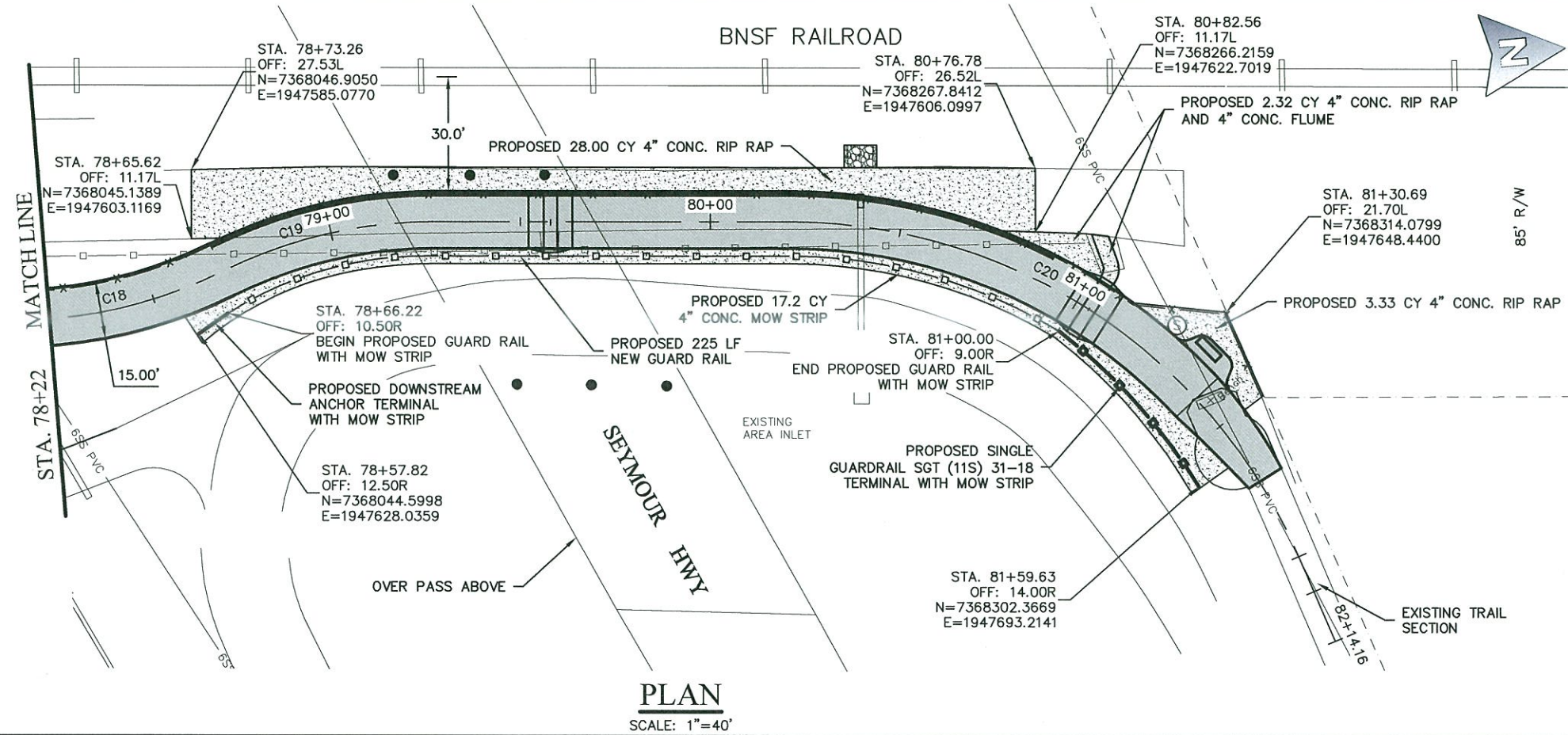
HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

CONCRETE RIP RAP
PLAN & PROFILE - 2

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: RIP RAP-2



\\Antares2\Share\Eng\Drawings\Terry Walters\Land Projects\2017\Trail by the Railroad\Drawings\Trail.dwg, Rip Rap-3, 11/29/2018 4:25:05 PM

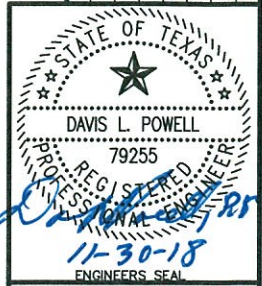


NOTE:
INSTALL 1" REFLEX RUBBER EXPANSION JOINT MATERIAL OR CLOSED
CELL EXTRUDED POLYPROPYLENE FOAM JOINT MATERIAL AROUND THE
THREE BRIDGE COLUMNS.

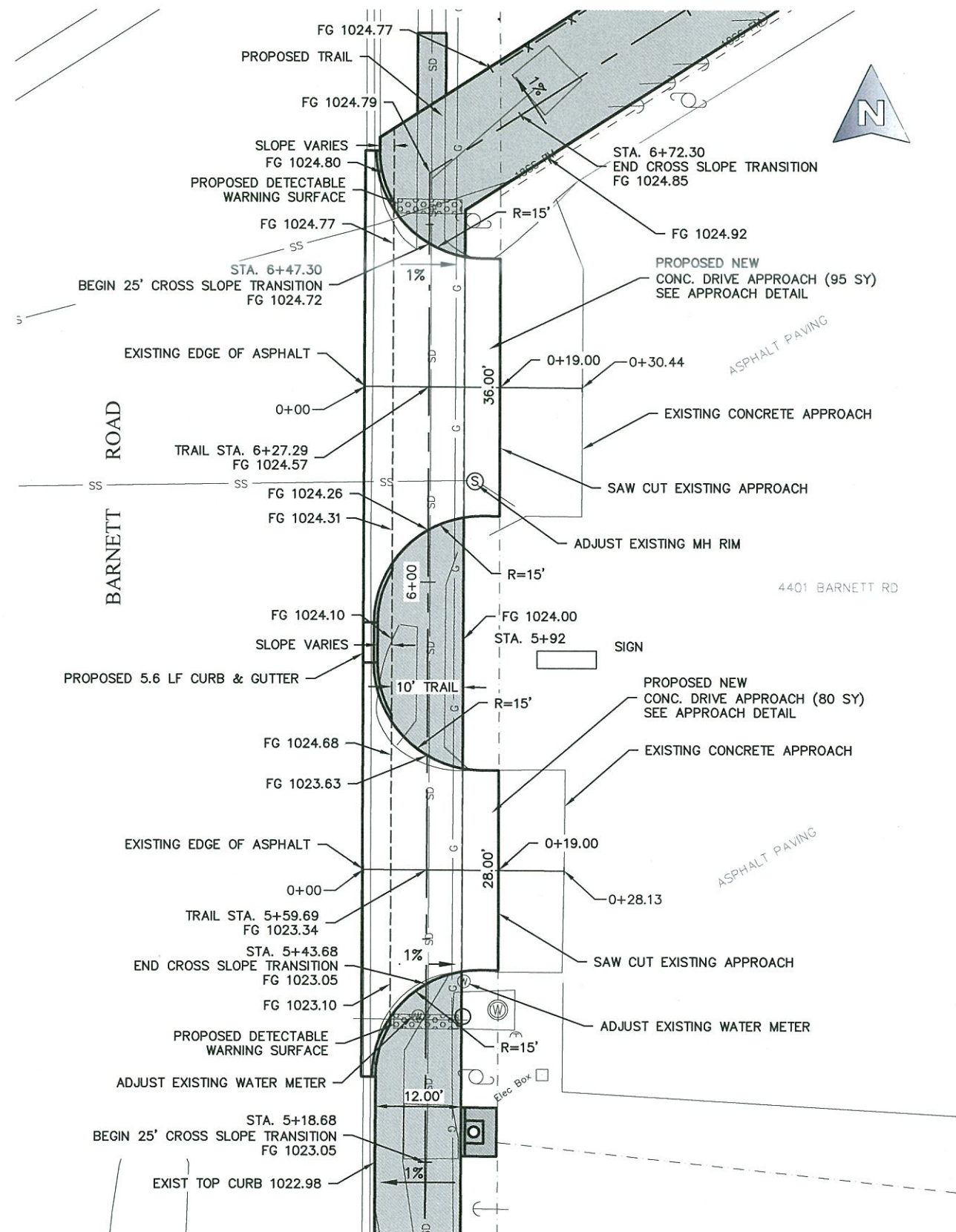
HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

CONCRETE RIP RAP - 3
AND GUARD RAIL

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: RIP RAP-3

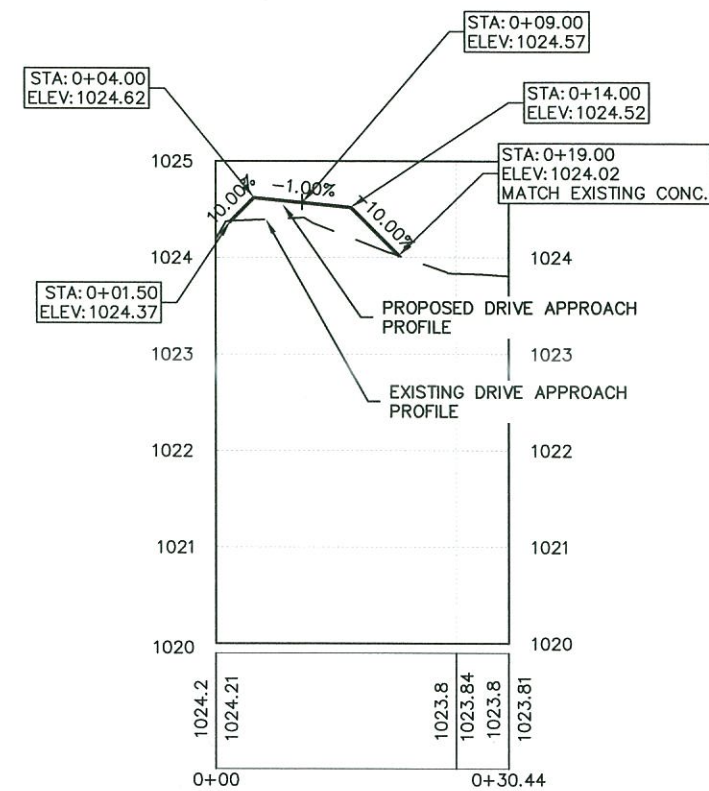


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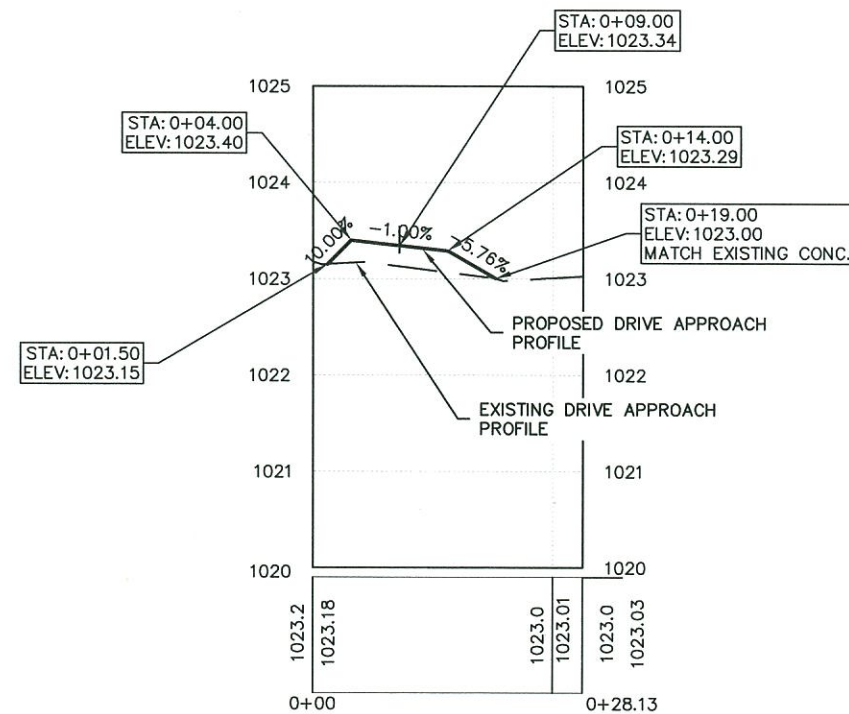
DRIVE APPROACHES

SCALE: 1"=20'



DRIVE APPROACH PROFILE AT STA. 6+27.29

SCALE: HORIZ: 1"=20'
VERT: 1"=2'



DRIVE APPROACH PROFILE AT STA. 5+59.69

SCALE: HORIZ: 1"=20'
VERT: 1"=2'

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

DRIVE APPROACHES

PROJECT MANAGER:
DRAWN BY: TW

PROJECT NUMBER: CWF17-444-11

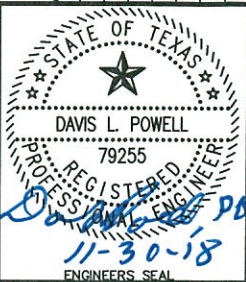
DATE: DEC 2018

SCALE: AS SHOWN

FIELD BOOK:

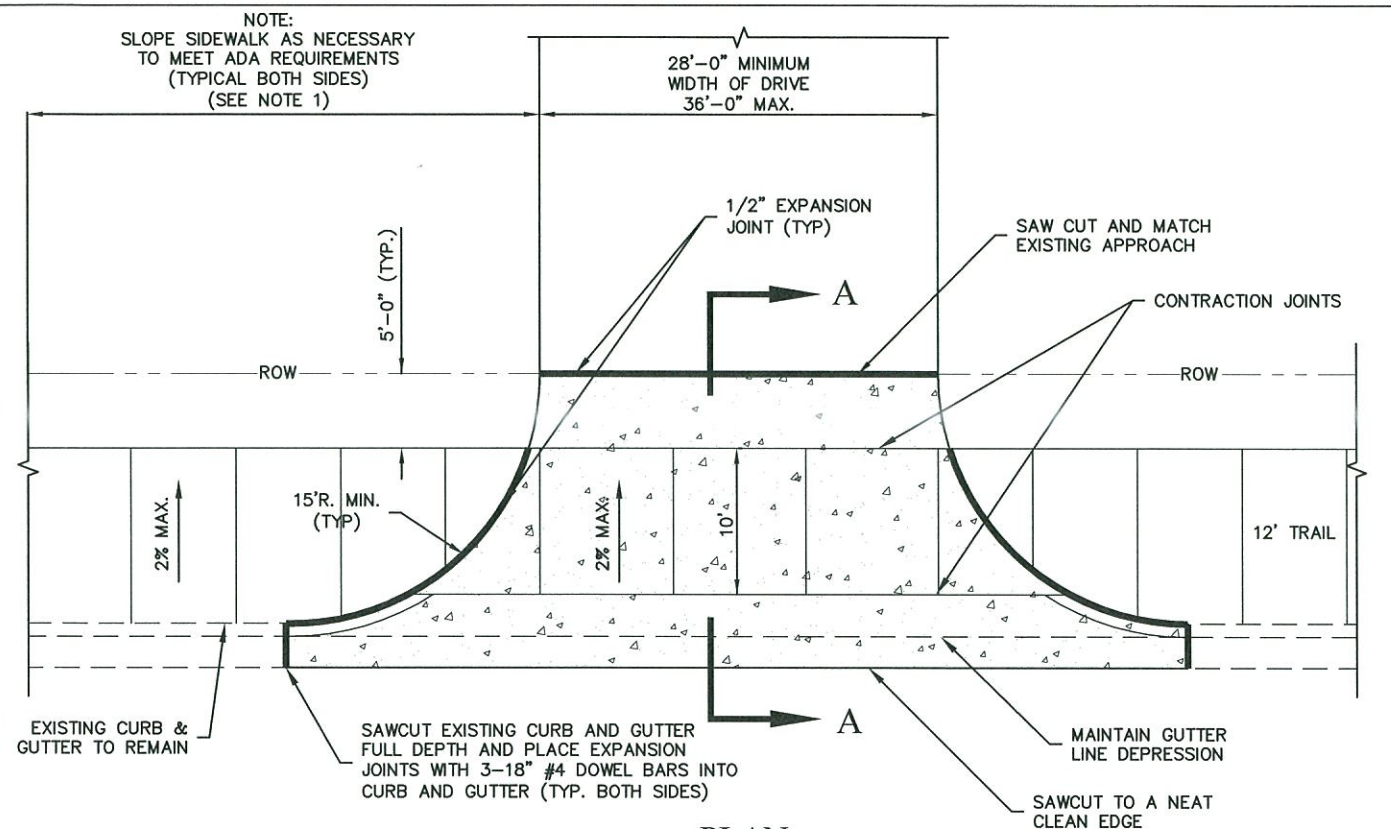
ACAD: XX

LAYOUT: APPROACHES

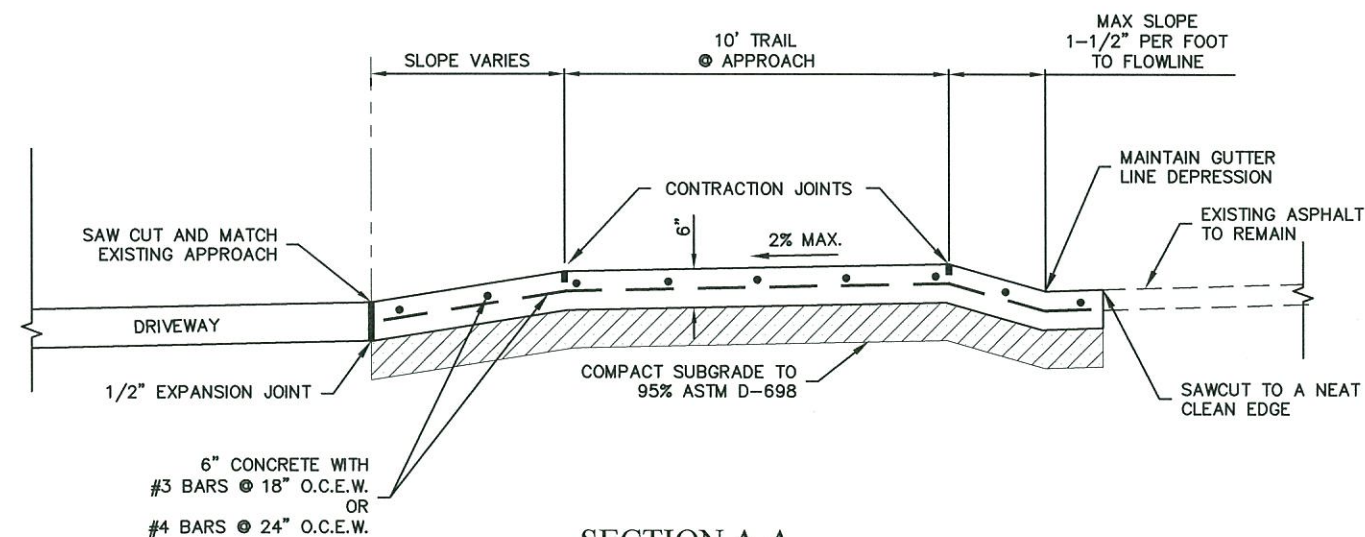


SHEET 48 OF 150

\\Antares2\Share_Eng\Drawings\Terry Walters\Land Projects\2017\Trail by the Railroad\DWG\Trail.dwg, Fire Line, 11/29/2018 4:38:02 PM



PLAN



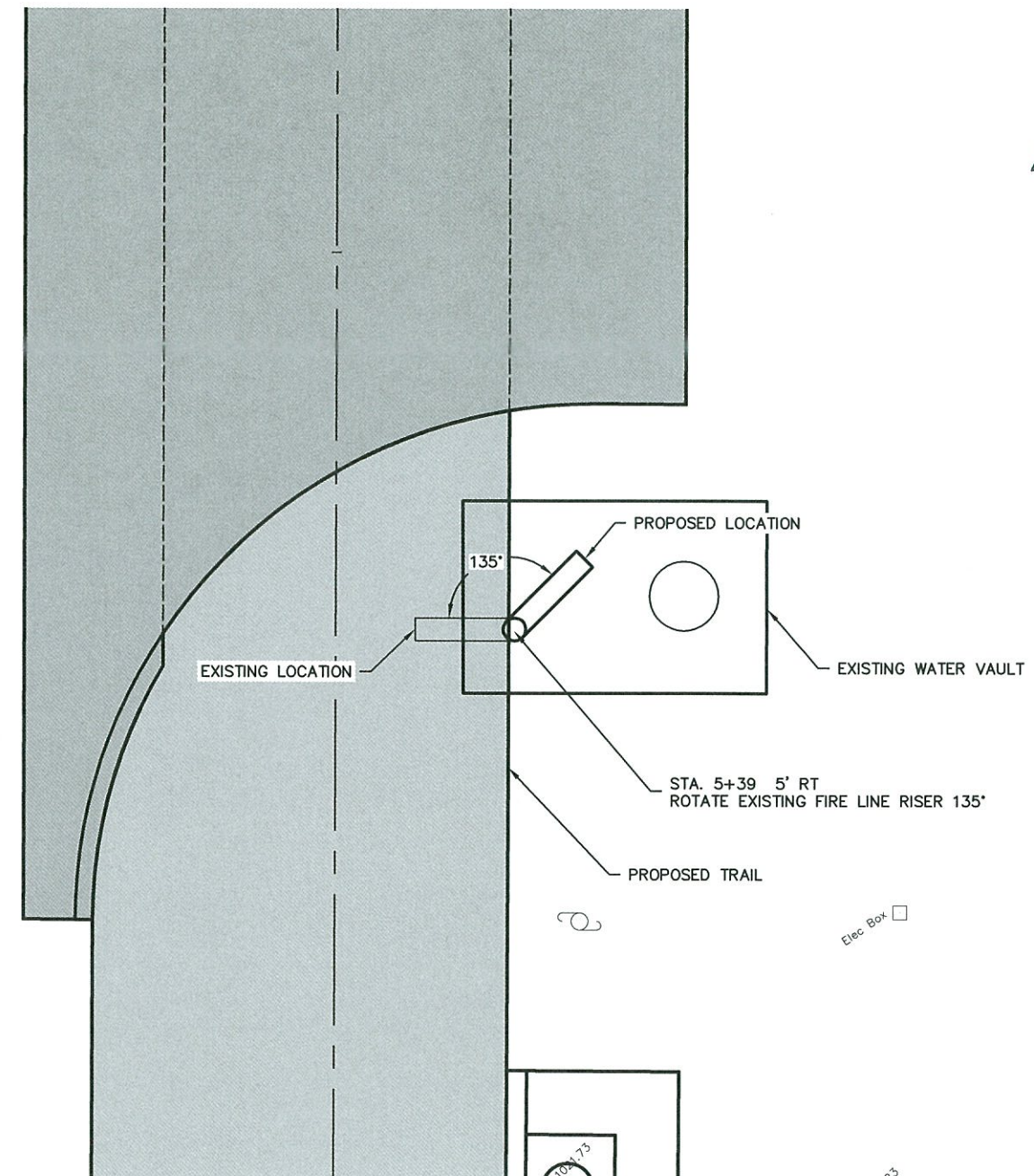
SECTION A-A

GENERAL NOTES:

1. SLOPE OF SIDEWALK AT DRIVE APPROACHES, AND DETECTABLE WARNING SURFACES MUST COMPLY WITH ADA REQUIREMENTS (1" PER FOOT MAXIMUM).
2. SEE DRIVE APPROACHES, ITEM 530.3 OF THE STANDARD SPECIFICATIONS.
3. ALL CONCRETE SHALL BE CLASS "C" (COMPRESSIVE STRENGTH OF 3600 PSI @ 28 DAYS).
4. SAND SHALL NOT BE ACCEPTED AS COMPACTED SUBGRADE. SAND WILL BE ALLOWED FOR LEVEL-UP ONLY.
5. ALL STEEL SHALL HAVE A 2" MINIMUM COVER.
6. REBAR SHALL STOP 2" PRIOR TO EDGE OF EXISTING STREET.
7. ANY UTILITY BOXES OR MANHOLES WITHIN THE APPROACH MUST BE ADJUSTED BY THE CITY UTILITY DEPARTMENT, OR OWNER OF UTILITY, TO BE FLUSH WITH FINISH GRADE, OR RELOCATED OUT OF THE APPROACH TO THE PROPER GRADE. ALL ADJUSTMENT COST WILL BE THE RESPONSIBILITY OF THE CONTRACTOR, OR THE OWNER INSTALLING THE APPROACH.

COMMERCIAL DRIVE APPROACH
ASPHALT STREET

NOT TO SCALE



NOTE:

ROTATE EXISTING FIRE LINE RISER WILL BE PAID
AS ITEM 5064-6001 ADJUST FIRE HYDRANT.

FIRE LINE RISER STA. 5+39

NOT TO SCALE

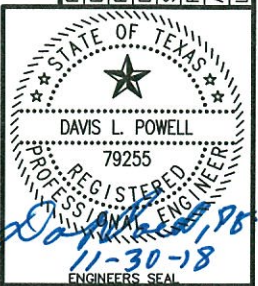
NO.	DATE	DESCRIPTION	BY



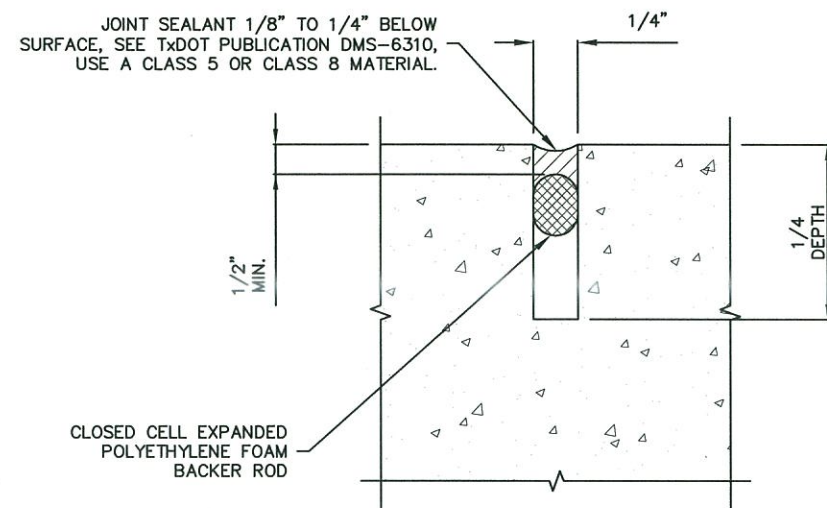
HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

DRIVE APPROACH AND
FIRE LINE RISER DETAILS

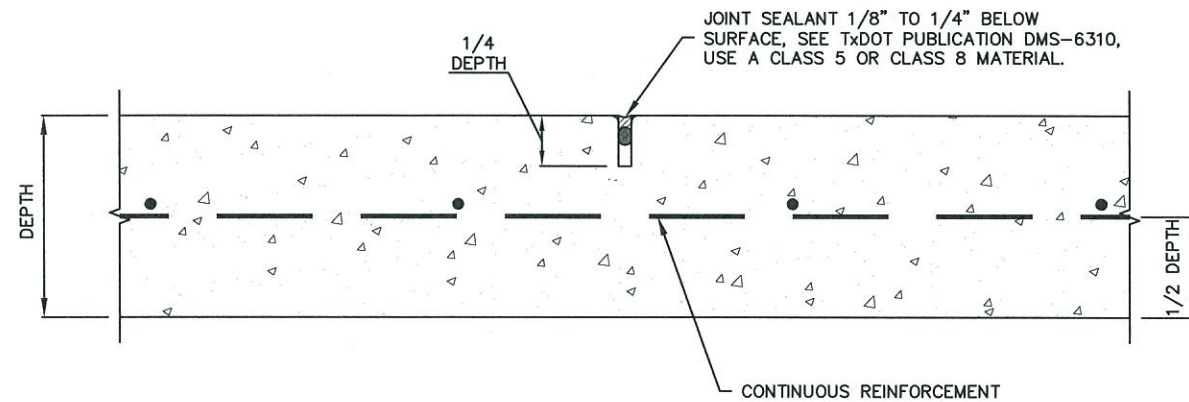
PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: FIRE LINE



\\Antares2\Share\Eng\Drawings\Terry Walters\Land Projects\2017\Trail by the Railroad\Drawings\Trail.dwg, Joint Detail-1, 11/29/2018 4:38:44 PM



JOINT SEALANT

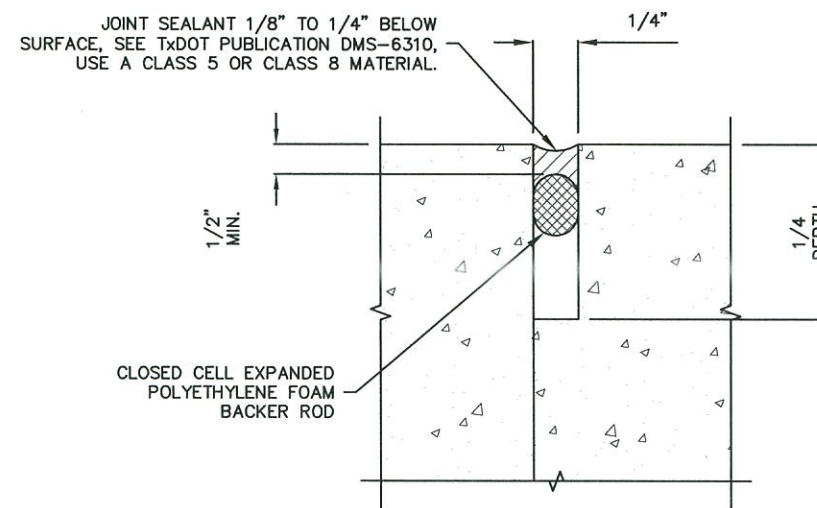


GENERAL NOTES:

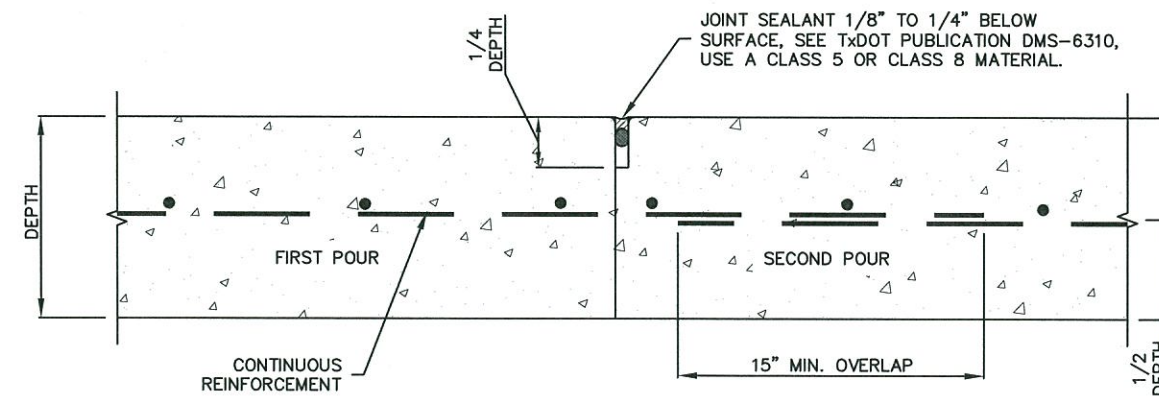
1. SEE CONTRACTION JOINTS, ITEM 360.4.4.2.2 OF THE STANDARD SPECIFICATIONS.

SAWED CONTRACTION JOINT

NOT TO SCALE



JOINT SEALANT



GENERAL NOTES:

1. SEE CONSTRUCTION JOINTS, ITEM 360.4.4.2 OF THE STANDARD SPECIFICATIONS.

CONSTRUCTION JOINT

NOT TO SCALE

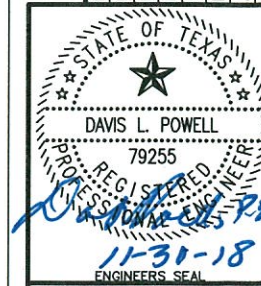
NO.	DATE	DESCRIPTION	BY



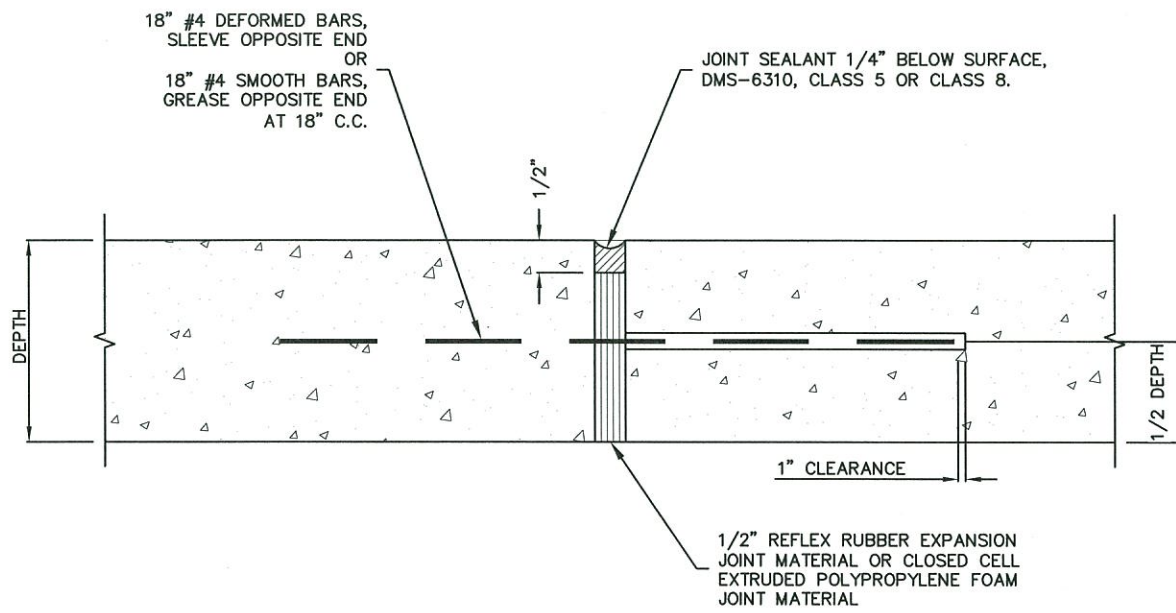
HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

JOINT DETAIL - 1

PROJECT MANAGER:	PROJECT NUMBER: CWF17-444-11
DRAWN BY: TW	DATE: DEC 2018
SCALE: AS SHOWN	FIELD BOOK:
ACAD: XX	LAYOUT: JOINT DETAIL-1

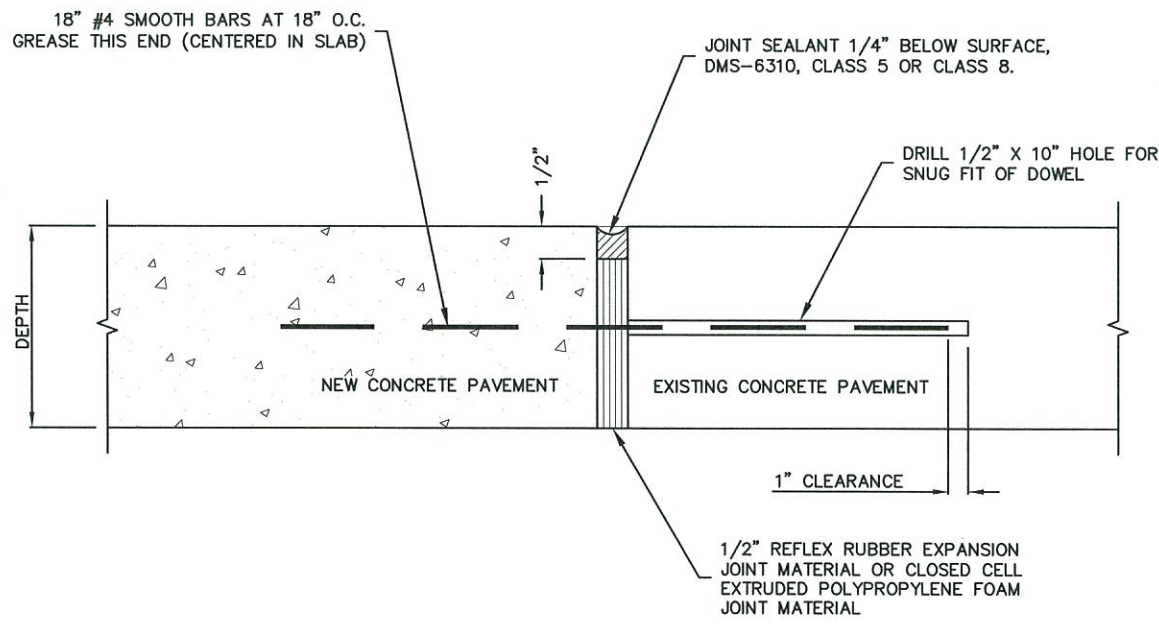


\\Antares\2\Share\Eng\Drawings\Terry Walters\Land Projects\2017\Trail by the Railroad\Drawings\Joint Detail-2, 11/29/2018 4:40:22 PM



- GENERAL NOTES:
1. SEE EXPANSION JOINTS, ITEM 360.4.4.2 OF THE STANDARD SPECIFICATIONS.
 2. DOWEL BARS MUST BE ADEQUATELY BRACED TO ASSURE THEY WILL BE MAINTAINED PERPENDICULAR TO JOINT DURING PLACEMENT OF CONCRETE.

EXPANSION JOINT
NOT TO SCALE



- GENERAL NOTES:
1. SEE EXPANSION JOINTS, ITEM 360.4.4.1. OF THE STANDARD SPECIFICATIONS.

EXISTING PAVEMENT
TIE-IN JOINT
NOT TO SCALE

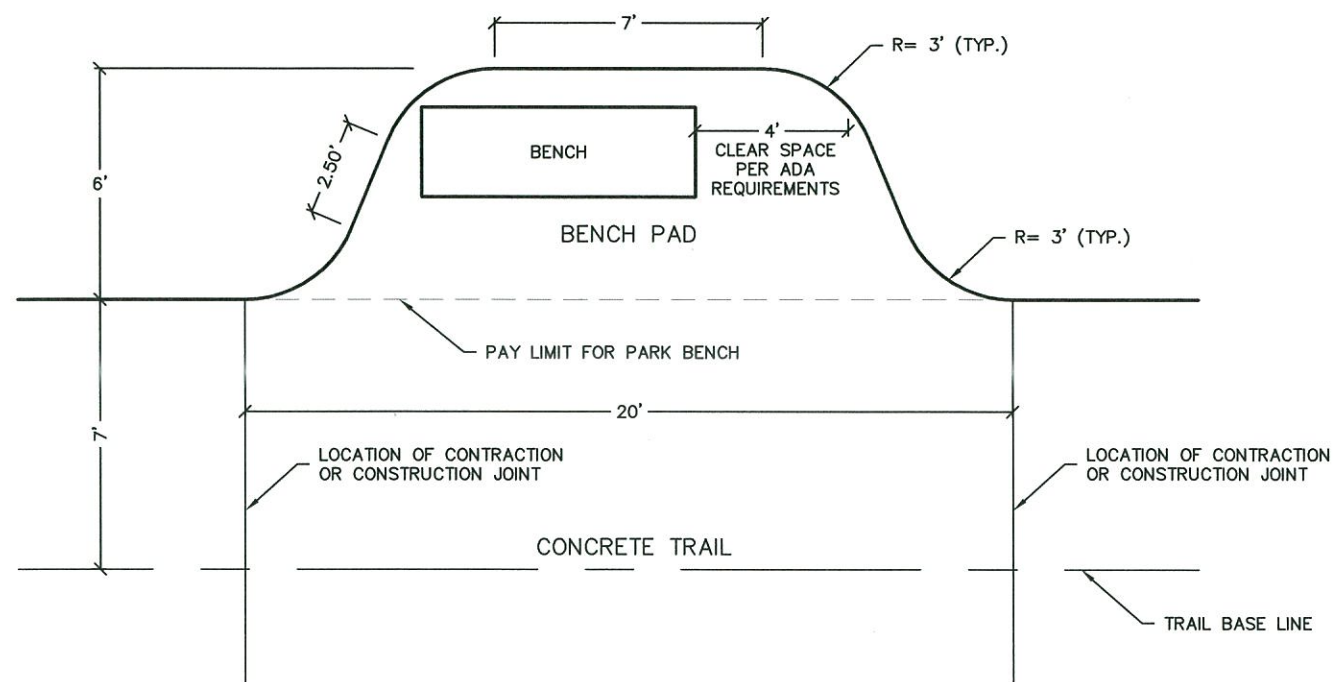
REVISIONS		DESCRIPTION		BY	
NO.	DATE	DESCRIPTION	BY	DATE	BY

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

JOINT DETAIL - 2

PROJECT MANAGER:	DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11	DATE: DEC 2018
SCALE: AS SHOWN	FIELD BOOK:
ACAD: XX	LAYOUT: JOINT DETAIL-2

SHEET 51 OF 150



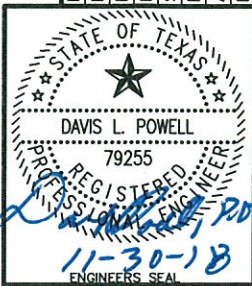
PARK BENCH CONCRETE PAD

NOT TO SCALE

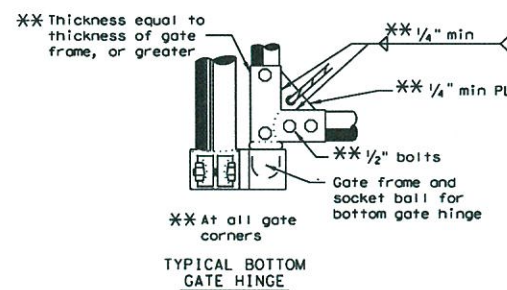
NOT TO SCALE

GENERAL NOTES:

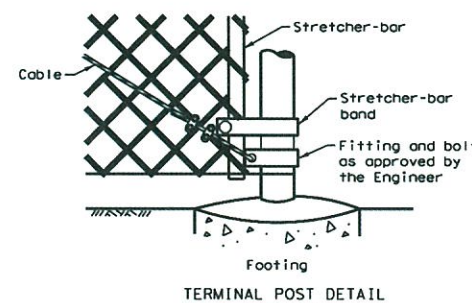
1. PARK BENCHES SHALL BE ITEM NO. 63-611-6PL BY DUMOR INC. DISTRIBUTED BY PAUL E. ALLEN COMPANY INCORPORATED, FLOWER MOUND TEXAS (888) 877-4887, OR APPROVED EQUAL.
2. PARK BENCHES SHALL HAVE CEDAR COLORED RECYCLED PLASTIC SLATS AND POWDER COATED FINISHED METAL FRAME WITH "GULL WING" STYLE SUPPORTS AND FASTENED TO CONCRETE PAD PER MANUFACTURES SPECIFICATIONS.
3. INSTALLED PARK BENCHES SHALL BE FREE FROM DEFECTS AND SQUARE TO THE EDGES OF THE CONCRETE AND ORIENTED SUCH THAT THE USER WILL BE FACING THE TRAIL.
4. CONCRETE PAD SHALL BE POURED MONOLITHICALLY WITH A 20' LONG SECTION OF TRAIL WITH NO SAW JOINTS. REINFORCING SHALL BE CONTINUOUS THROUGHOUT. LOCATE CONTRACTION/CONSTRUCTION JOINTS AS NOTED. NO EXPANSION JOINT MATERIAL SHALL BE INSTALLED IF CONSTRUCTION JOINT METHOD IS USED.
5. CONCRETE PAD AND BENCH ARE CONSIDERED A COMBINED SINGLE BID ITEM.
6. ANY EXCAVATION OR FILL REQUIRED FOR PLACEMENT OF PAD SHALL BE INCLUDED.
7. FINAL GRADING SHALL PROVIDE SMOOTH TRANSITION PROVIDING POSITIVE DRAINAGE IN THE DIRECTION OF THE TRAIL CROSS SLOPE WITH SLOPES NOT EXCEEDING 4 : 1.
8. BENCHES SHALL BE PLACED ON PAD WITH 4' CLEAR ON ONE END FOR COMPLIANCE WITH ADA.
9. BENCH PAD SHALL BE GRADED SO THAT BENCH SEAT IS NO STEEPER THAN 0.5%.



\\Antares2\Share\ EngDrafters\Terry Walters\Land Projects\Land Projects 2017\Trail by the Railroad\Drawg\Fence-1, 11/29/2018 4:42:01 PM



Foundation designs shown are "minimums" for a 6 ft. fence. Taller fences may require larger foundation designs.



1. Items herein shall conform to Item 550, "Chain Link Fence."
2. Typical installation plan may vary as shown elsewhere on the plans or as directed by the Engineer. Location of gates shown elsewhere on plans.
3. Gate-frame members shall be bolted, at frame corners, to joint fittings with four 1/2" bolts per joint.
4. All cable connections are to be made with two 3/4" cable clamps.
5. All pull posts and end posts and their foundations shall have the same respective dimensions as those shown for corner post.
6. All pull post shall be furnished with two stretcher bars.
7. One end of each turnbuckle may be attached directly to fittings with a clevis.
8. Concrete footings are to be crowned at the top to shed water.



GATE (TYPES AND SIZES)	
<p><u>Single Inclusive</u></p> <p>Up to 6'</p> <p>Over 6' to 12'</p> <p>Over 12' to 18'</p> <p>Over 18'</p>	<p><u>Double Inclusive</u></p> <p>Up to 12'</p> <p>Over 12' to 26'</p> <p>Over 26' to 36'</p> <p>Over 36'</p>

GATE FRAME (WEIGHT)	GATE POST (WEIGHT)
<p><u>SIZE</u> <u>WT./LIN. FT.</u></p> <p>1 1/2" nom dia. 2.72 Lbs. or equal</p>	<p><u>SIZE</u> <u>WT./LIN. FT.</u></p> <p>2 1/2" nom dia. 5.79 Lbs. or equal</p> <p>3 1/2" nom dia. 9.11 Lbs. or equal</p> <p>6" nom dia. 18.97 Lbs.</p> <p>8" nom dia. 24.70 Lbs.</p>

Barbed wire arm related items shall conform to Item 550, "Chain Link Fence."

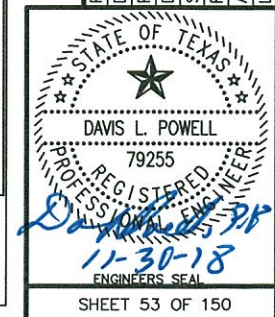
The diagram illustrates a typical fastener assembly. It shows a horizontal line representing a fabric edge with two diagonal lines branching off, labeled "Knuckled selvages". A horizontal line is labeled "Tension wire". A diagonal line is labeled "#9 gauge wire". A circular fastener is labeled "Typical fastener". A dimension line indicates a distance of "2\" between two points on the knuckled selvages.

CLF-10

 Texas Department of Transportation	<i>Design Division Standard</i>	
<h1>CHAIN LINK FENCE</h1>		
<h2>CLF-10</h2>		
FILE# clf10.dgn  Tx007 1996	DWT: Tx007 Ckt: AM DW: 30 Ckt: VP	
REVISIONS	CONT SEC1	JOB
	DIST	COUNTY
		SHEET NO

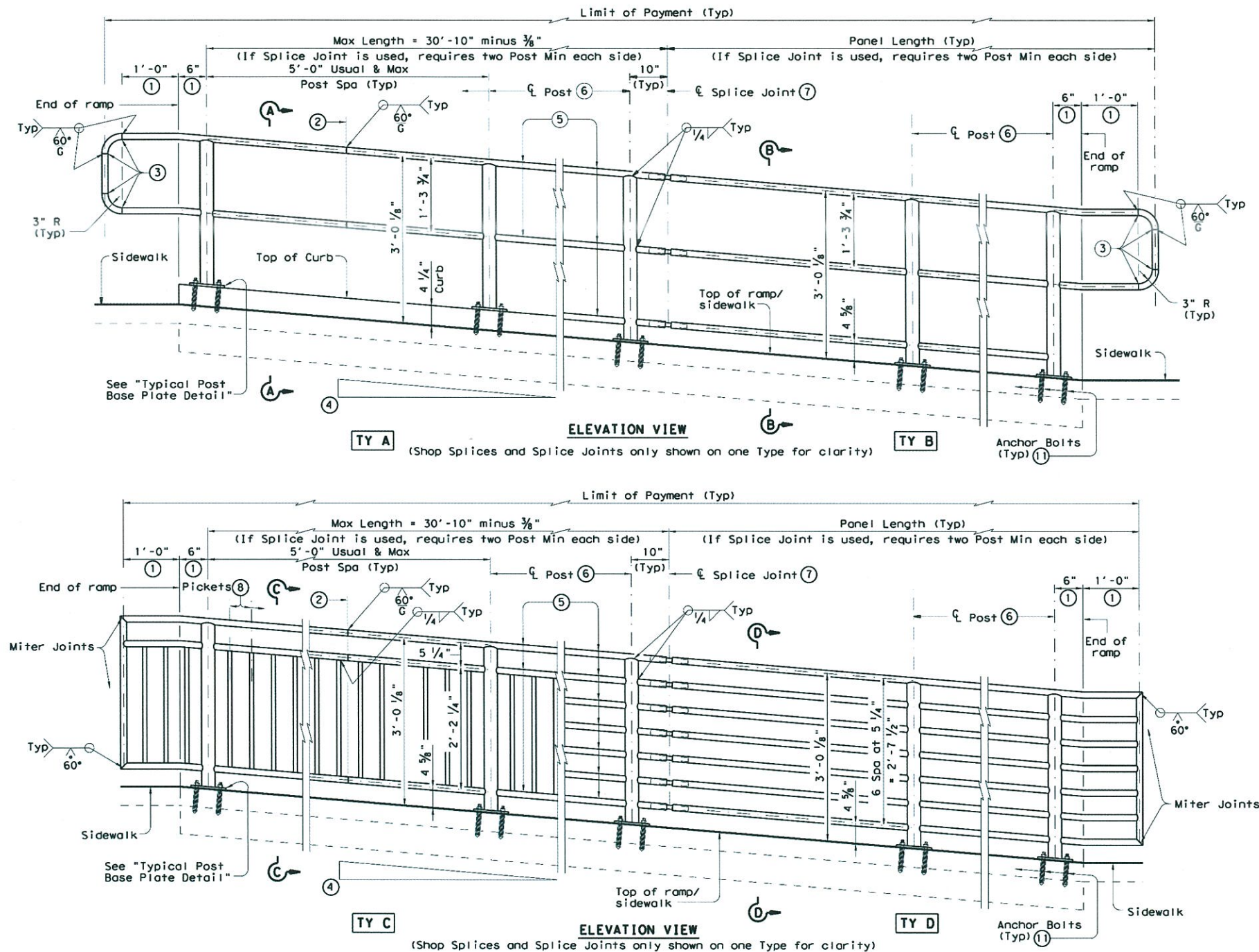
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CLF-10

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: FENCE-1



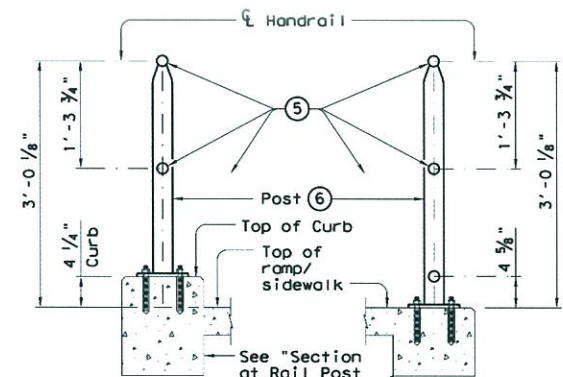
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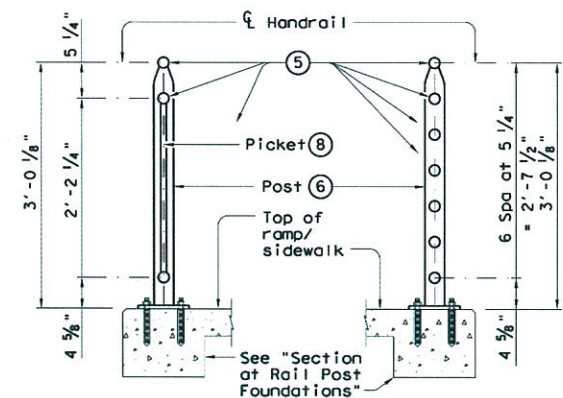


- ① Parallel to ground.
- ② One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
- ③ Shop splice is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
- ④ See Ramp Details located elsewhere in plans for ramp slope and dimensions. Maximum ramp slope will not exceed 8.3 percent. Level landing required for each 30" rise if grade exceeds 5 percent.
- ⑤ 1 1/2" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1 1/2" Dia. pipe for galvanizing drainage and venting.
- ⑥ 2 1/2" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). See "Post Mount Detail" for crimping and trimming post to fit Dia. of top rail. Provide holes as needed in post for galvanizing drainage and venting. Plumb all posts.
- ⑦ See "Handrail Fabrication Details" for Splice Joints.
- ⑧ 1/2" Dia. Round Bar equal spacing at 4 1/2" Max. Plumb all pickets.
- ⑨ When needed for accessibility (grade > 5 percent) or as needed for pedestrian safety.
- ⑩ Not to be used on bridges.
- ⑪ See "General Notes" for anchor bolt information.

RECOMMENDED USAGE ⑨ ⑩	
Dropoff Height/Condition	Recommended Rail Options
<30" dropoff	TY A, TY B, TY C, or TY D
≥ 30" dropoff, or along Bike Path	TY E or TY F

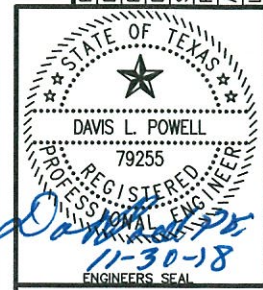


SECTION A-A (Showing Handrail TY A) SECTION B-B (Showing Handrail TY B)



SECTION C-C (Showing Handrail TY C) SECTION D-D (Showing Handrail TY D)

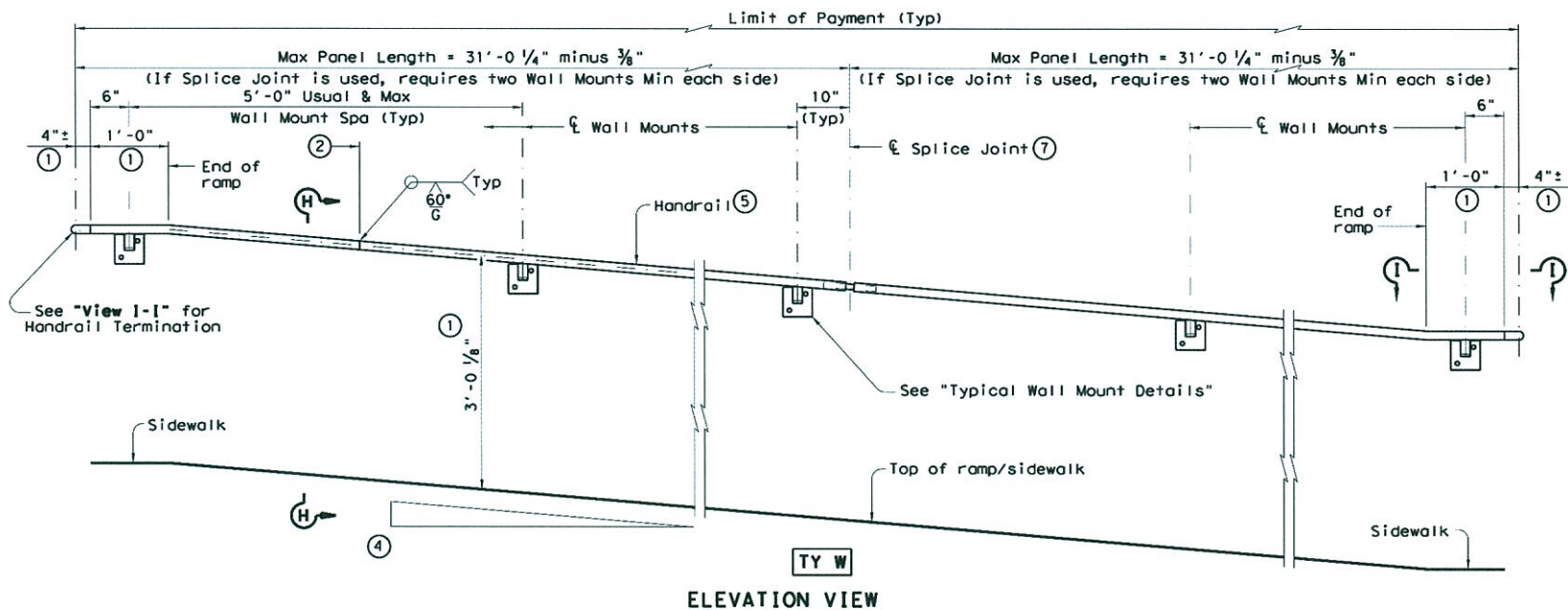
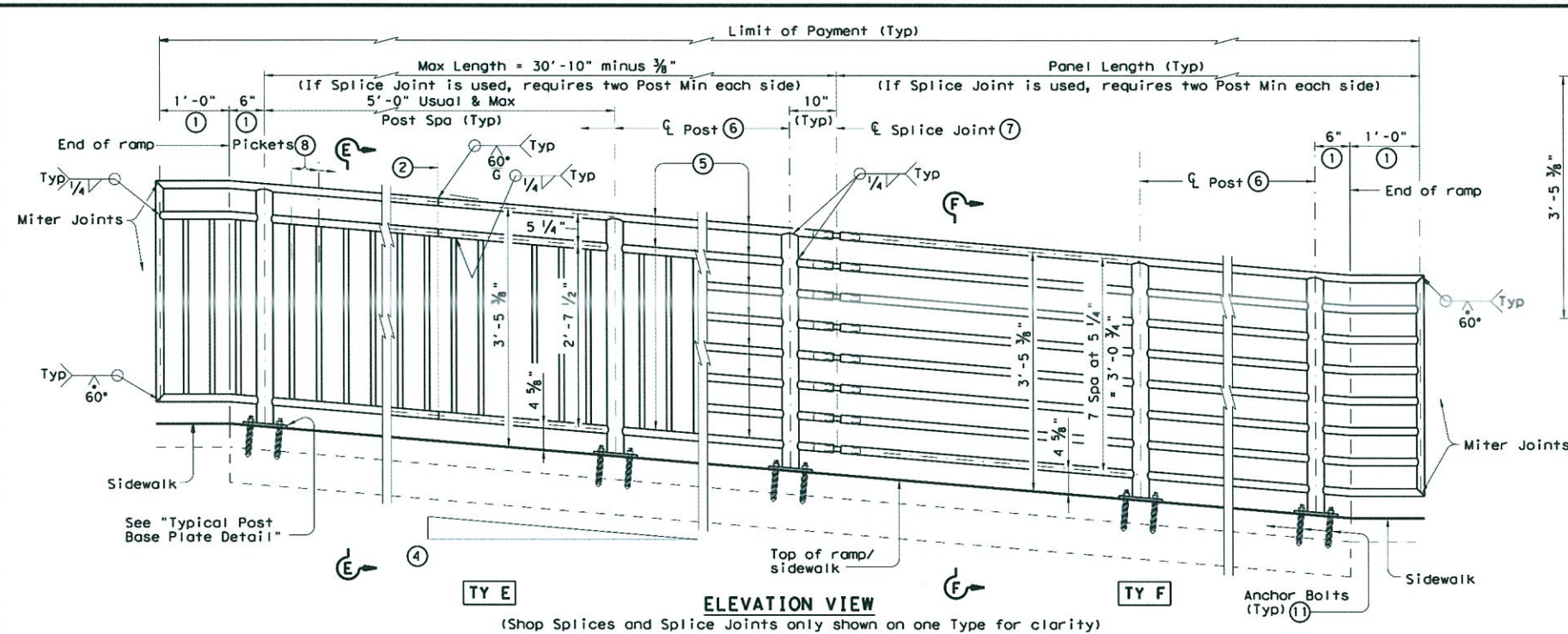
Texas Department of Transportation		Design Division Standard	
PEDESTRIAN HANDRAIL DETAILS			
PRD-13			
FILE: prd13.dgn	DW: TxDOT	CK: AM	DW: JTR
© TxDOT December 2006	CONT: SECT	JOB: HIGHWAY	
REVISIONS			
REVISED MAY, 2013 (VP)	DIST: COUNTY	SHEET NO.	



\\Antares2\Share_Eng\Drawings\Terry Wallers\Land Projects\2017\Trail by the Railroad\DWG\Trail.dwg, PRD-13-2, 11/29/2018 4:43:34 PM

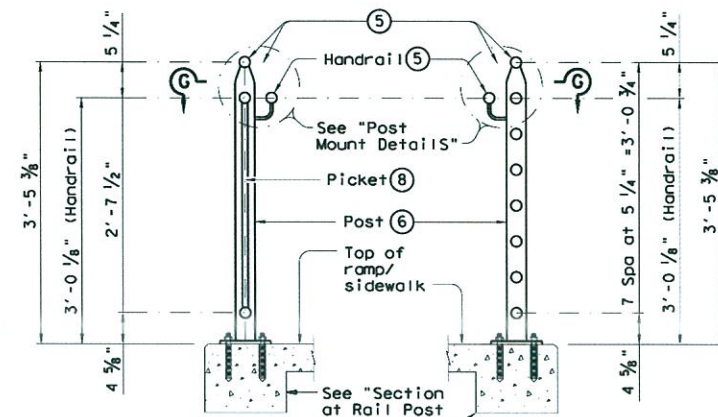
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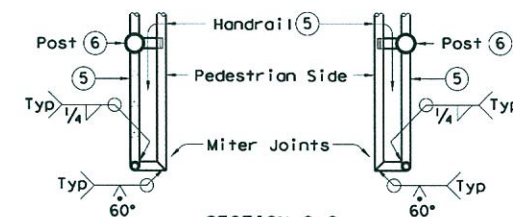


- ① Parallel to ground.
- ② One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
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- ④ See Ramp Details located elsewhere in plans for ramp slope and dimensions. Maximum ramp slope will not exceed 8.3 percent. Level landing required for each 30' rise if grade exceeds 5 percent.
- ⑤ 1 1/2" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1 1/2" Dia. pipe for galvanizing drainage and venting.

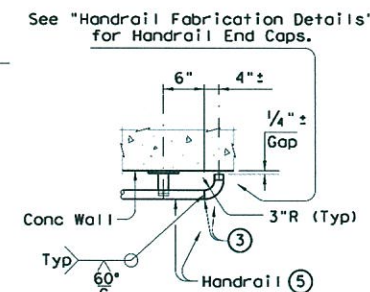
- ⑥ 2 1/2" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). See "Post Mount Detail" for crimping and trimming post to fit Dia. of top rail. Provide holes as needed in post for galvanizing drainage and venting. Plumb all posts.
- ⑦ See "Handrail Fabrication Details" for Splice Joints.
- ⑧ 1/2" Dia. Round Bar equal spacing at 4 1/2" Max. Plumb all pickets.
- ⑨ See "General Notes" for anchor bolt information.



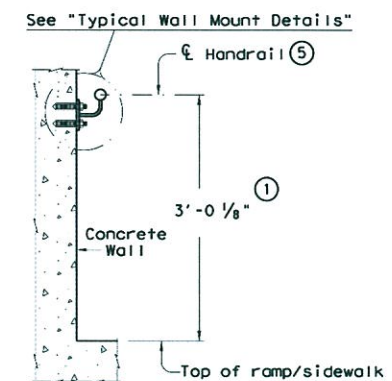
SECTION E-E (Showing Handrail TY E) SECTION F-F (Showing Handrail TY F)



SECTION G-G (Showing Handrail Termination)



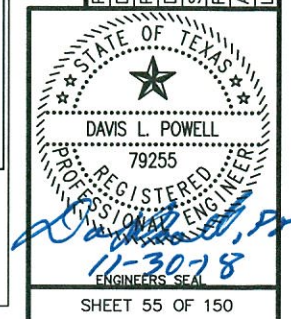
VIEW I-I (Showing Handrail Termination)



SECTION H-H (Showing Handrail TY W)

SHEET 2 OF 3

Texas Department of Transportation		Design Division Standard	
PEDESTRIAN HANDRAIL DETAILS			
PRD-13			
FILE: prd13.dgn	DWG: TxDOT	CHK: AM	DWG: JTR
REVISED MAY, 2013 (VP)	CON: SECT	JOB	HIGHWAY
DIST		COUNTY	SHEET NO.



SHEET 55 OF 150

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

HANDRAIL - 2
PRD - 13

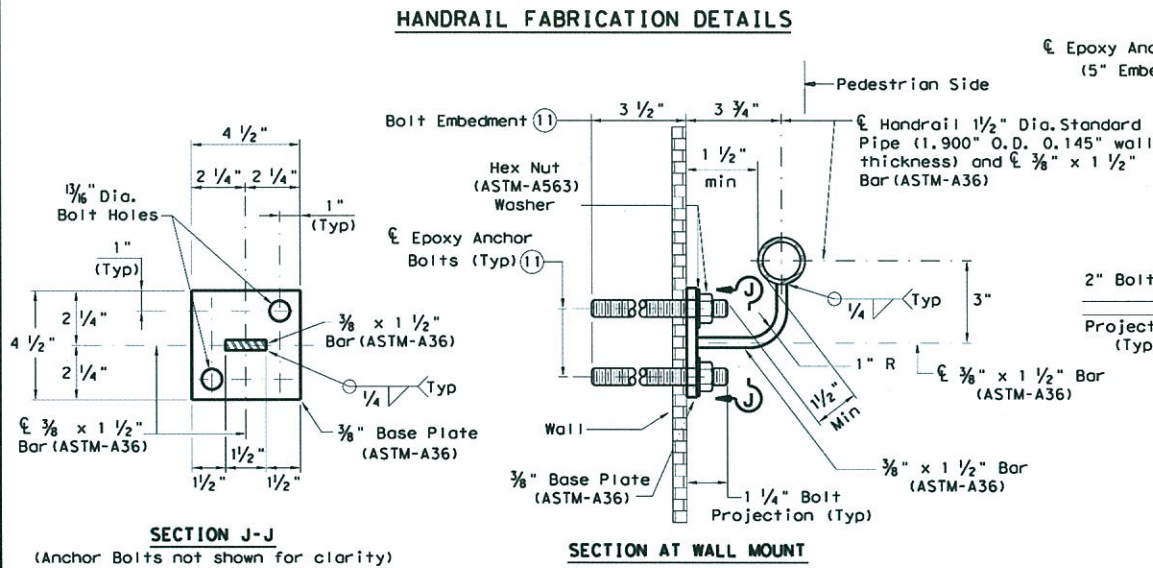
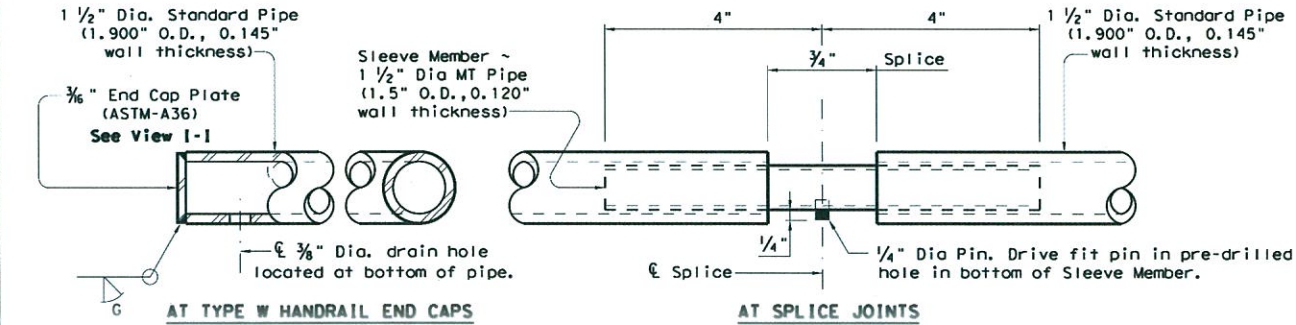
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DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: PRD-13-2



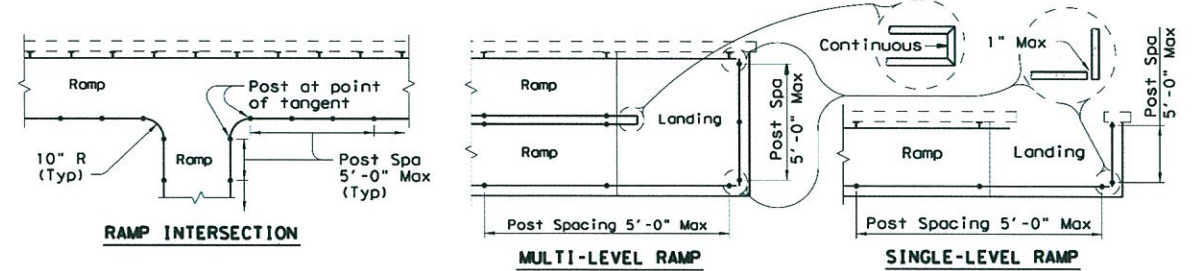
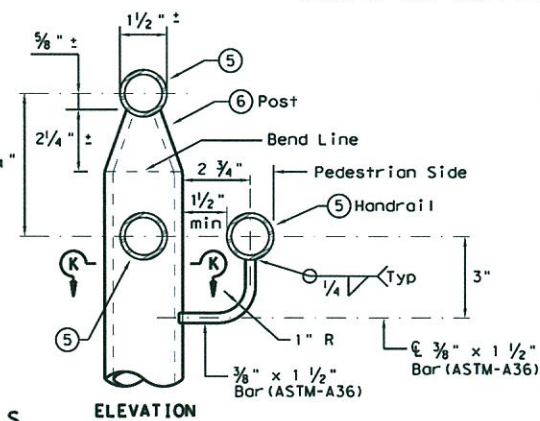
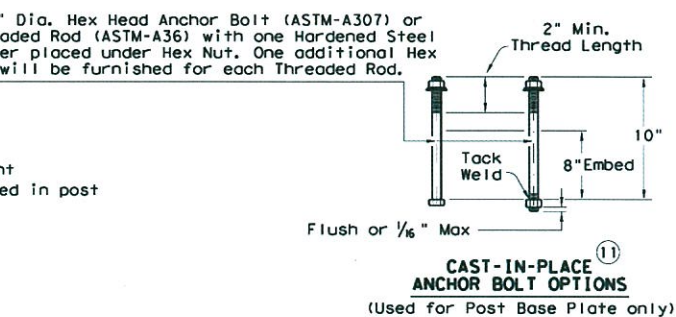
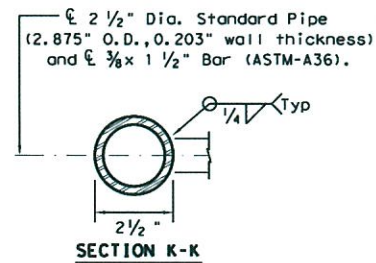
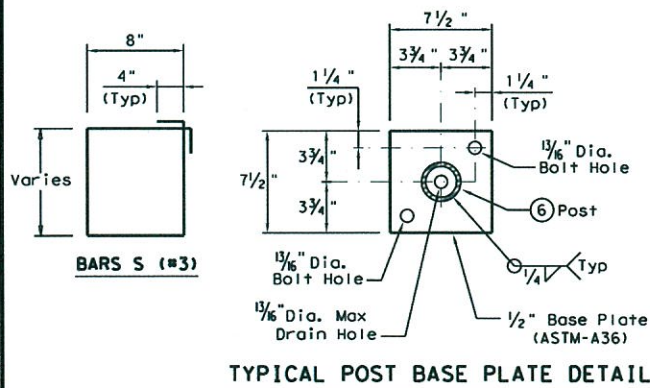
NO. DATE DESCRIPTION BY
REVISIONS

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FILE:



- ⑤ 1 1/2" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp/sidewalk. Provide holes as needed in 1 1/2" Dia. pipe for galvanizing drainage and venting.
- ⑥ 2 1/2" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). Plumb all posts. See "Post Mount Detail" for crimping and trimming post to fit the diameter of top rail. Provide holes as needed in post for galvanizing drainage and venting.
- ⑪ See "General Notes" for anchor bolt information.
- ⑫ Bars S(#3) spaced at 12" Max (Spaced 3" from outside edge of overall length of Ramp/Sidewalk).
- ⑬ Provide 1 1/2" end cover to Bars D(#4) from outside edge of overall length of Ramp/Sidewalk.



GENERAL NOTES

Designed according to ADAAG, Texas Accessibility Standards, Uniform Building Code, and AASHTO LRFD Specifications.

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

Pipe will conform to ASTM-A53 Grade B or A500 Grade B. Steel plates and steel bars will conform to ASTM-A36. Mechanical tubing (MT) will conform to ASTM A513 Grade 1015 or higher. Galvanize all steel components except reinforcing steel unless noted otherwise.

Concrete for foundations will be in accordance with Item 531 "Sidewalks". All reinforcing steel must be Grade 60. Bar laps, where required, will be as follows: Uncoated ~ #4 = 1'-5" Epoxy coated ~ #4 = 2'-1"

When the plans require painted steel, follow the requirements for painting galvanized steel in Item 446, "Cleaning and Painting Steel". Sleeve Members will receive galvanization and only get field painted after installation unless directed otherwise by Engineer.

Epoxy Anchor bolts for wall mount and post base plate will be 3/8" Dia. ASTM A36 threaded rods with one hex nut and one hardened steel washer at each bolt. 3/8" Dia. threaded rod embedment depth for wall mounts is 3 1/2" and embedment depth for post base plate is 5".

Embed threaded rods into concrete with a Type III (Class C) epoxy meeting the requirements of DMS-6100, "Epoxyes and Adhesives". Mix and dispense adhesive with the manufacturer's static mixing nozzle/dual cartridge system. Core drill holes (percussion drilling not permitted).

At the contractor's option the post base plate anchor bolts may be cast with the Ramp/Sidewalk (See Cast-in-Place Anchor Bolt Options).

Optional cast-in-place anchor bolts will be 3/8" Dia ASTM A307 Grade A bolts (or A36 threaded rods with one tack welded hex nut each) with one hex nut and one hardened steel washer at each bolt. Embedment depth of cast-in-place bolt will be 8" for post base plate.

Handrails and any wall or other surface adjacent to them will be free of any sharp or abrasive elements.

Submit shop drawings to the Engineer unless otherwise noted. For curved handrail applications, fabricate the handrail to the curve if radius is less than 600 ft. Shop drawings are required when rail is fabricated to the curve.

For all handrails, erection drawings will be submitted to the Engineer for approval to ensure proper installation.

Drawings will show handrail mount locations with bolts setting, spacing, ramp slope, and/or splice joint locations, and handrail lengths with identification showing where each handrail goes on the layout.

Payment for concrete sidewalks or curb ramps will be paid for in accordance with Item 531 "Sidewalks".

Payment for all items shown is to be included in unit price bid in accordance with Item 450 "Railing" of the type specified.

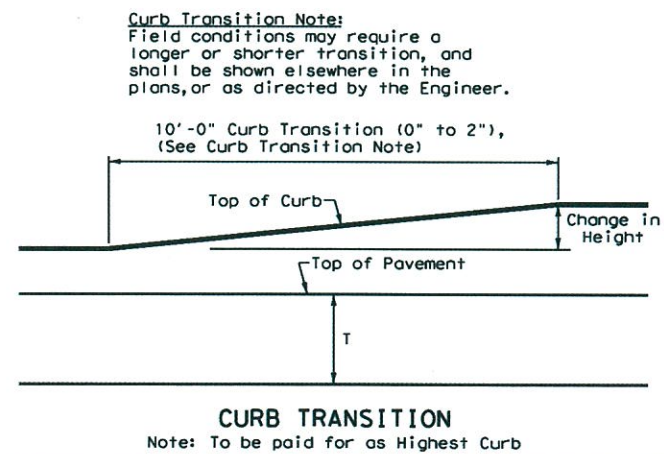
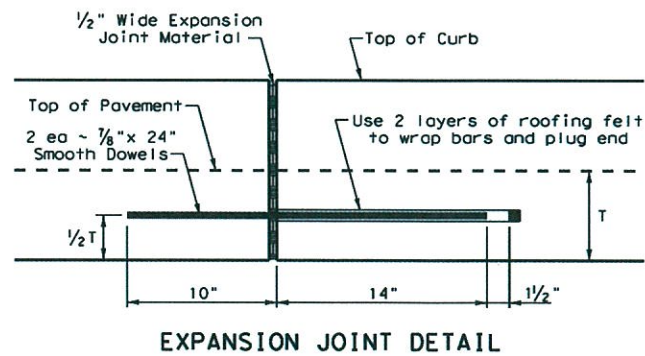
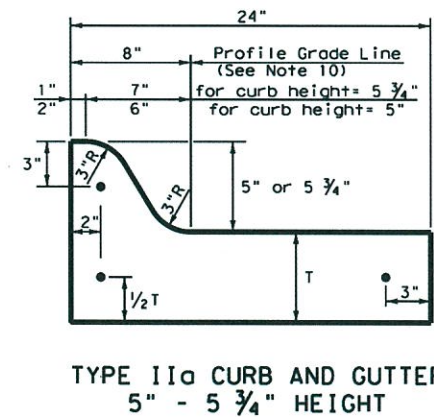
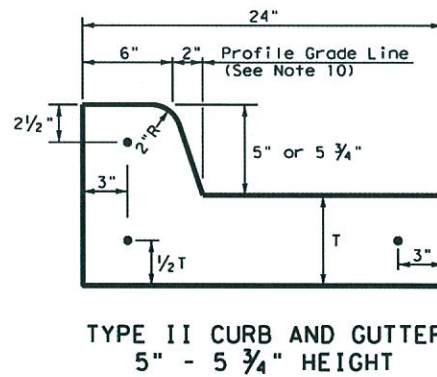
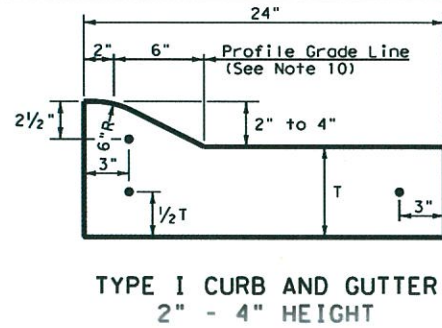
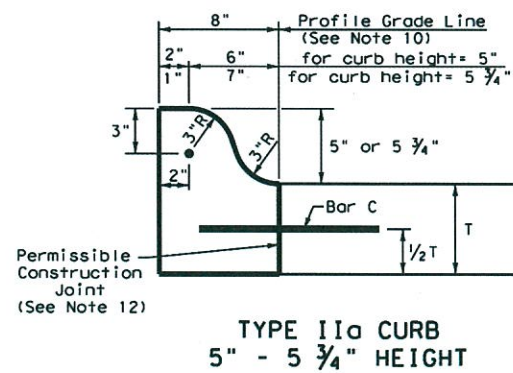
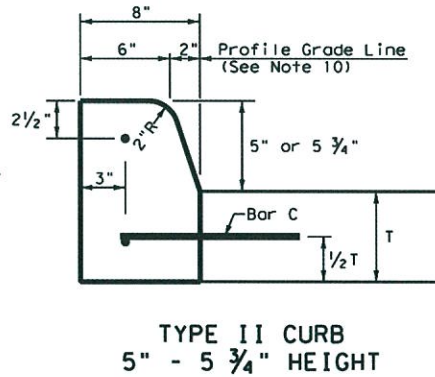
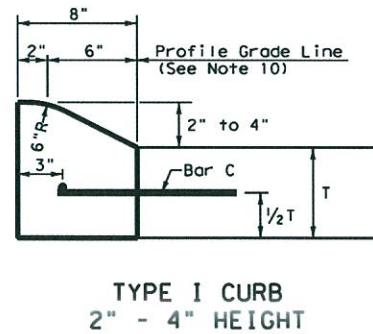
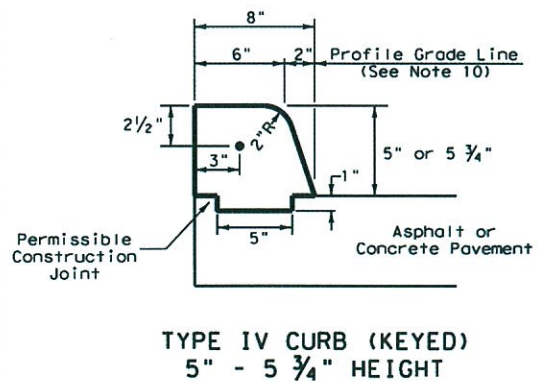
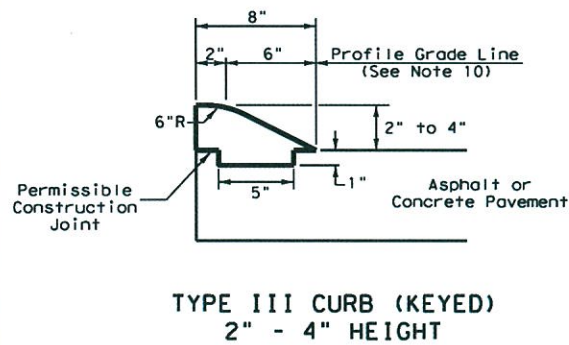
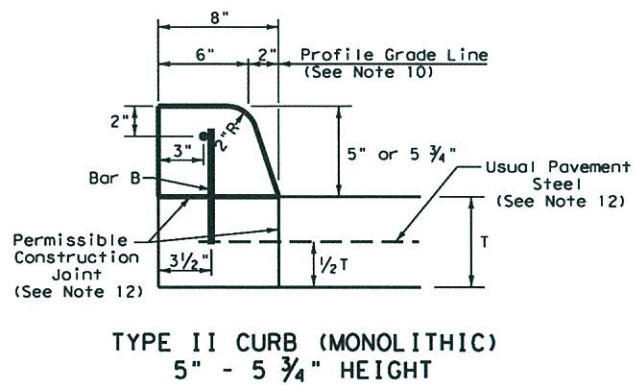
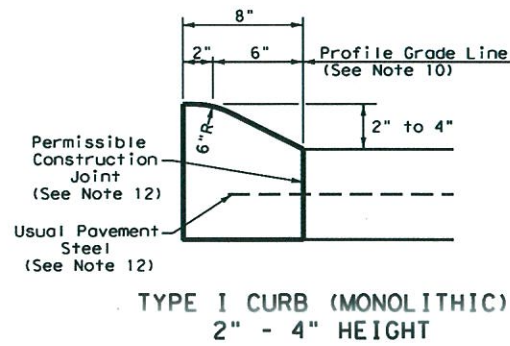
All exposed edges will be rounded or chamfered to approximately 1/8" by grinding.

SHEET 3 OF 3

Texas Department of Transportation		Design Division Standard	
PEDESTRIAN HANDRAIL DETAILS			
PRD-13			
FILE: prd13.dgn	DW: TxDOT	CK: AM	DW: JTR
© TxDOT December 2006	CONT	SECT	JOB
REVISIONS	HIGHWAY		
REVISED MAY, 2013 (VP)	DIST	COUNTY	SHEET NO.

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DATE: FILE:



General Notes

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Producer List (MPL), maintained by TxDOT, Construction Division.
4. Round exposed sharp edges with a rounding tool, to a minimum radius of 1/4 inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. Where concrete curb is placed on existing concrete pavement, the pavement shall be drilled and the reinforcing bars grouted in place.
7. Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C-C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. When vertical permissible construction joints are used, resulting in a longitudinal construction joint in the pavement, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans for longitudinal construction joints. Reinforcing steel for curb section shall then conform to that required for concrete curb.



Texas Department of Transportation		Design Division Standard	
CONCRETE CURB AND GUTTER			
CCCCG-12			
FILE: ccccg12.dgn	DN: TxDOT	CK: AM	DR: VP
© TxDOT: 1995	CON: SECT	JOB: HIGHWAY	
REVISED: 2012 - VP	DIST:	COUNTY:	SHEET NO:



HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CCWF17-444-11
CONCRETE CURB & GUTTER
CCCCG-12

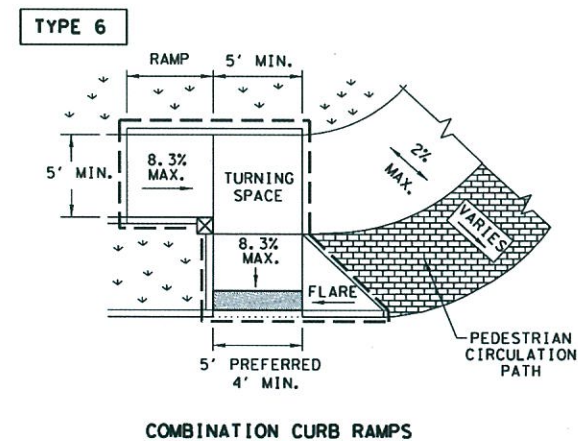
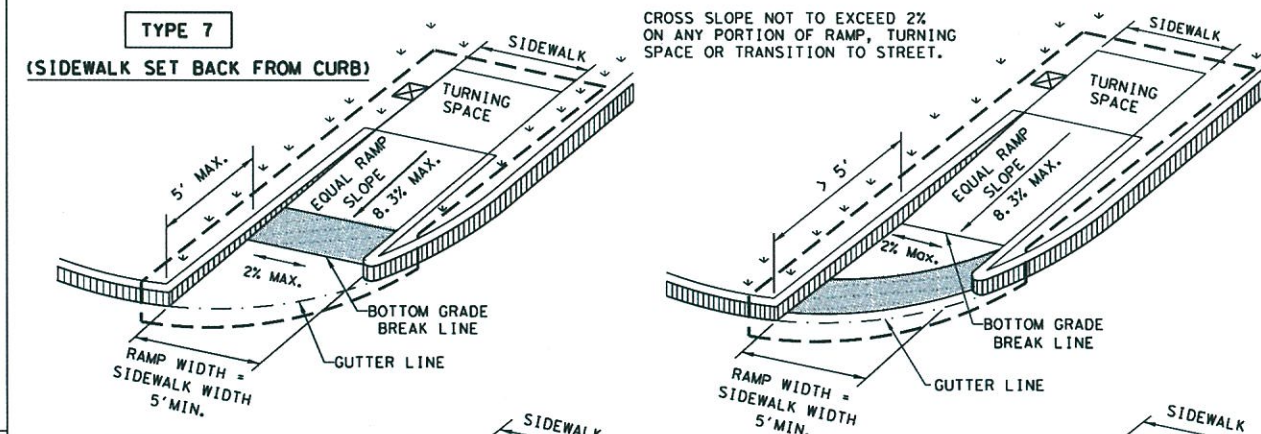
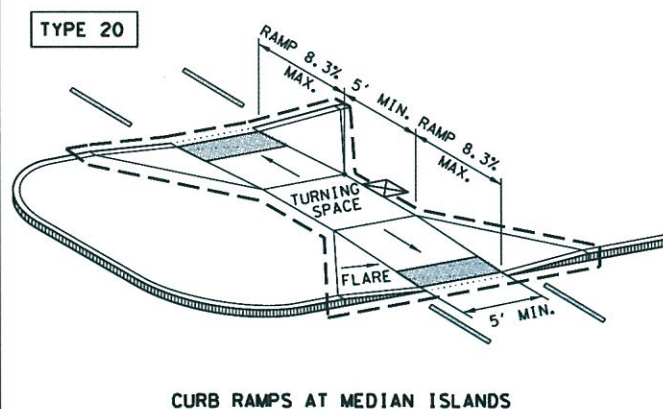
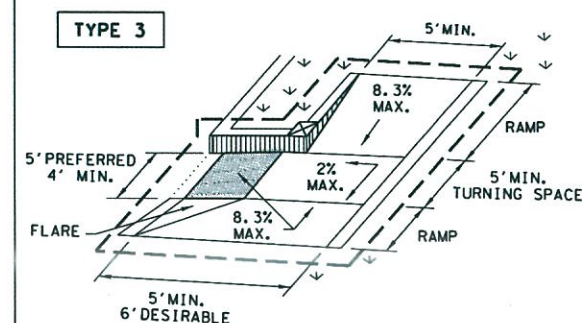
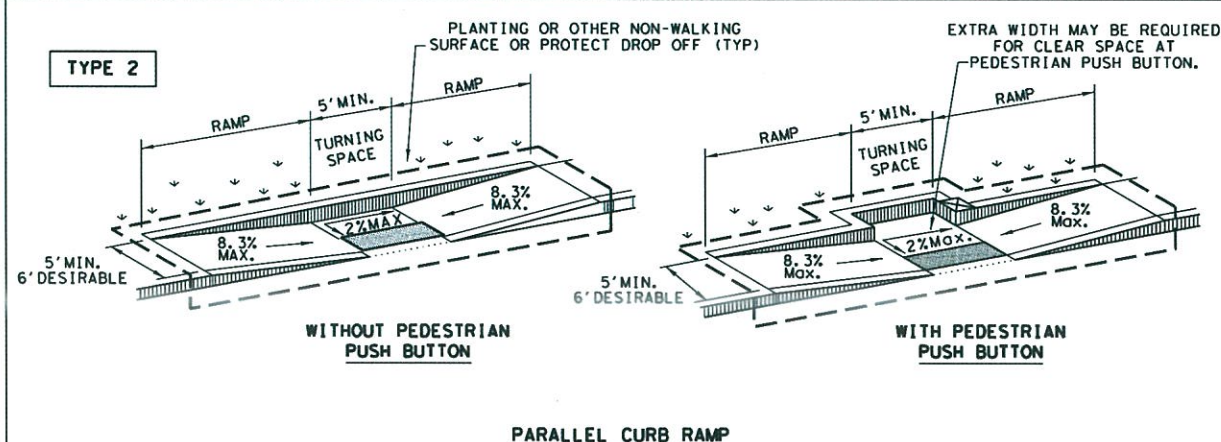
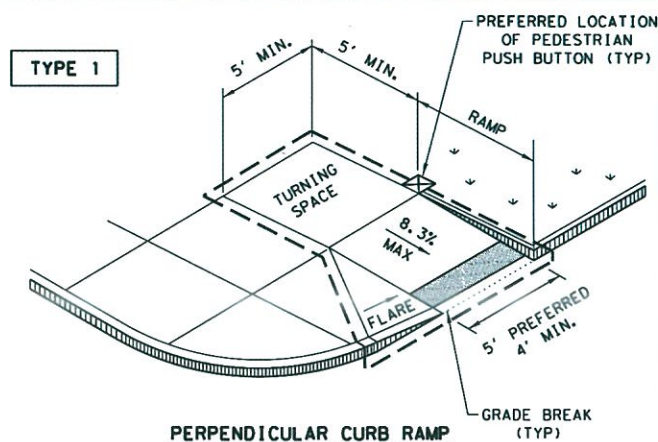
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DRAWN BY: TW
PROJECT NUMBER: CCWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: CURB

NO.	DATE	DESCRIPTION	BY

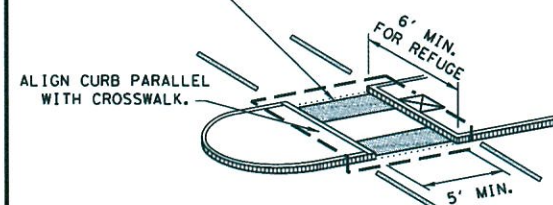


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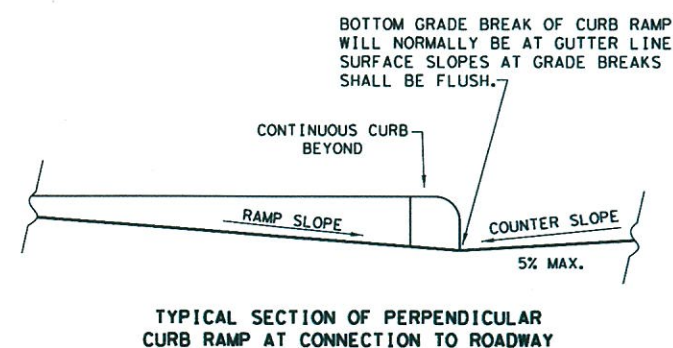
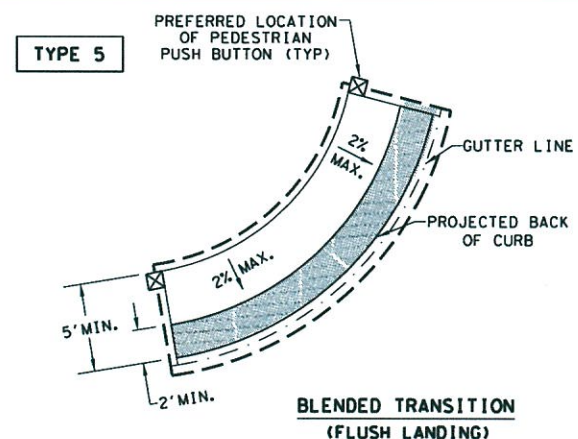
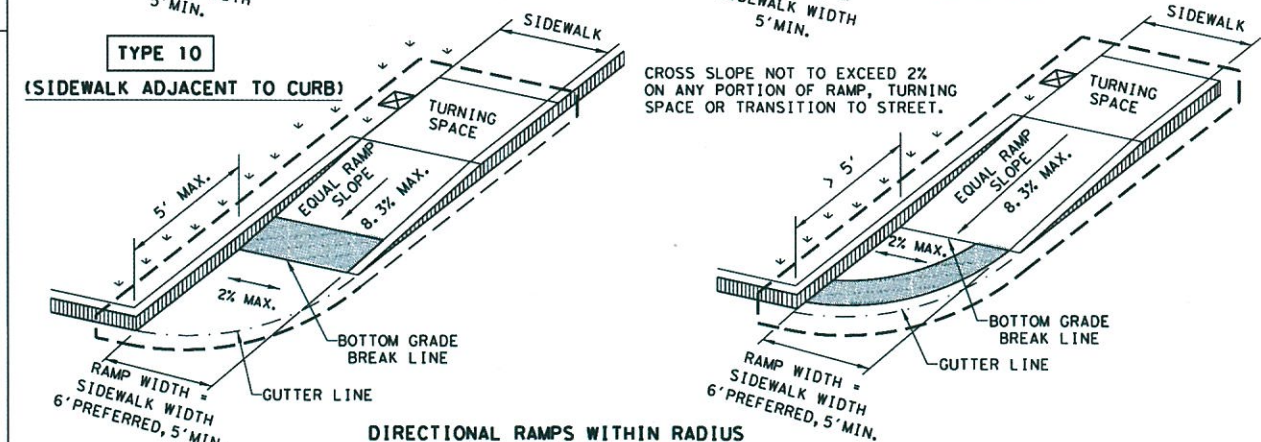
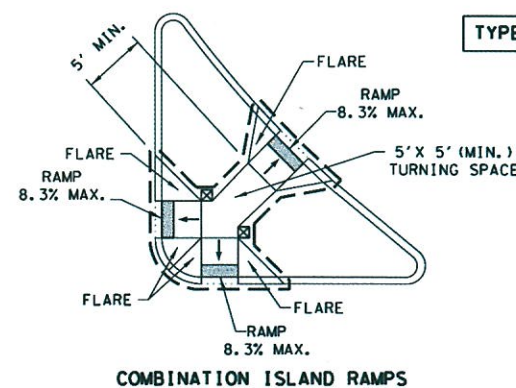
DATE.



INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.



NOTE: CURB DETAILS ARE SHOWN
ELSEWHERE IN THE PLANS



NOTES / LEGEND:

SEE GENERAL NOTES ON SHEET 2 OF 4 FOR MORE INFORMATION.

DENOTES PLANTING OR
NON-WALKING SURFACE
NOT PART OF PEDESTRIAN
CIRCULATION PATH.

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION
OF PEDESTRIAN PUSH BUTTON
IF APPLICABLE.

GUTTER LINE

GRADE BREAK

RAMP LIMITS

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SHEET 1 OF 4


Texas Department of Transportation

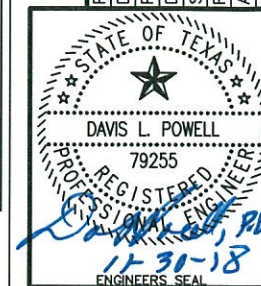
**Design
Division
Standard**

PEDESTRIAN FACILITIES

CURB RAMPS

PED-18

FILE: ped18	DH: TxDOT	DH: VP	Ck: KM	Ck: PK & JC
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				
REVISED 08, 2005				
REVISED 04, 2012				
REVISED 01, 2018	DIST	COUNTY		SHEET NO.



SHEET 58 OF 150

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

PEDESTRIAN FACILITIES CURB RAMPS - 1

PED-18

[illegible]

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DATE: FILE:

GENERAL NOTES

CURB RAMPS

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
4. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5' x 5' passing areas at intervals not to exceed 200' are required.
5. Turning Spaces shall be 5' x 5' minimum. Cross slope shall be maximum 2%.
6. Clear space at the bottom of curb ramps shall be a minimum of 4' x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5' x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
16. Provide a smooth transition where the curb ramps connect to the street.
17. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
18. Existing features that comply with applicable standards may remain in place unless otherwise shown on the plans.

DETECTABLE WARNING MATERIAL

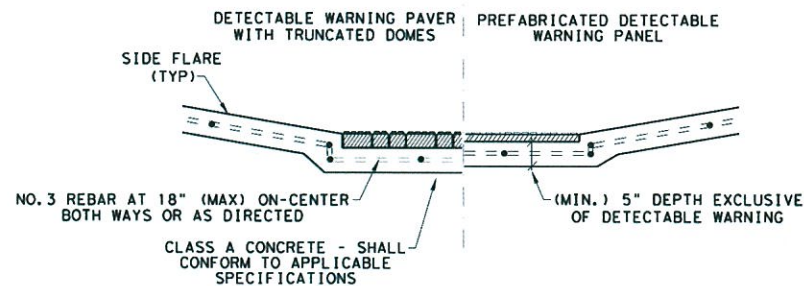
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cost-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
20. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
21. Detectable warning surfaces must be firm, stable and slip resistant.
22. Detectable warning surfaces shall be a minimum of 24 inches in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

DETECTABLE WARNING PAVERS (IF USED)

25. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

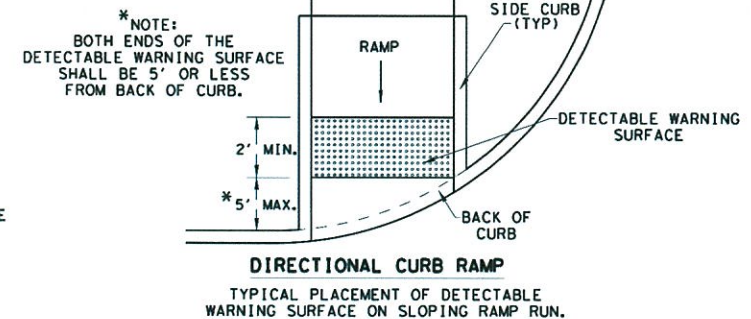
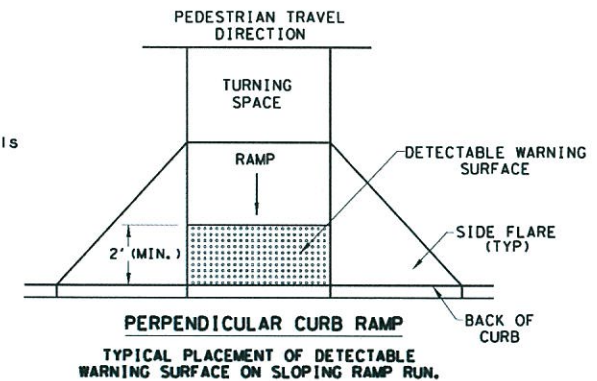
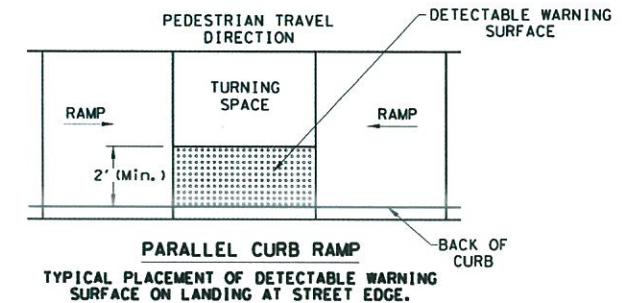
SIDEWALKS

27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
29. Street grades and cross slopes shall be as shown elsewhere in the plans.
30. Changes in level greater than 1/4 inch are not permitted.
31. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than five percent (5%) must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with PROWAG R409.
32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
33. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
34. Sidewalk details are shown elsewhere in the plans.



SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

DETECTABLE WARNING SURFACE DETAILS



SHEET 2 OF 4

Texas Department of Transportation		Design Division Standard	
PEDESTRIAN FACILITIES			
CURB RAMPS			
PED-18			
FILE: pec18	DATE: MARCH 1, 2002	CONF: SEC1	JOB: HIGHWAY
REVISIONS	REVISED 08/2005	DIST: COUNTY	SHEET NO.
REVISIONS	REVISED 06/2012		
REVISIONS	REVISED 01/2018		

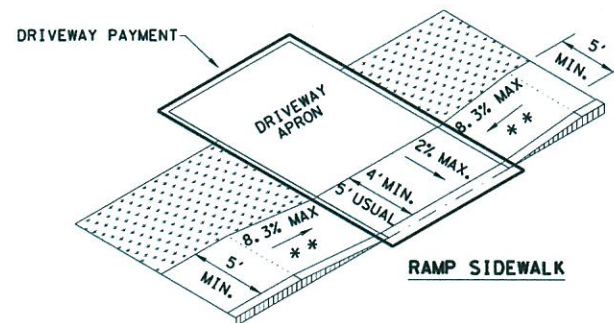
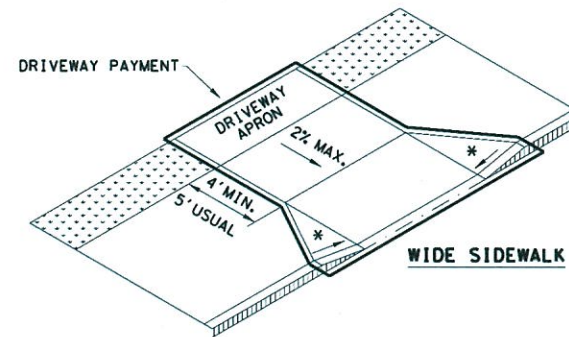
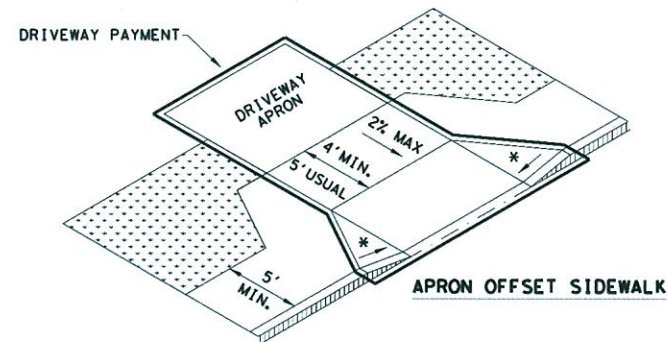
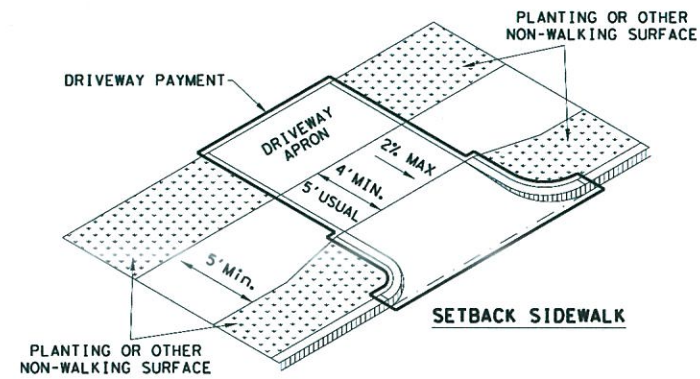


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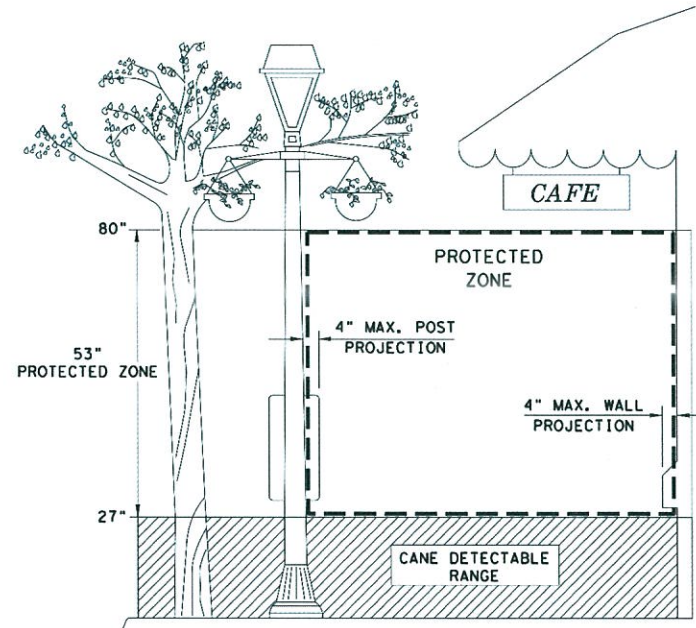
DISCLAIMER:
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DATE:
FILE:

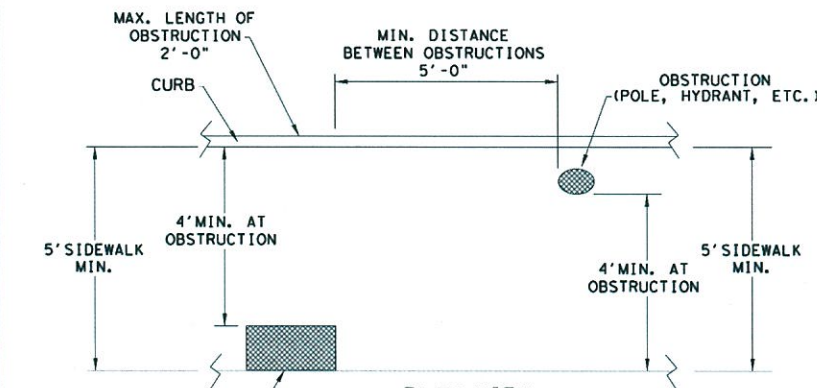
SIDEWALK TREATMENT AT DRIVEWAYS



- NOTES:
- * WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.
 - ** IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.

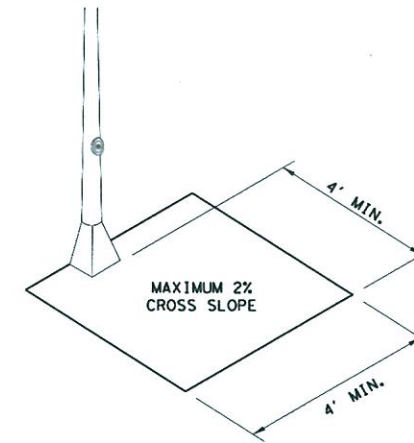


NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.

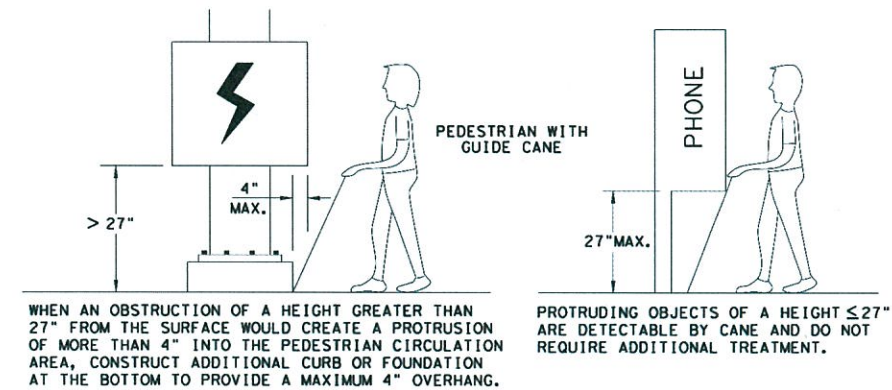


PLAN VIEW
PLACEMENT OF STREET FIXTURES

NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.



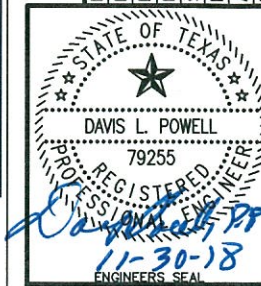
CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

SHEET 3 OF 4

Texas Department of Transportation		Design Division Standard	
PEDESTRIAN FACILITIES			
CURB RAMPS			
PED-18			
FILE: pec18	DW: TxDOT	DM: VP	CK: KV
© TxDOT: MARCH, 2002	CONT	SECT	JOB
REVISED 08, 2005	DIST	COUNTY	SHEET NO.
REVISED 06, 2012			
REVISED 01, 2018			



HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

PEDESTRIAN FACILITIES CURB RAMPS - 3
PED - 18

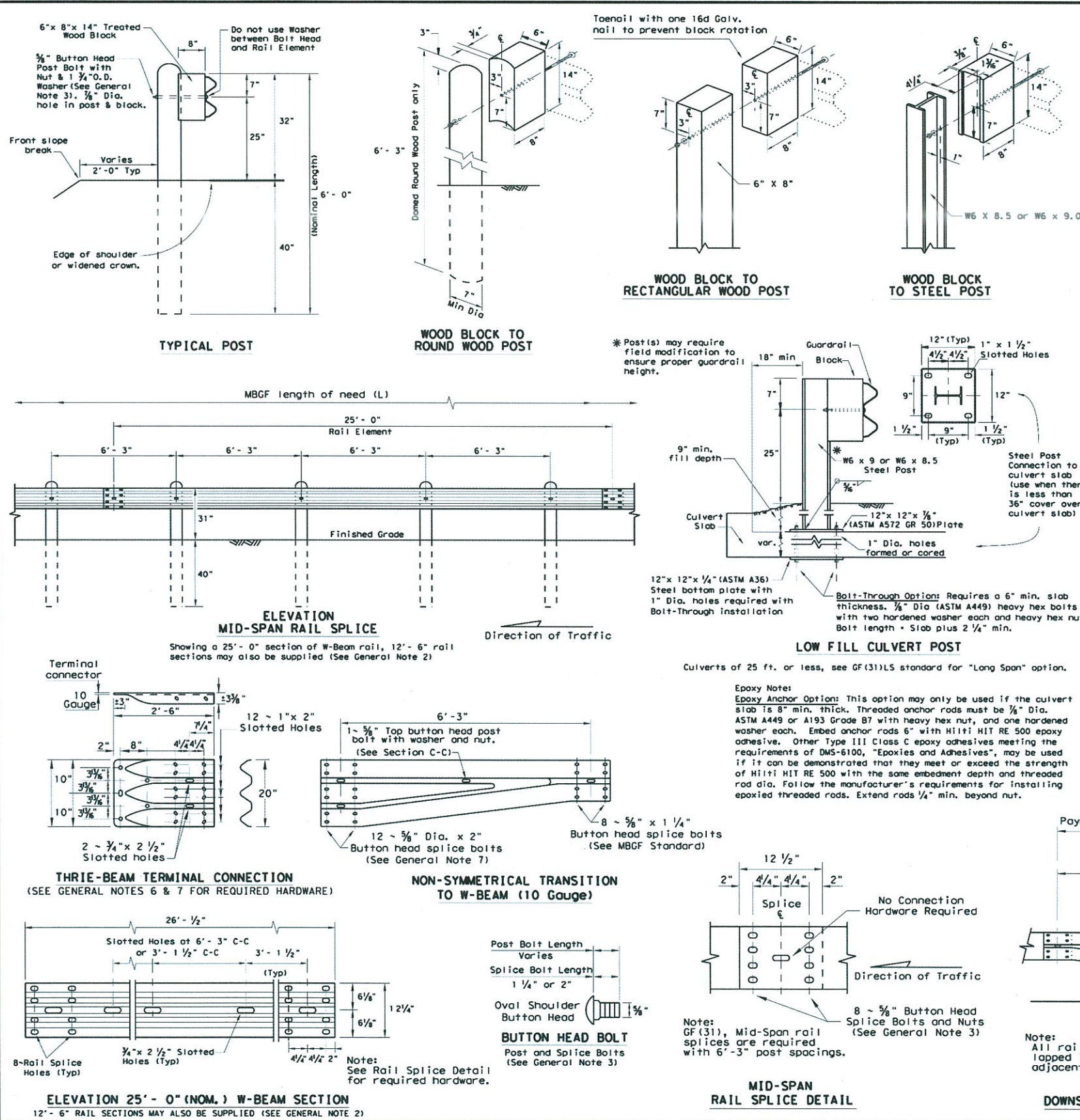
PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: PED-18-3

NO.	DATE	DESCRIPTION	BY



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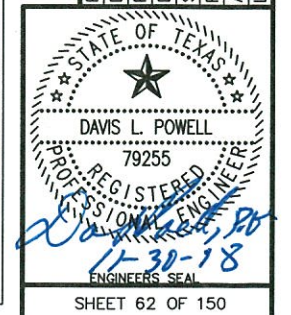
DATE: FILE:



GENERAL NOTES

1. The type of post (round wood post, rectangular wood post, or steel post) will be as shown in the plans. The exact position of MBGF shall be shown in the plans or as directed by the Engineer. Steel posts to be galvanized in accordance with Item 445, "Galvanizing."
2. Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified in the plans. The Contractor may furnish rail elements of 25'-0", or 12'-6" (nom.) lengths. Rail elements may have slotted holes at 3'-1 1/2" C-C or 6'-3" C-C. A special length of rail may be manufactured to accommodate the downstream anchor terminal (DAT) and the transition sections of guardrail.
3. Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and Type A (1 3/4" O.D.) washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are 3/4" x 1 1/4" (or 2" long at triple rail splices) with a 3/8" double recessed nut (ASTM A563). Thrie beam "connection" 3/8" dia. (ASTM A325) hex bolts shall be of sufficient length to extend through the full thickness of the rail, washers, and nuts.
4. Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
5. Crown shall be widened to accommodate the Metal Beam Guard Fence.
6. The lateral approach to the guard fence, shall have a maximum slope of 1V:10H.
7. If shown elsewhere in the plans or as directed by the Engineer, the guard fence may be flared at a rate of 25:1 or flatter.
8. Unless otherwise shown in the plans, guard fence placed in the vicinity of curbs shall be positioned so that the face of curb is located directly below or behind the face of the rail. Rail placed over curbs shall be installed so that the post bolt is located approximately 25 inches above the gutter pan or edge of shoulder.
9. If solid rock is encountered within 0 to 18" of the finished grade, drill a 22" dia. hole, or drill two 12" dia. front to back overlapping holes, 24" into the rock. If solid rock is encountered below 18", drill a 12" dia. hole, 12" into the rock or to the standard embedment depth, whichever maybe less. Any excess post length, after meeting these depths, may be field cut to ensure proper guardrail mounting height. Backfill with a cohesionless material.
10. Posts shall not be set in concrete, of any depth.
11. Special fabrication will be required at installations having a curvature of less than 150 ft. radius.
12. Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL may furnish composite material posts and/or blocks.
13. For posts located partially or wholly between precast box culvert units, the use of a cast-in-place concrete closure between boxes is required. See Detail "A" on Bridge Standard SCP-MD.

		Design Division Standard	
METAL BEAM GUARD FENCE			
GF (31) - 14			
FILE: gf31'14.dgn	DWG: TxDOT	CHK: AM	DWG: V/P
© TxDOT: December 2011	CONT: SECT	JOB	HIG-WAY
REVISIONS			
DIST	COUNTY	SHEET NO.	



HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

GUARD FENCE - 1
GF (31) - 14

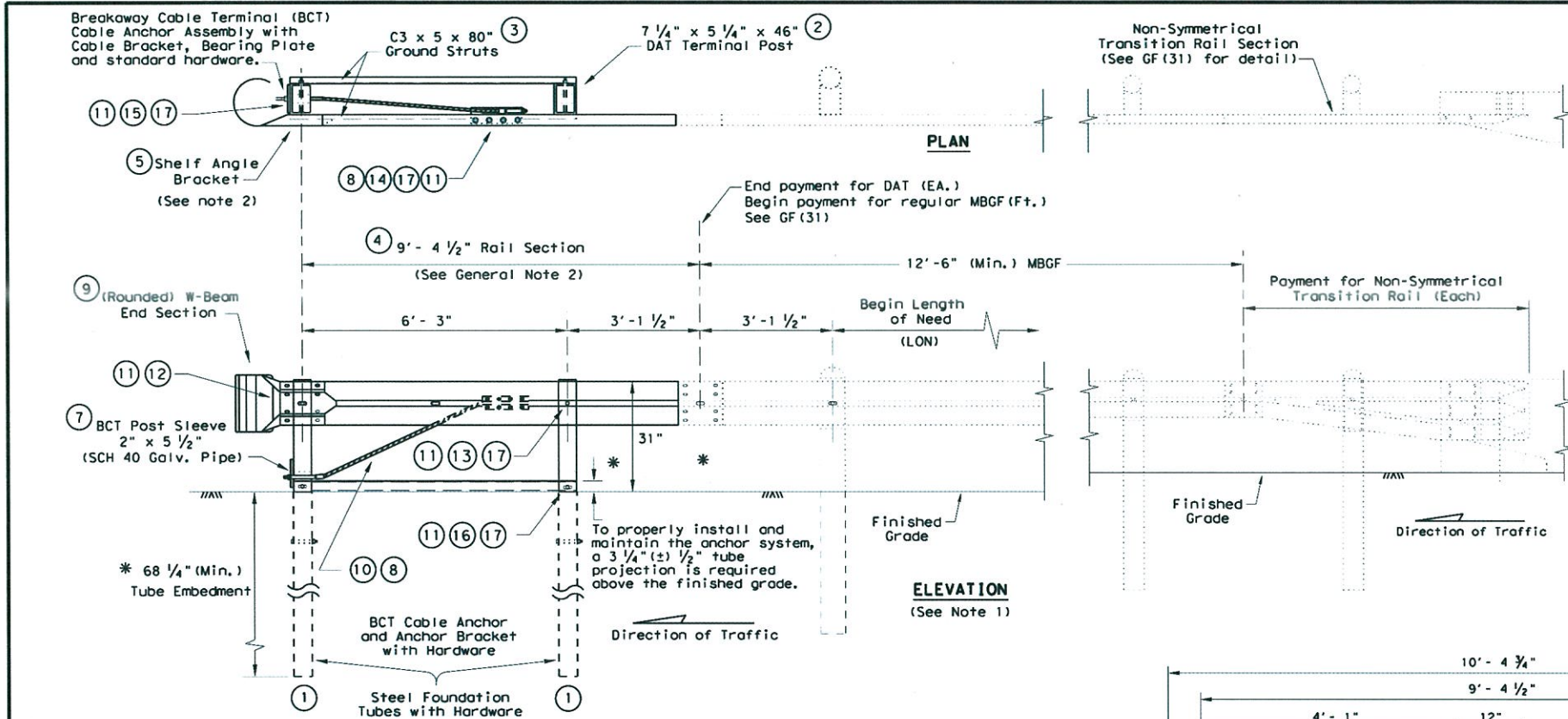
PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: GF(31)-14

NO.	DATE	DESCRIPTION	BY



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DATE:
FILE:



DOWNSTREAM ANCHOR TERMINAL (DAT)

Only for downstream use, when located outside the horizontal clearance area of opposing traffic.

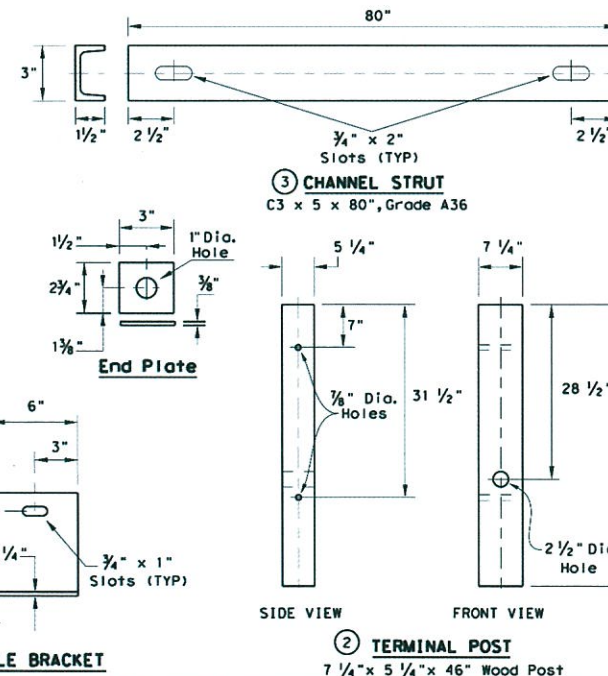
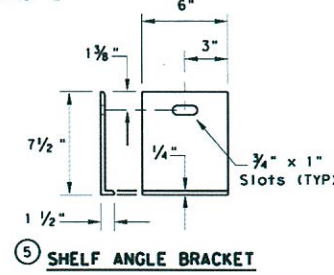
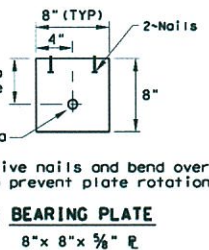
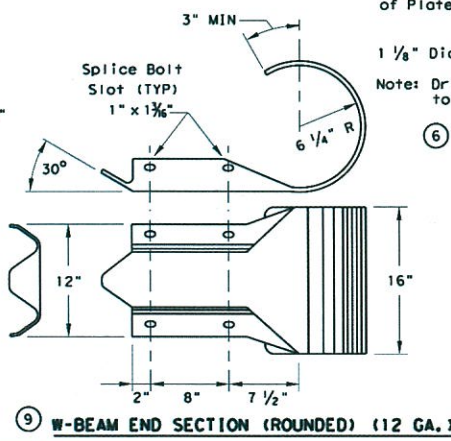
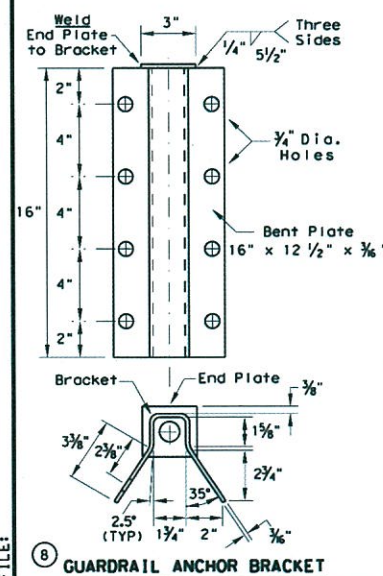
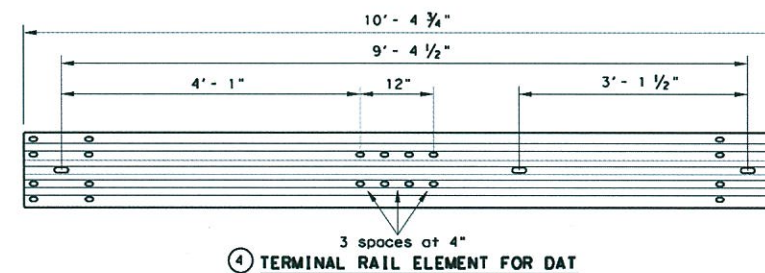
GENERAL NOTES

1. The detail shown is the minimum length of Need (LON) for a DAT connected to a concrete rail.
2. The rail section at the end post is supported by the Shelf Angle Bracket. The rail element is not attached to the end post.
3. The foundation tubes shall not project more than 3 3/4" above the finished grade.
4. All hardware for DAT shall be ASTM A307 unless otherwise shown.
5. Refer to GF(31) sheet for terminal connection details.

MOW STRIP INSTALLATION

If a mow strip is required with the DAT installation the leave-out area around the steel foundation tubes and the two channel struts may be omitted. This will require a full pour at the foundation tubes.

#	(DAT) PARTS LIST	QTY
1	Steel Foundation Tube	2
2	DAT Terminal Post	2
3	Channel Strut	2
4	Terminal Rail Element	1
5	Shelf Angle Bracket	1
6	BCT Bearing Plate	1
7	BCT Post Sleeve	1
8	Guardrail Anchor Bracket	1
9	(Rounded) W-Beam End Section	1
10	BCT Cable Anchor	1
11	Recessed Nut, Guardrail	20
12	1 1/4" Button Head Bolt	4
13	10" Button Head Bolt	2
14	5/8" x 2" Hex Head Bolt	8
15	5/8" x 8" Hex Head Bolt	4
16	5/8" x 10" Hex Head Bolt	2
17	5/8" Flat Washer	18



Texas Department of Transportation		Design Division Standard	
METAL BEAM GUARD FENCE (Downstream Anchor Terminal)			
GF(31)DAT-14			
FILE: gf31dat14.cgn	DW: TxDOT	CHK: AM	DW: VP
© TxDOT: December 2011	CONF: SECT	JOB	HIGHWAY
REVISIONS		DIST	COUNTY
		SHEET	NOL

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

GUARD FENCE - 2
GF(31) DAT -14

PROJECT MANAGER:
DRAWN BY: TW

PROJECT NUMBER: CWF17-444-11

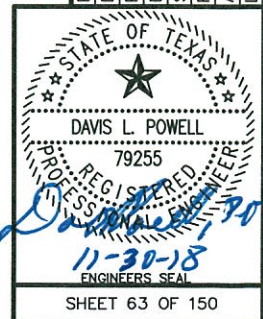
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SCALE: AS SHOWN

FIELD BOOK:

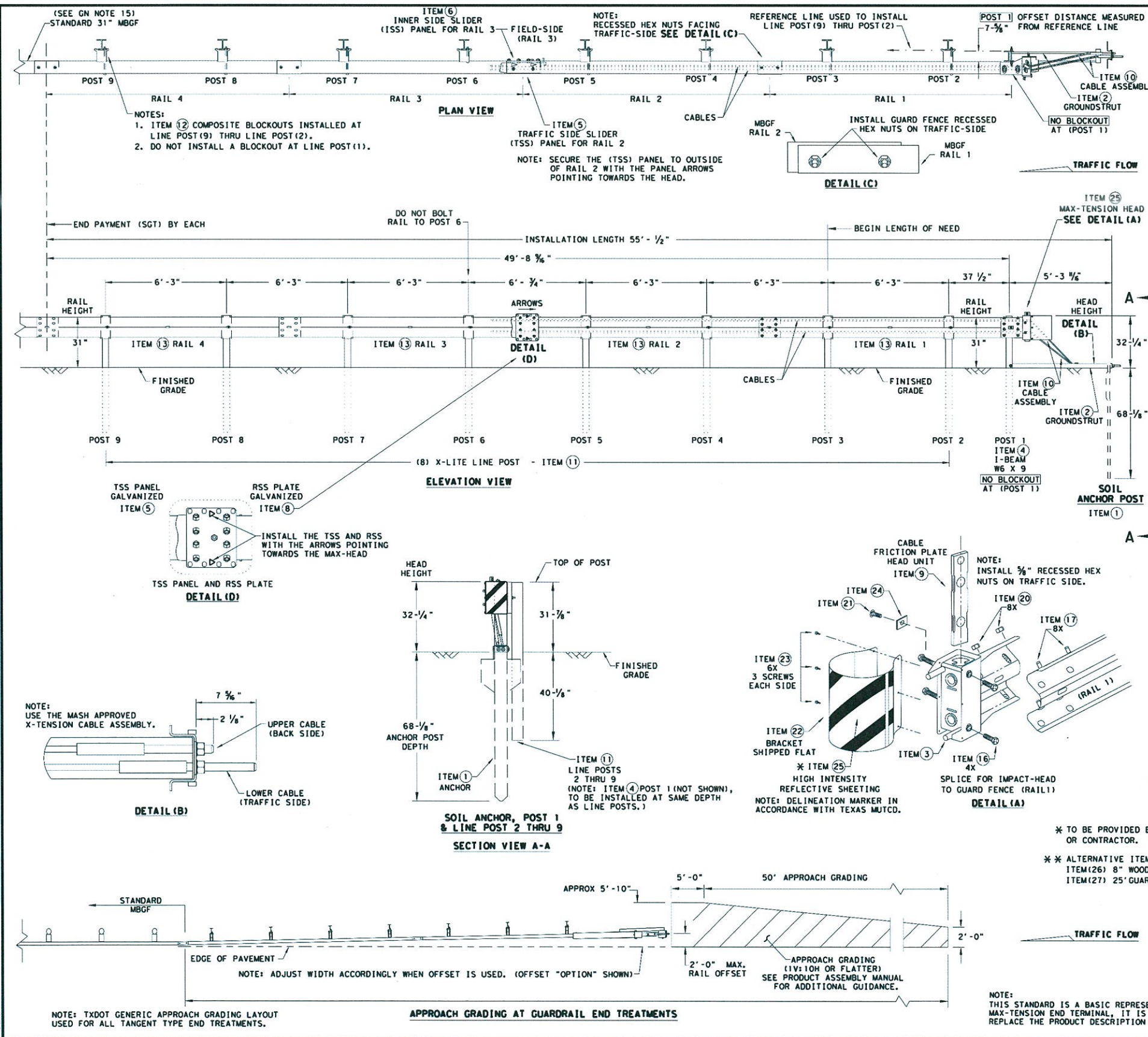
ACAD: XX

LAYOUT: GF(31)DAT-14



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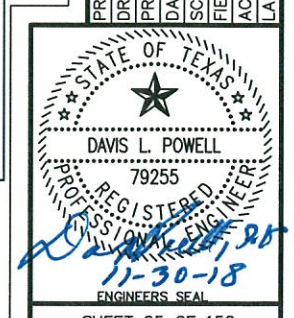
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- GENERAL NOTES**
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800.
 - FOR INSTALLATION, REPAIR, & MAINTENANCE REFER TO THE: MAX-TENSION INSTALLATION INSTRUCTION MANUAL. P/N MANMAX REV D (ECN 3516).
 - APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
 - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TxDOT'S LATEST ROADWAY MOW STRIP STANDARD.
 - ALL STEEL COMPONENTS ARE GALVANIZED PER ASTM A123 OR EQUIVALENT UNLESS OTHERWISE STATED.
 - SYSTEM SHOWN USING STEEL WIDE FLANGE POST WITH COMPOSITE BLOCKOUTS.
 - COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
 - REFER TO INSTALLATION MANUAL FOR SPECIFIC PANEL LAPPING GUIDANCE.
 - IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL FOR INSTALLATION GUIDANCE.
 - POSTS SHALL NOT BE SET IN CONCRETE.
 - A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POST TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST.
 - MAX-TENSION SYSTEM SHALL NEVER BE INSTALLED WITHIN A CURVED SECTION OF GUARDRAIL.
 - IF A DELINEATION MARKER IS REQUIRED, MARKER SHALL BE IN ACCORDANCE WITH TEXAS MUTCD.
 - THE SYSTEM IS SHOWN WITH 12'-6" MBGF PANELS, 25'-0" MBGF PANELS ARE ALSO ALLOWED.
 - A MINIMUM OF 12'-6" OF 12GA. MBGF IS REQUIRED IMMEDIATELY DOWNSTREAM OF THE MAX-TENSION SYSTEM.

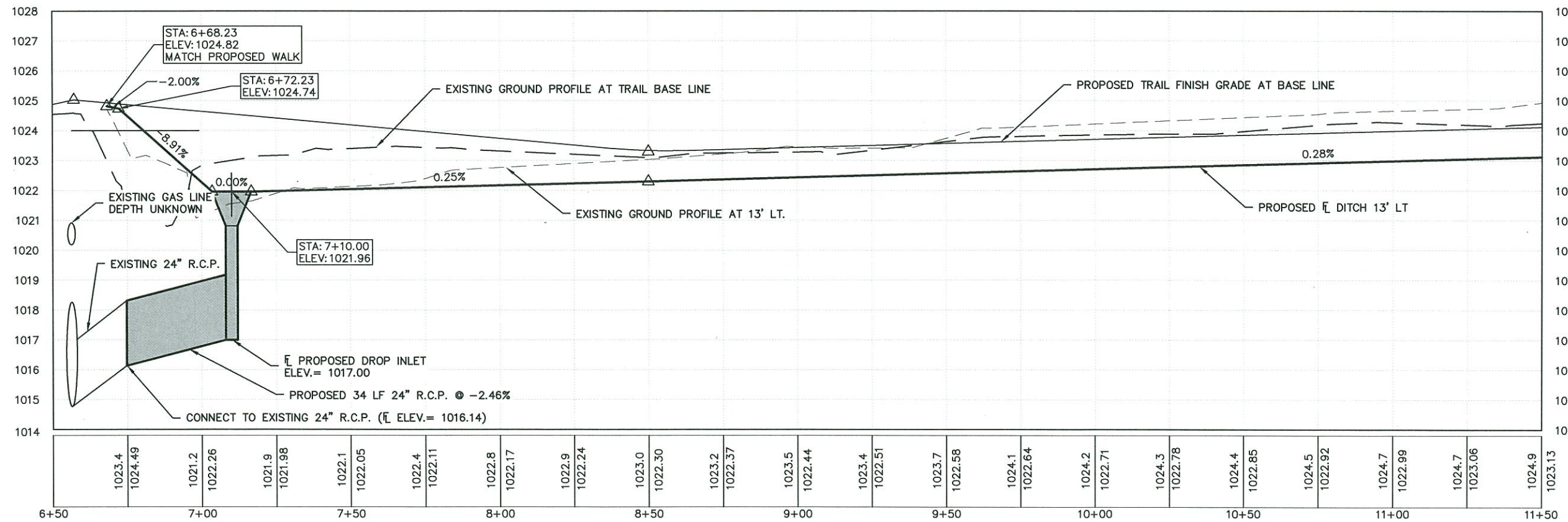
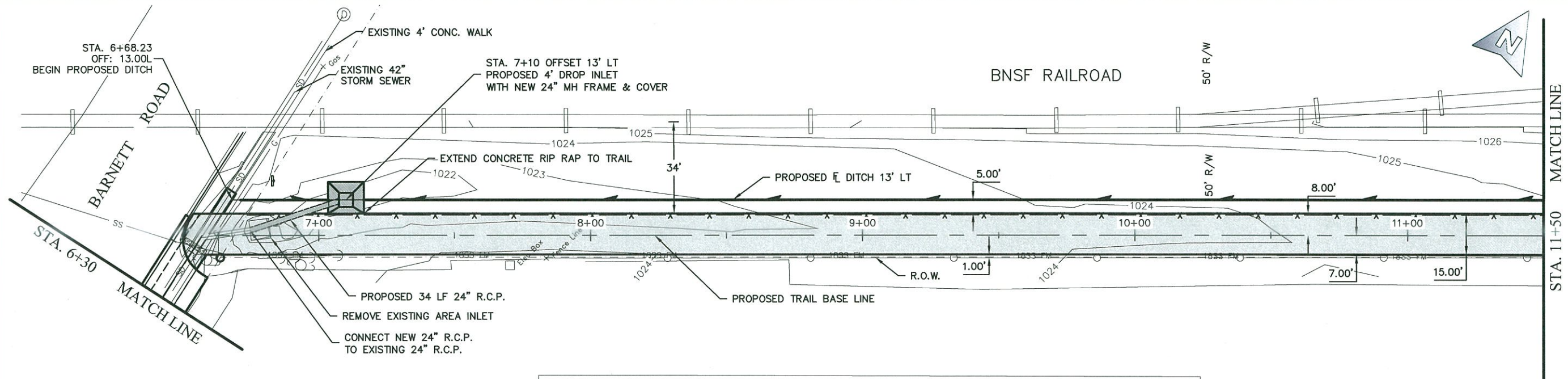
ITEM #	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	3/4" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	3/4" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	3/4" X 1 1/4" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	3/4" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	3/8" WASHER F436 STRUCTURAL MGAL	2
20	4001116	3/8" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	3/8" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATING MOUNTING (BRACKET)	1
23	BSI-2001887	1/4" X 3/4" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWR03	1
25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL, 8-SPACE, 12GA.	2
28	MANMAX Rev. (D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

\\Antares2\Share\ EngDrafters\Terry Walters\Land Projects\Land Projects 2017\Trail by the Railroad\Drawings\GF(31)MS-17, 11/30/2018 8:45:38 AM

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SHEET 65 OF 150

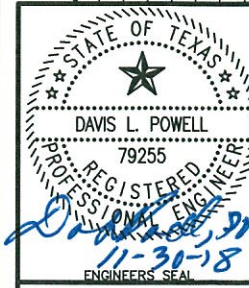
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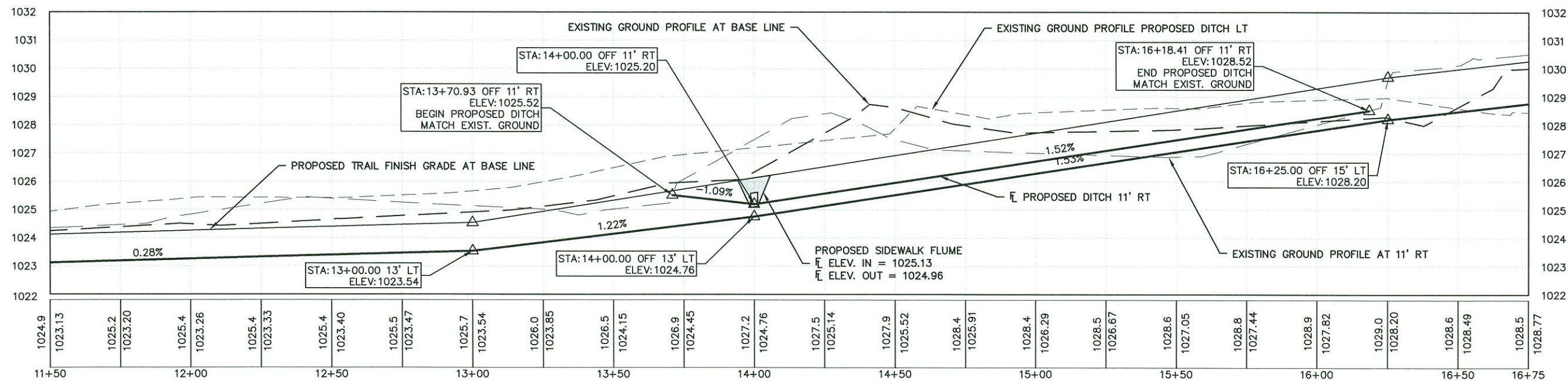
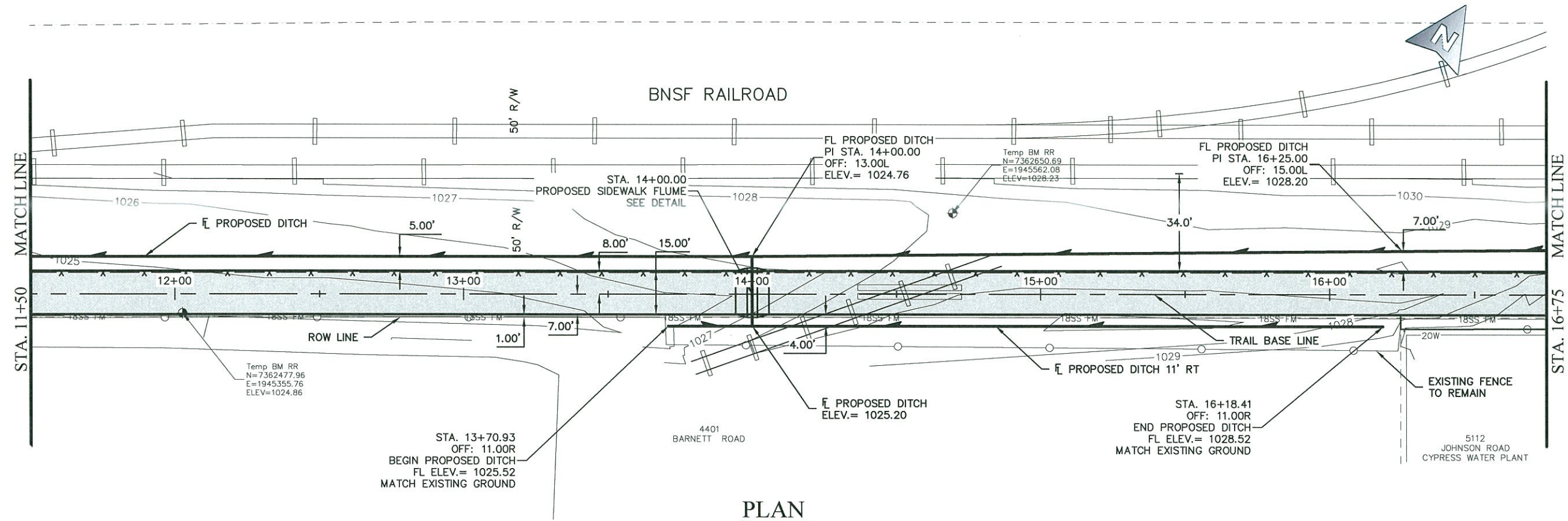
HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

PROPOSED DITCH
PLAN & PROFILE - 1

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: DITCH-1



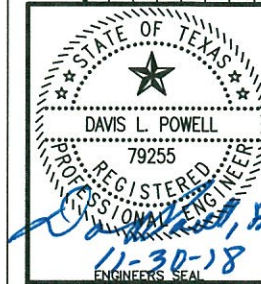
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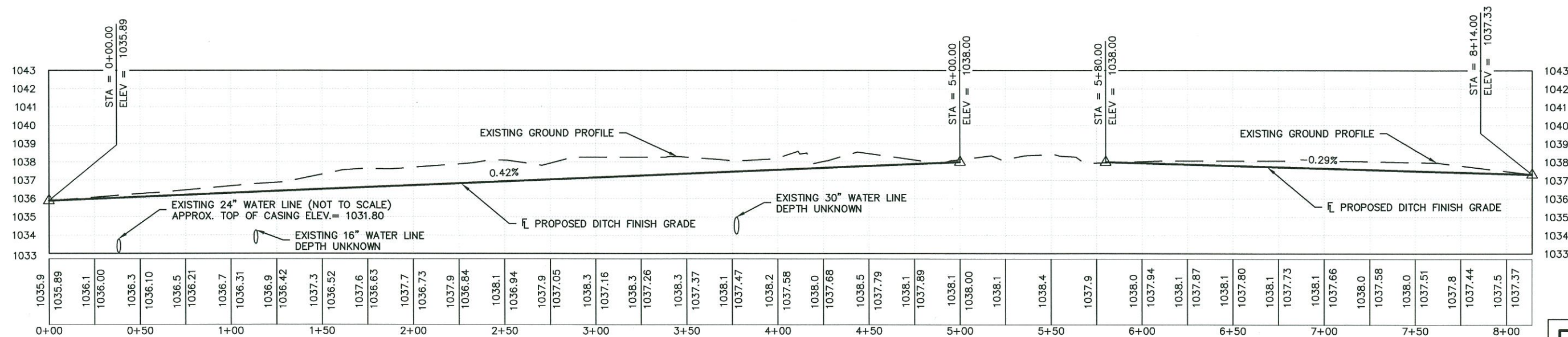
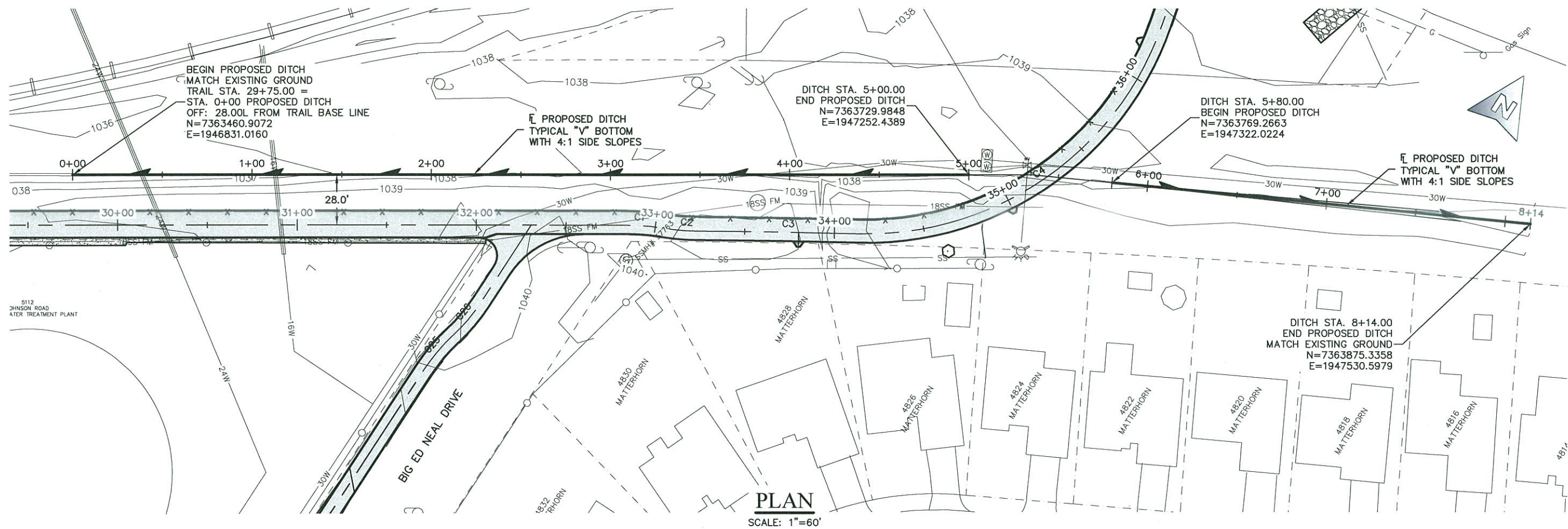
HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

PROPOSED DITCH
PLAN & PROFILE - 2

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: DITCH-2



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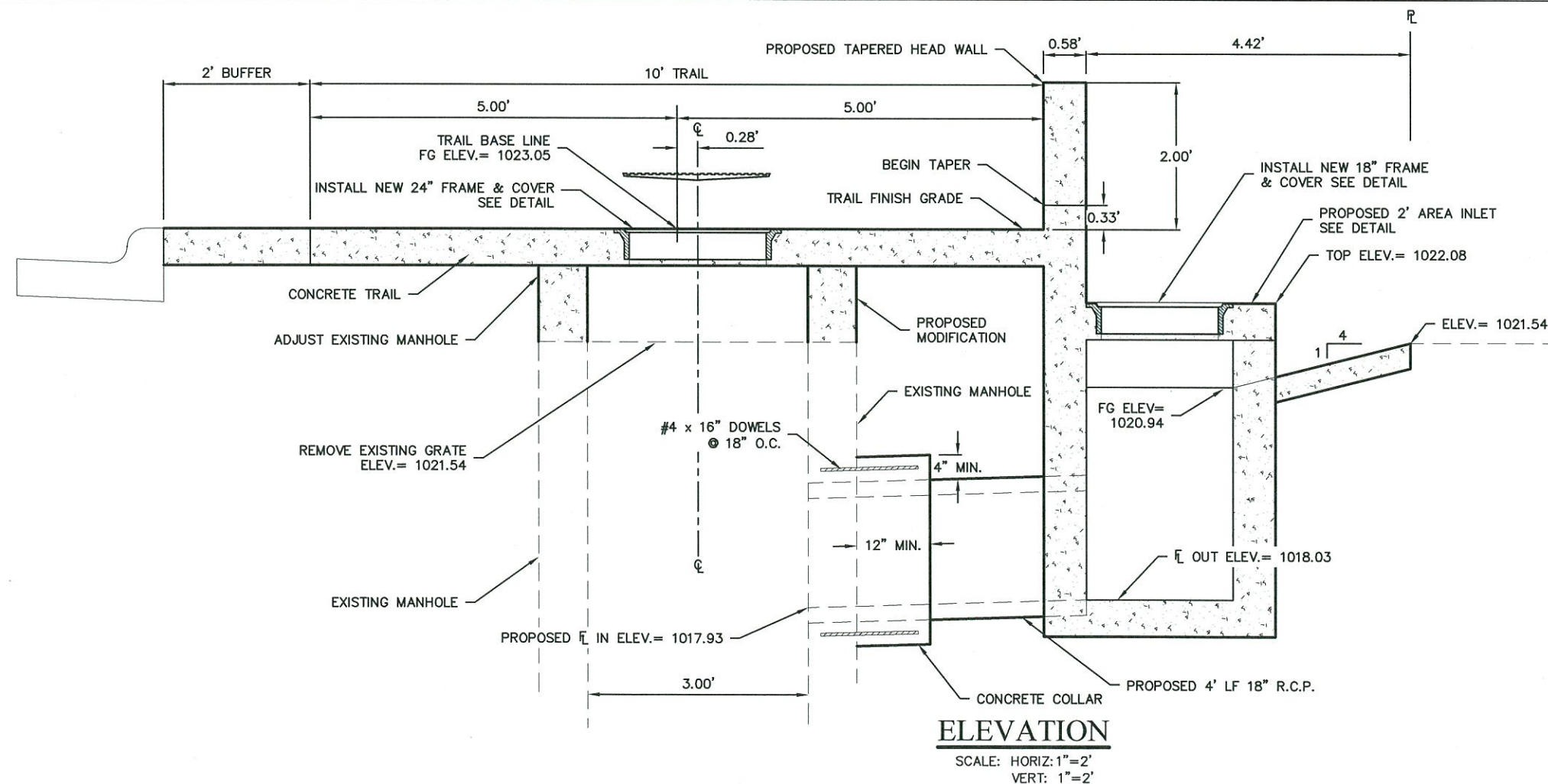
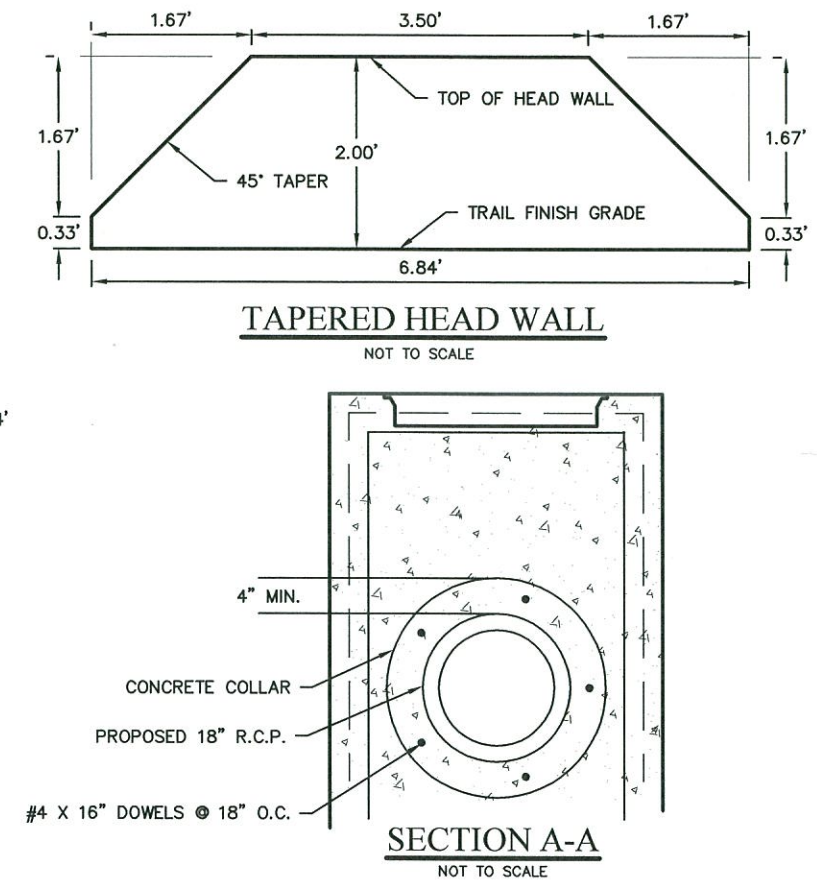
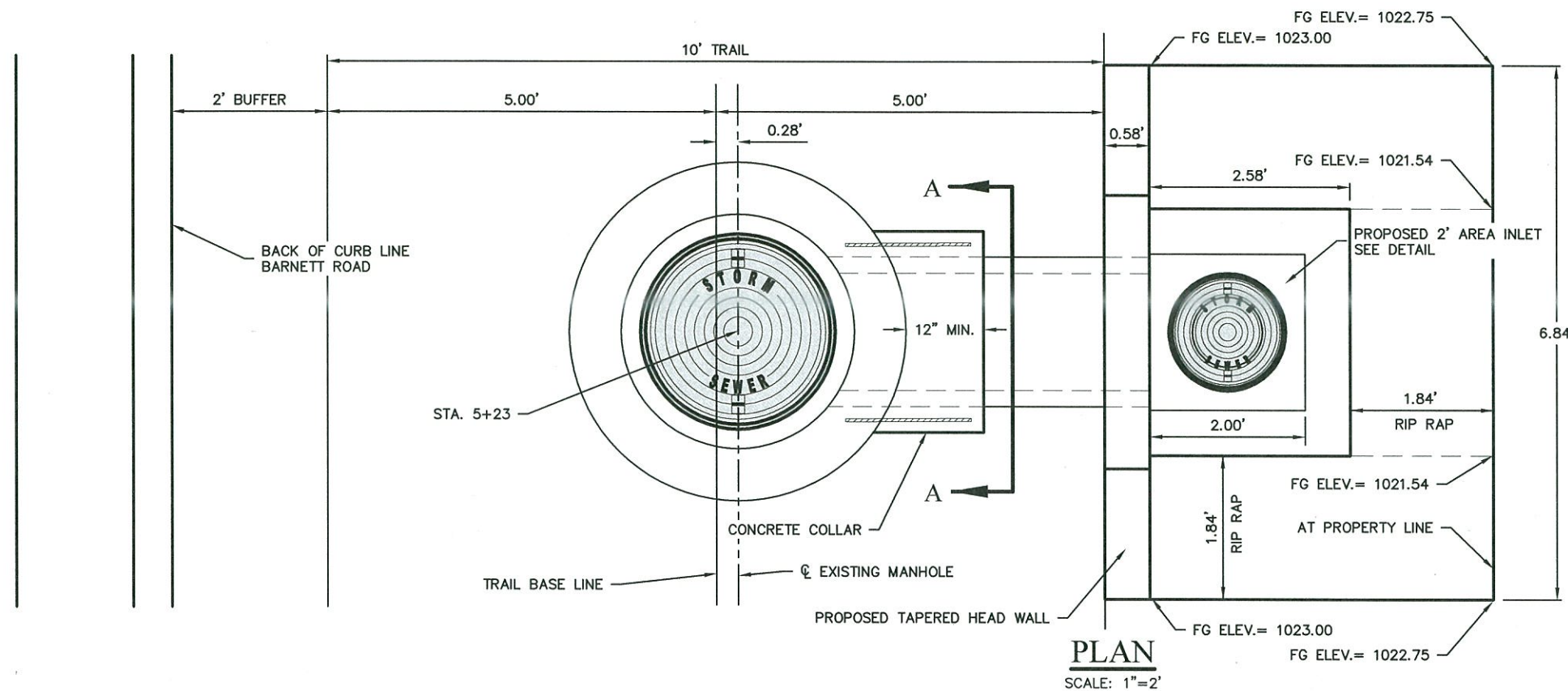
HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

PROPOSED DITCH
PLAN & PROFILE - 4
LAYOUT: DITCH-4

PROJECT MANAGER: TW
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK: XX
ACAD: XX
LAYOUT: DITCH-4



\\Antares2\Share\Eng\Drawings\Terry Walters\Land Projects\2017\Trail by the Railroad\DWG\trail.dwg, Drainage-1, 11/30/2018 9:13:05 AM



GENERAL NOTES:

1. REMOVE TOP OF EXISTING GRATE INLET.
2. EXTEND RISER TO MEET TRAIL SECTION.
3. INSTALL NEW 24\"

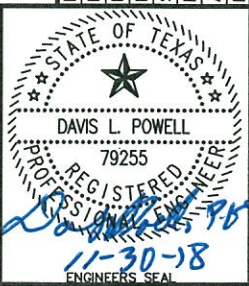
GENERAL NOTES FOR: NEW R.C.P. TO EXISTING MANHOLE CONNECTION

1. CONTRACTOR SHALL CHIP OUT EXIST. CONCRETE AS NECESSARY TO ACCOMMODATE INSTALLATION OF 18\"
2. 18\"
3. #4 X 16\"
4. CONTRACTOR SHALL REMOVE DEBRIS FROM INSIDE THE EXISTING MANHOLE, DEBRIS REMOVAL SHALL BE INCIDENTAL TO PIPE INSTALLATION.
5. CONCRETE COLLAR SHALL BE CLASS A (3000 PSI) CONCRETE.
6. R.C.P. TO EXISTING MANHOLE CONNECTION SHALL BE WATER TIGHT.

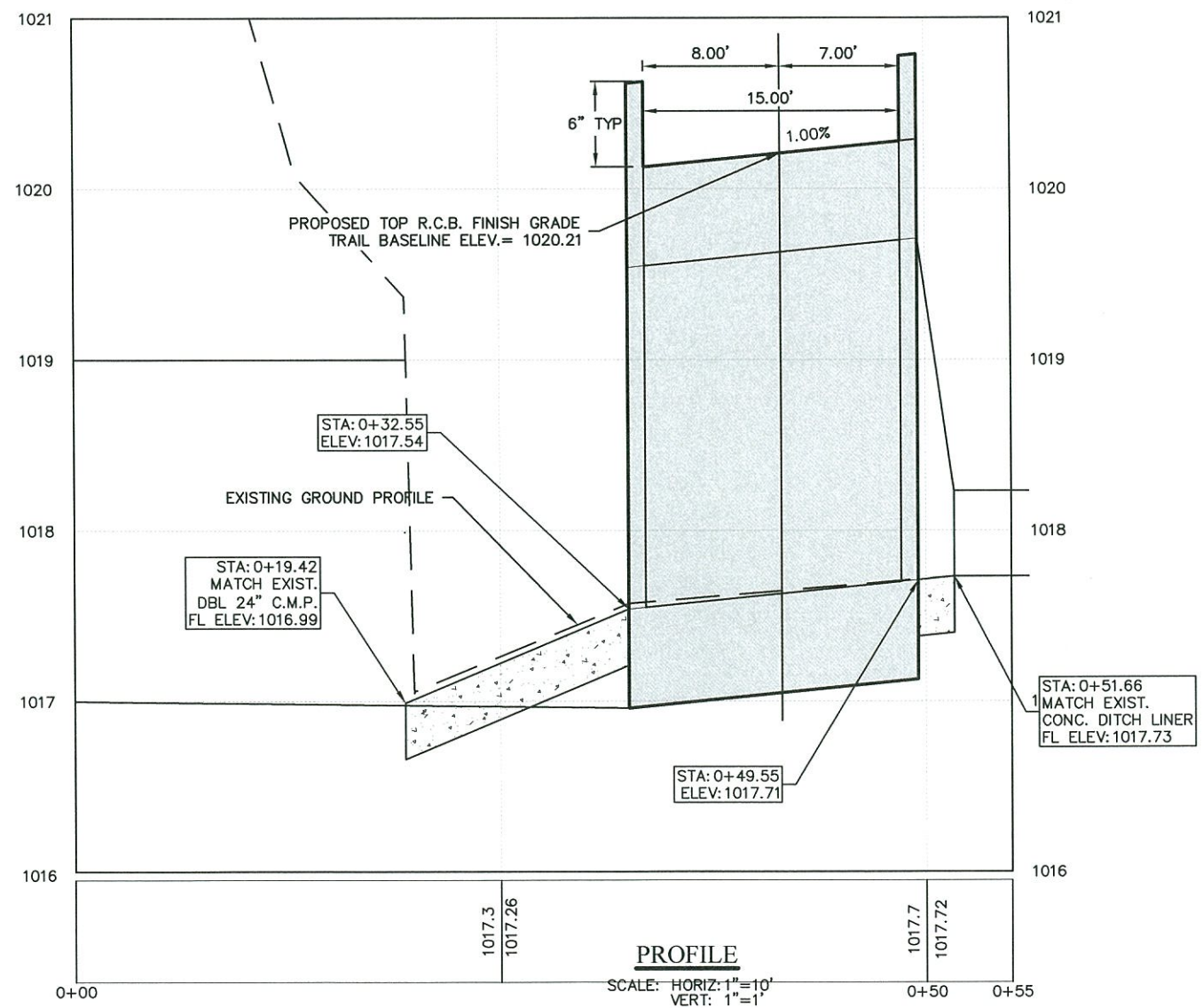
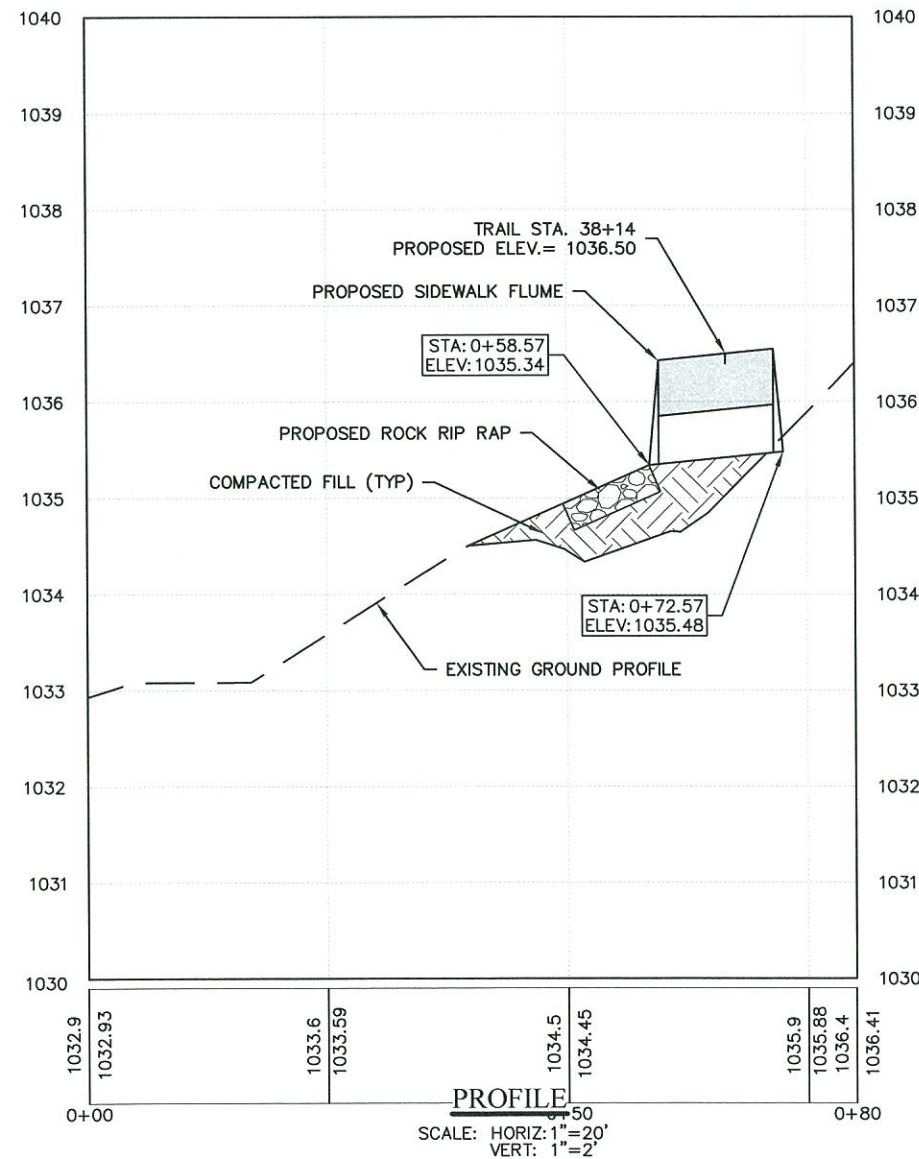
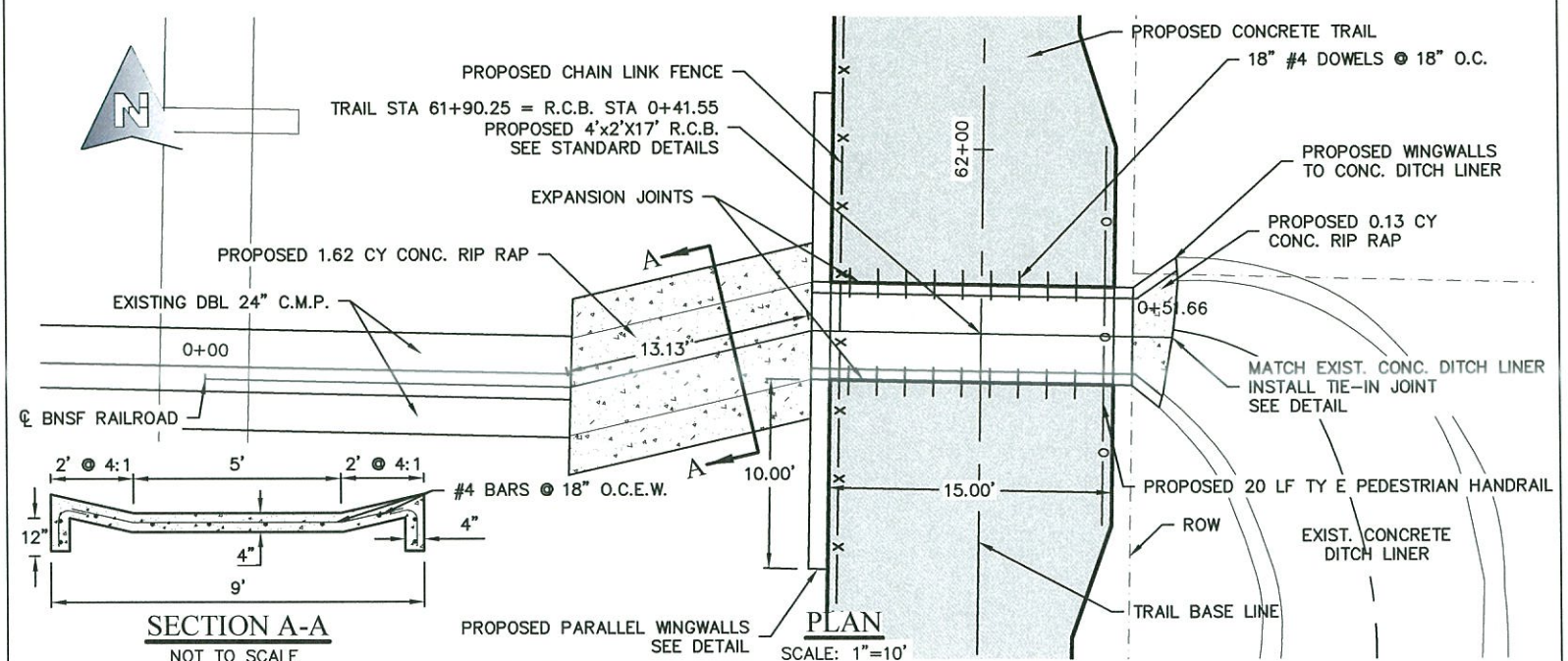
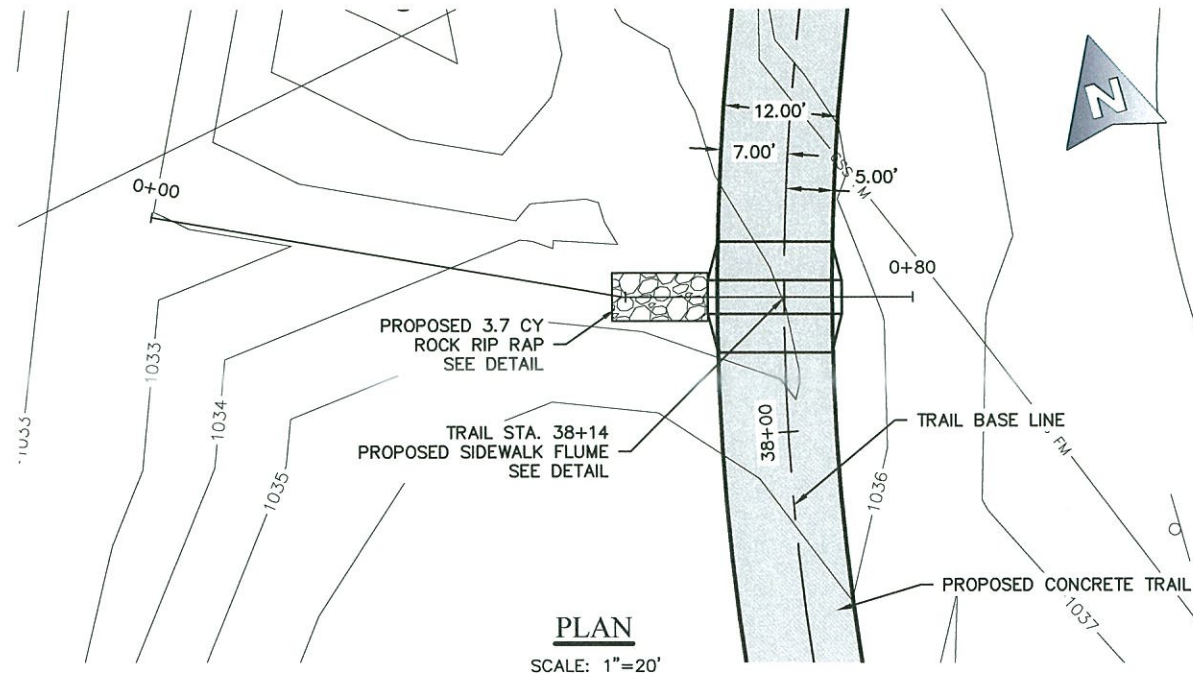
HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

DRAINAGE DETAILS - 1
MODIFIED INLET STA. 5+23

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: DRAINAGE-1



\\Antares2\Share\Eng\Drawings\Terry Walters\Land Projects\2017\Trail by the Railroad\DWG\Trail.dwg, Drainage-2, 11/30/2018 9:14:33 AM



SIDEWALK FLUME STA. 38+14

R.C.B. STA. 61+90.25

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

DRAINAGE DETAILS - 2

PROJECT MANAGER:

DRAWN BY: TW

PROJECT NUMBER: CWF17-444-11

DATE: DEC 2018

SCALE: AS SHOWN

FIELD BOOK:

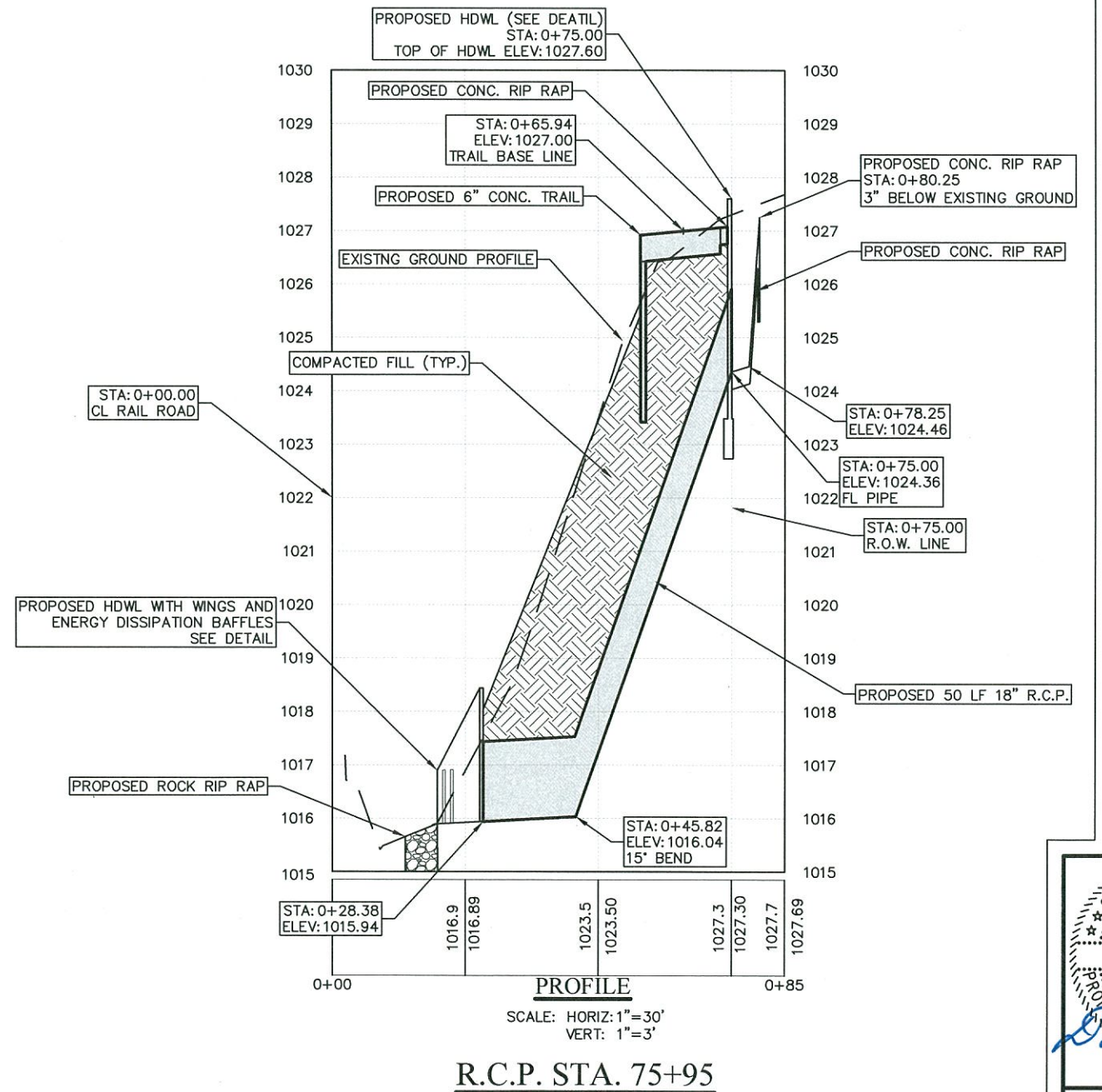
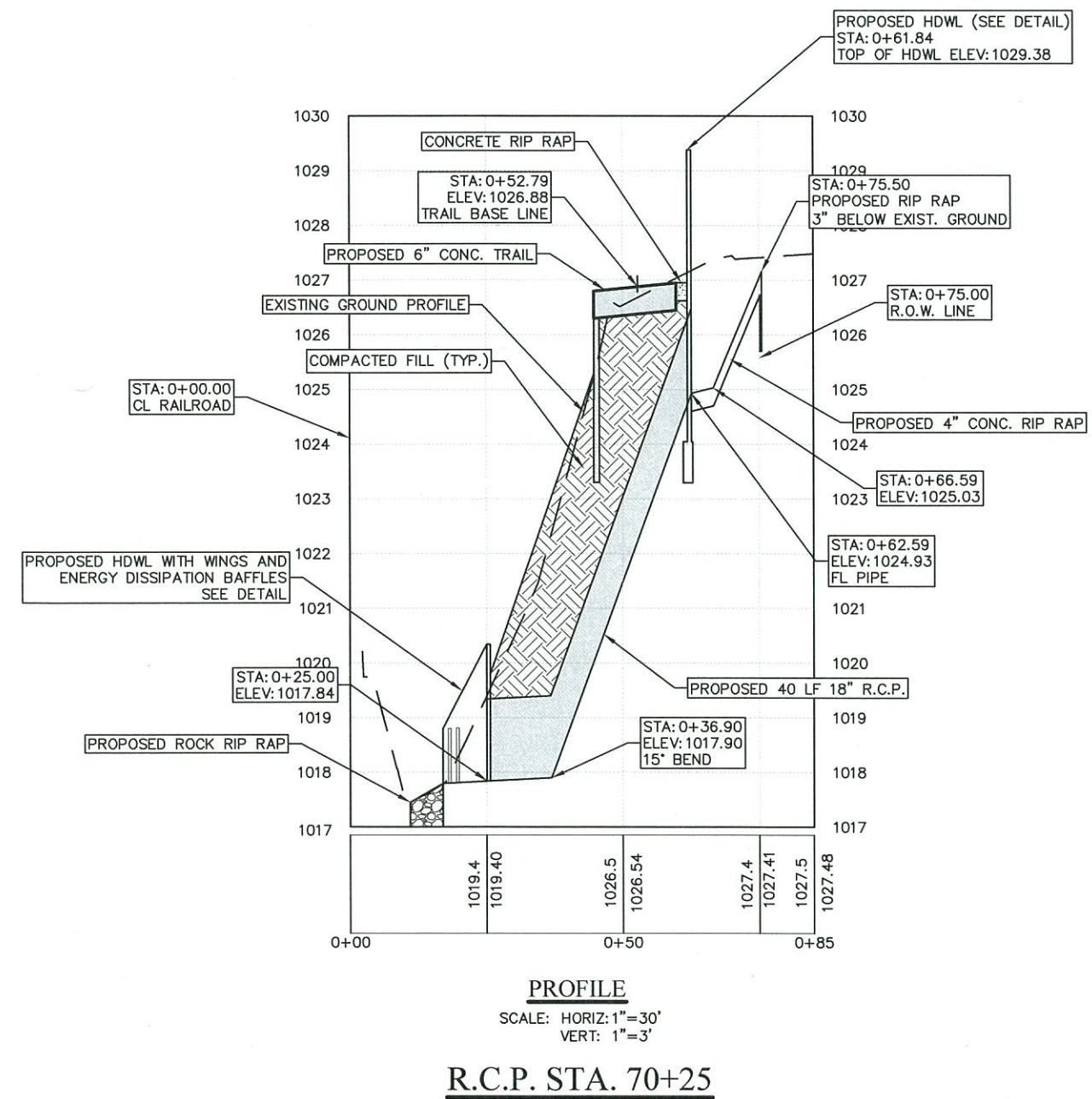
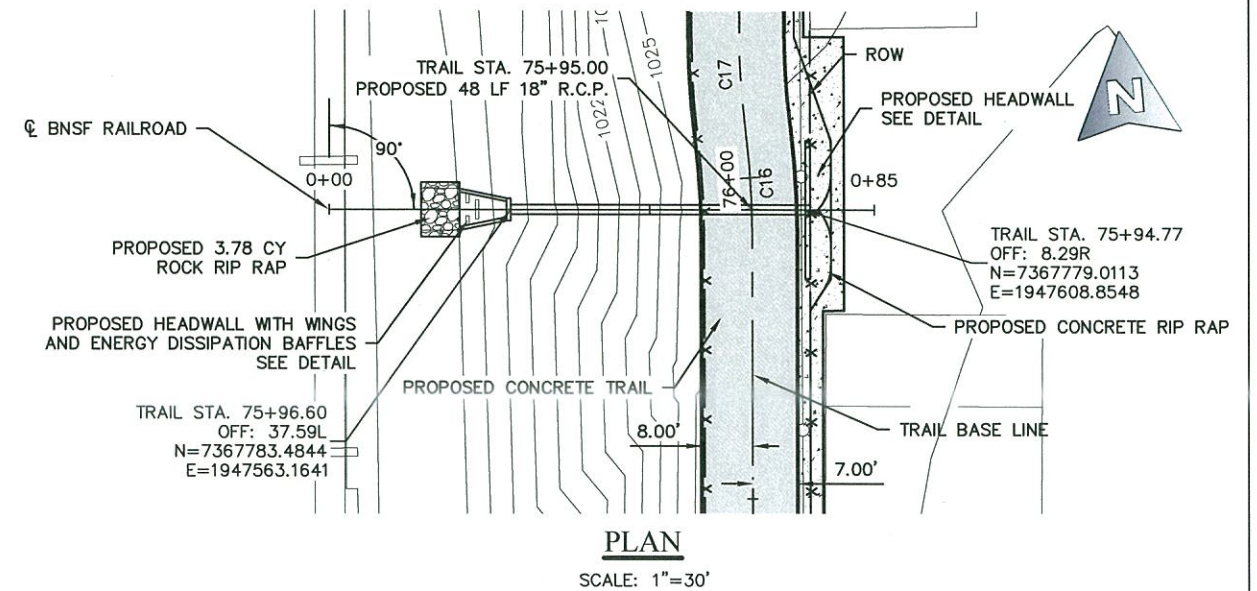
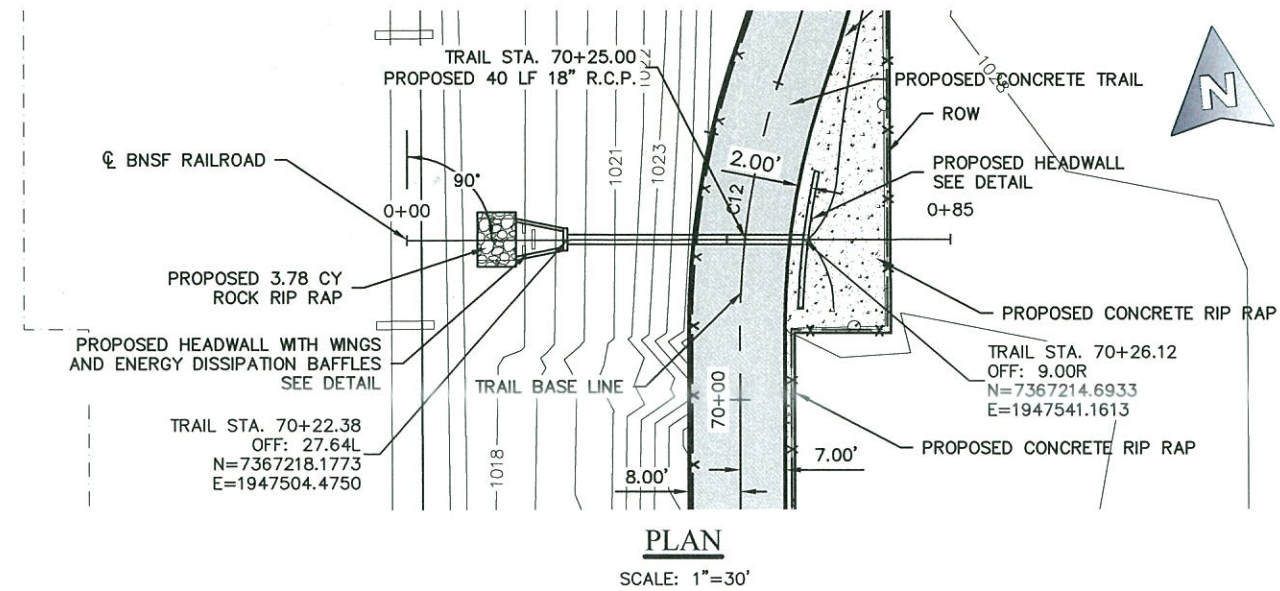
ACAD: XX

LAYOUT: DRAINAGE-2



SHEET 71 OF 150

\\Antares2\Share\Eng\Drawings\Terry Walters\Land Projects\2017\Trail by the Railroad\Drawings\Drainage-3, 11/30/2018 9:15:55 AM



HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

DRAINAGE DETAILS - 3

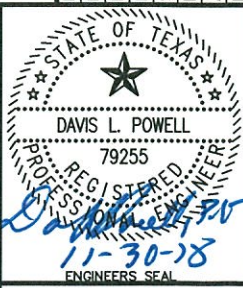
PROJECT MANAGER:
DRAWN BY: TW

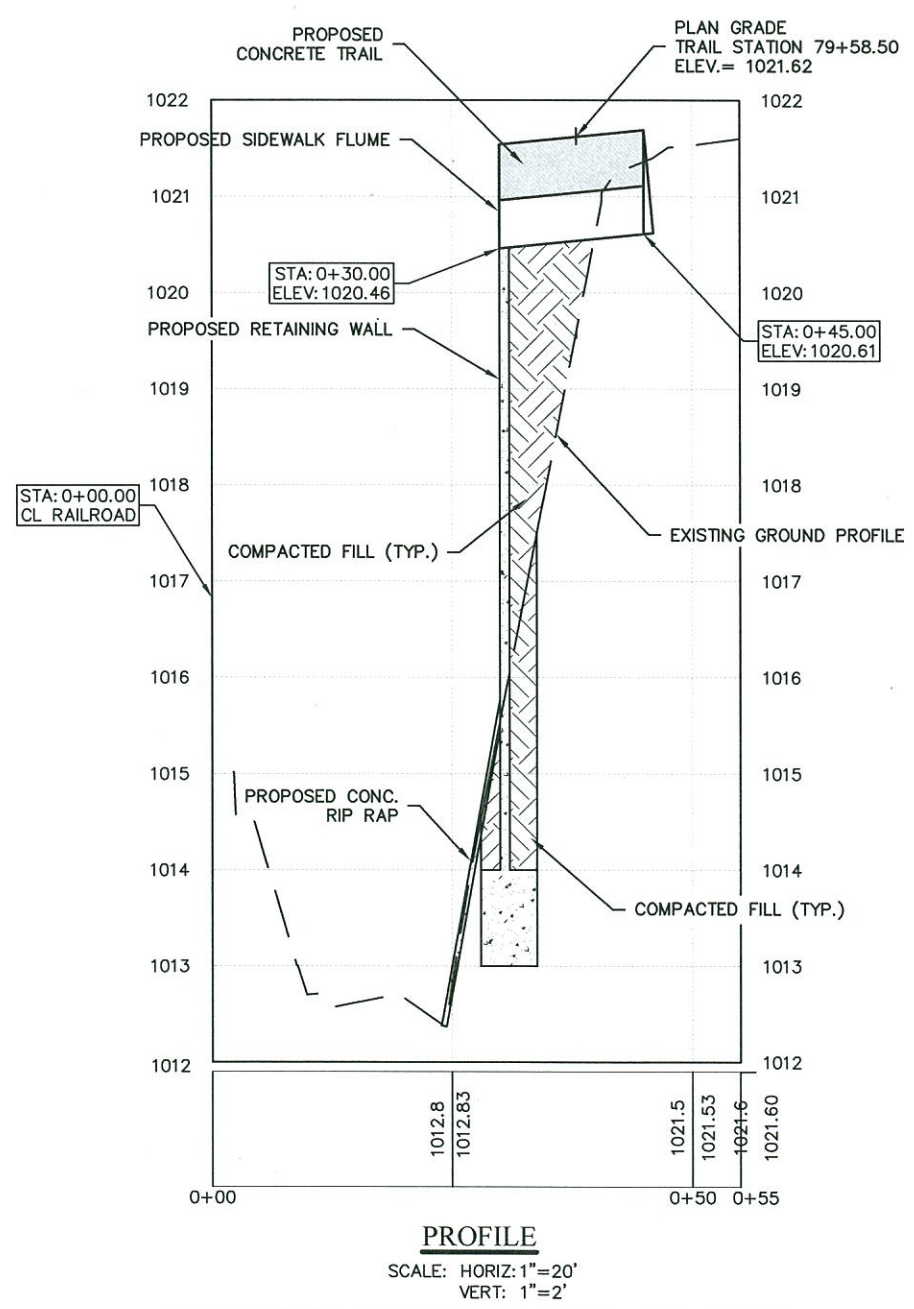
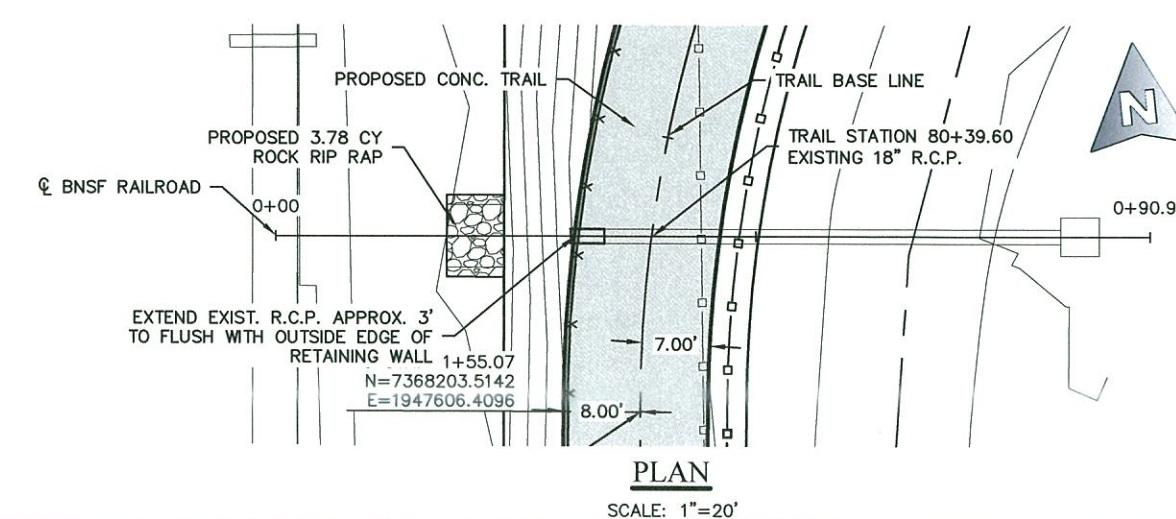
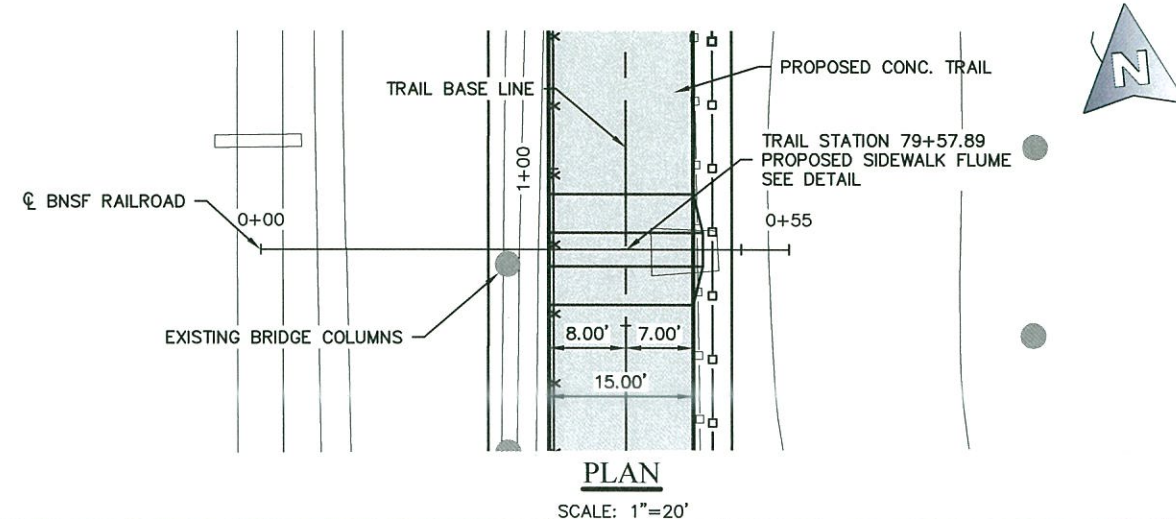
PROJECT NUMBER: CWF17-444-11

DATE: DEC 2018

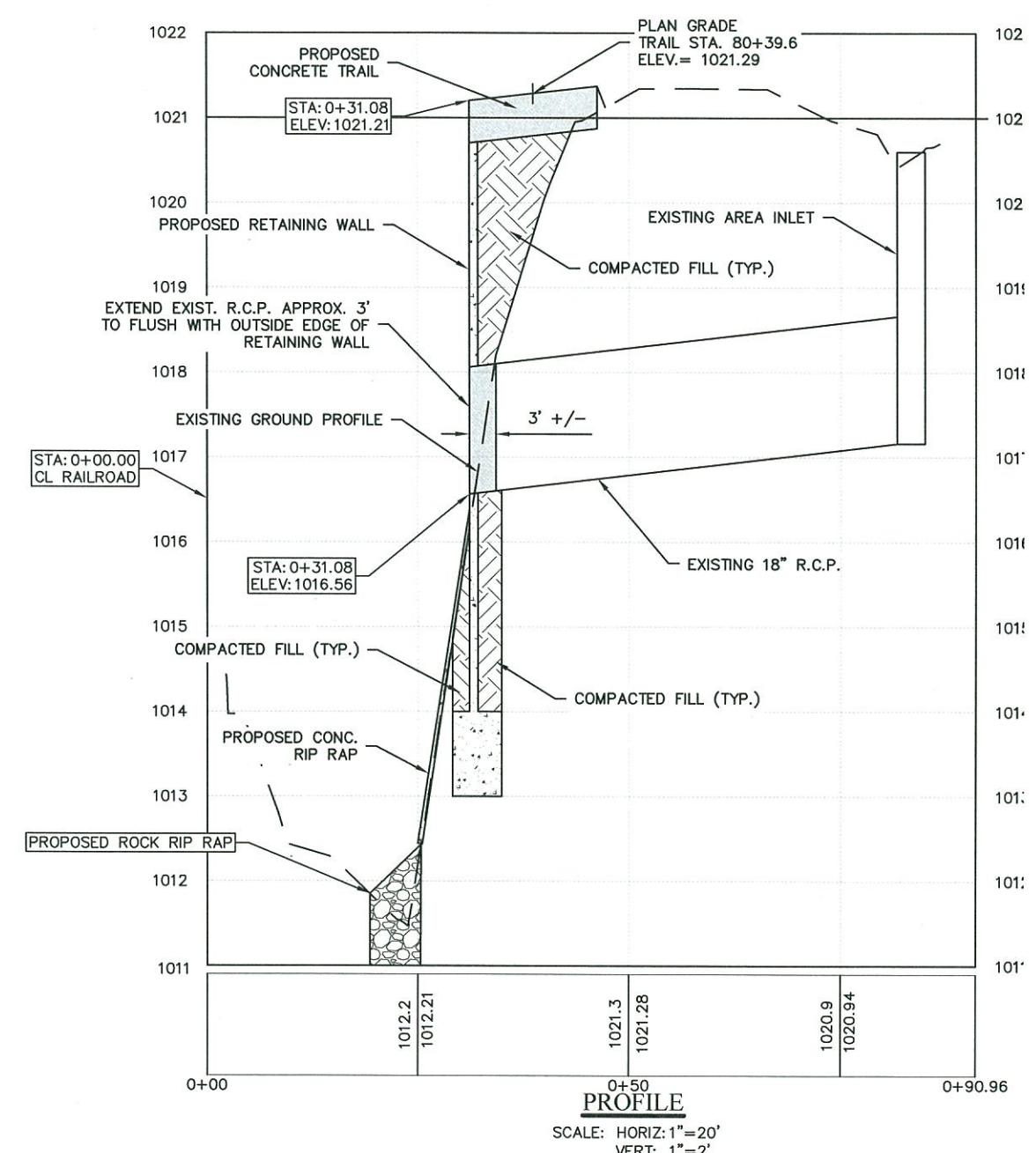
SCALE: AS SHOWN

FIELD BOOK:
ACAD: XX
LAYOUT: DRAINAGE-3





SIDEWALK FLUME STA. 79+57.89



EXTEND EXISTING R.C.P. STA. 80+39.60

PROJECT MANAGER: TW
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK: XX
ACAD: XX
LAYOUT: DRAINAGE-5

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

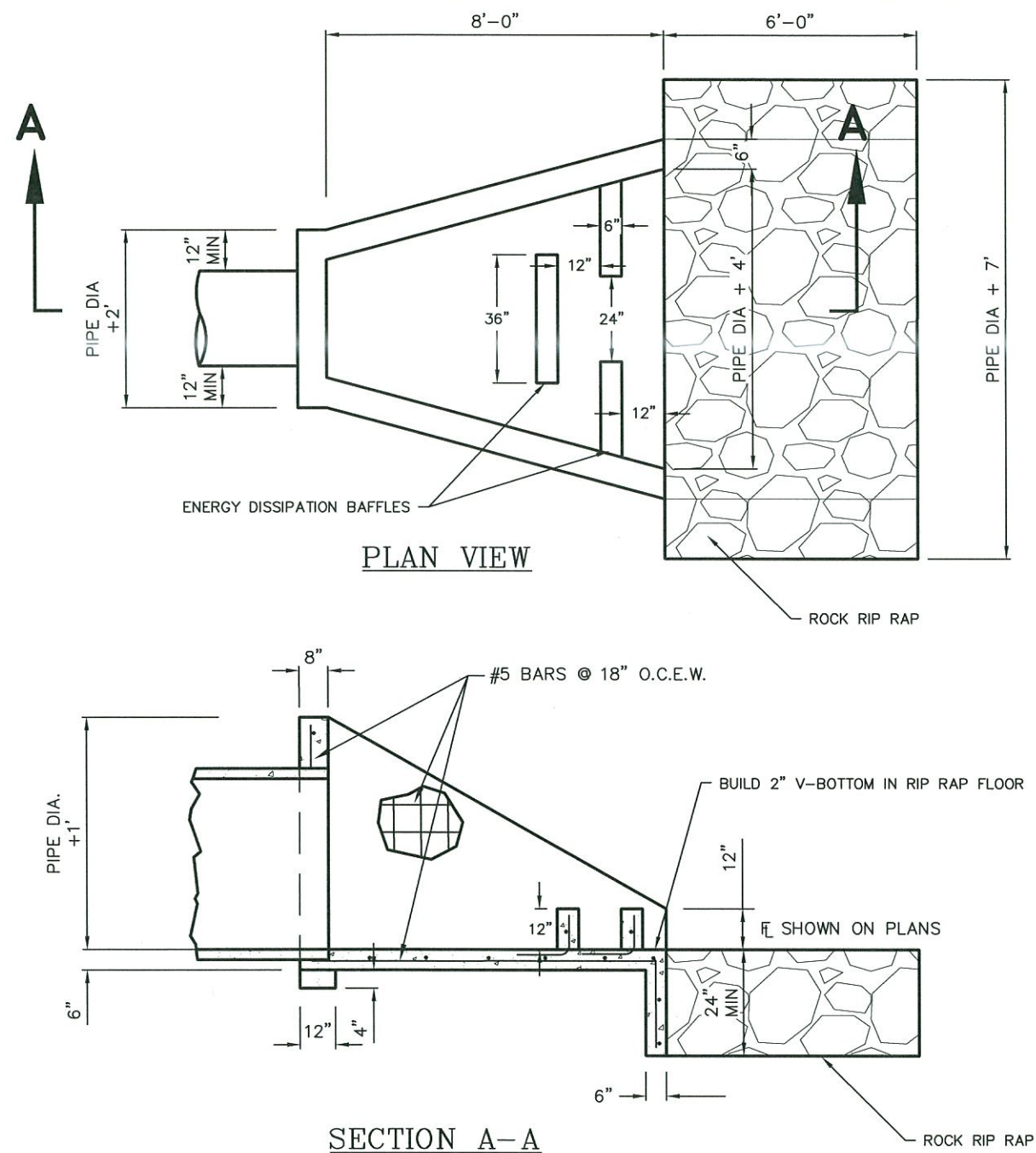
DRAINAGE DETAILS - 5

NO. DATE DESCRIPTION BY

REVISIONS

STATE OF TEXAS
DAVIS L. POWELL
79255
REGISTERED PROFESSIONAL ENGINEER
11-30-18
ENGINEERS SEAL

\\Antares2\Share\Eng\Drawings\Terry Walters\Land Projects\2017\Trail by the Railroad\DWG\Trail.dwg, Storm Details-1, 11/30/2018 10:28:34 AM

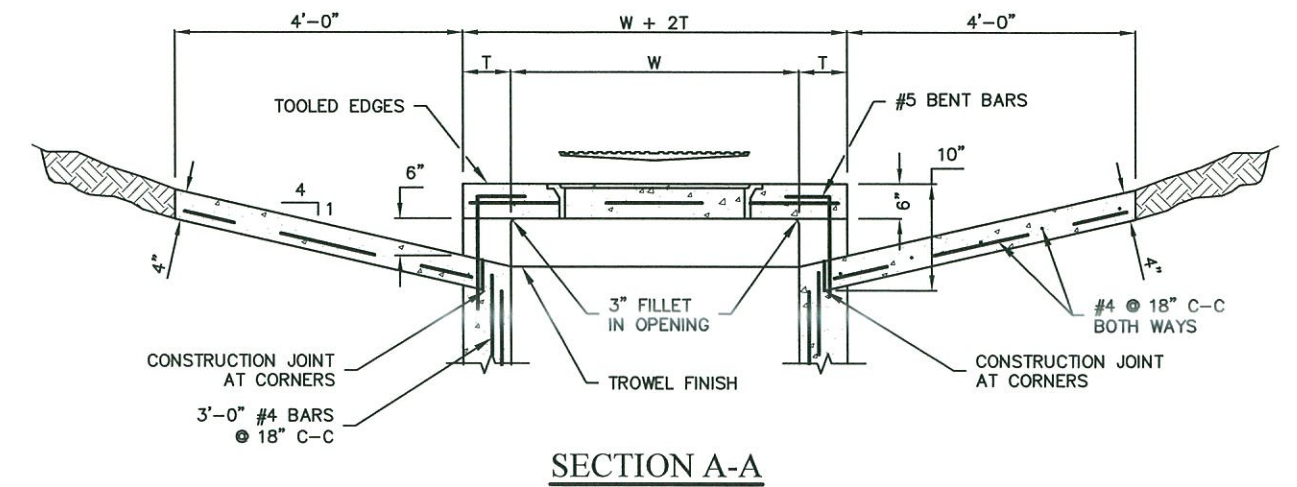


GENERAL NOTES:

1. \bar{f} SHOWN ON PLANS.
2. ALL CONCRETE SHALL BE CLASS "C" (COMPRESSIVE STRENGTH OF 3600 PSI @ 28 DAYS)

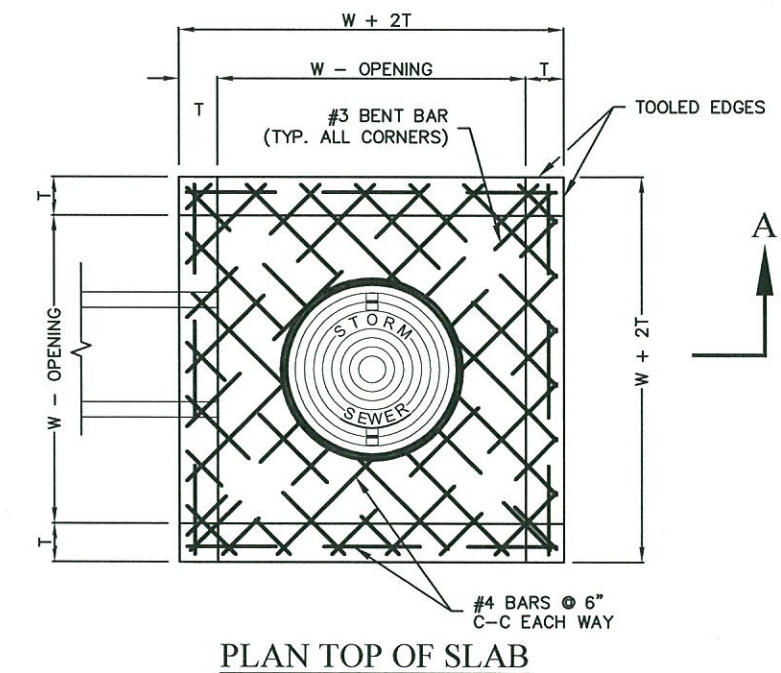
CONCRETE HEADWALL WITH WINGWALLS AND ENERGY DISSIPATION BAFFLES

NOT TO SCALE



INLET SIZE	T	W
2' SQUARE	7"	2'-0"
4' SQUARE	7"	4'-0"
5' SQUARE	8"	5'-0"
6' SQUARE	9"	6'-0"

SECTION A-A



PLAN TOP OF SLAB

GENERAL NOTES:

1. MATERIAL AND WORKMANSHIP SHALL CONFORM WITH THE REQUIREMENTS OF NCTCOG STANDARD SPECIFICATIONS FOR STANDARD CONCRETE MANHOLES. MINIMUM CLASS "A" CONCRETE.
2. LAYERS OF REINFORCING STEEL NEAREST THE INTERIOR AND EXTERIOR SURFACES SHALL HAVE A COVER OF 2" TO THE CENTER OF BARS, UNLESS OTHERWISE NOTED.
3. FOR DETAILS OF REINFORCING OF LOWER PORTIONS OF INLET SEE APPROPRIATE SQUARE MANHOLE DETAILS.
4. DEPTH OF DROP INLET FROM FINISHED GRADE TO FLOW LINE OF INLET IS VARIABLE. APPROXIMATE DEPTH WILL BE SHOWN ON PLANS AT LOCATION OF INLET.
5. ALL STANDARD DROP INLETS SHALL HAVE ONE OPENING ON EACH SIDE UNLESS OTHERWISE SHOWN ON PLANS.
6. DECK MAY BE REINFORCED SAME AS 4' SQUARE MANHOLE.

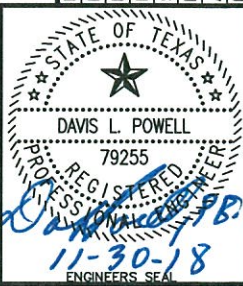
DROP INLET 2', 4', 5', OR 6' SQUARE

NOT TO SCALE

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

STORM WATER DETAILS - 1

PROJECT MANAGER: TW
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: STORM DETAILS-1



SHEET 76 OF 150

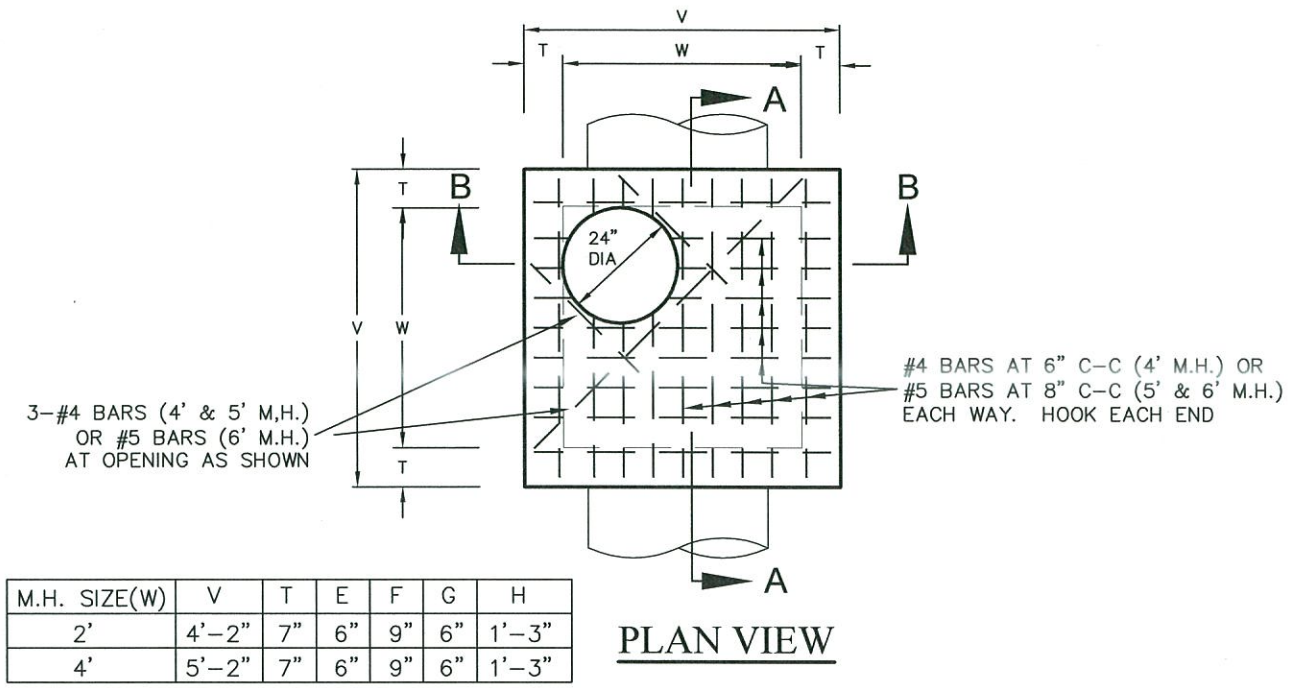
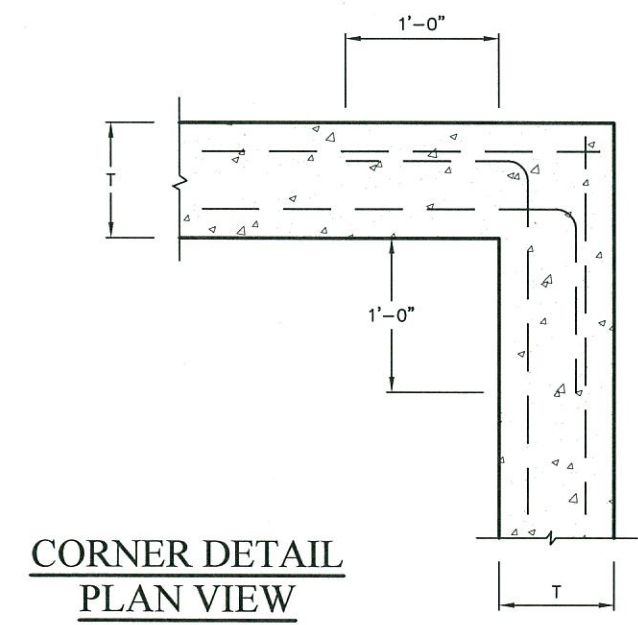
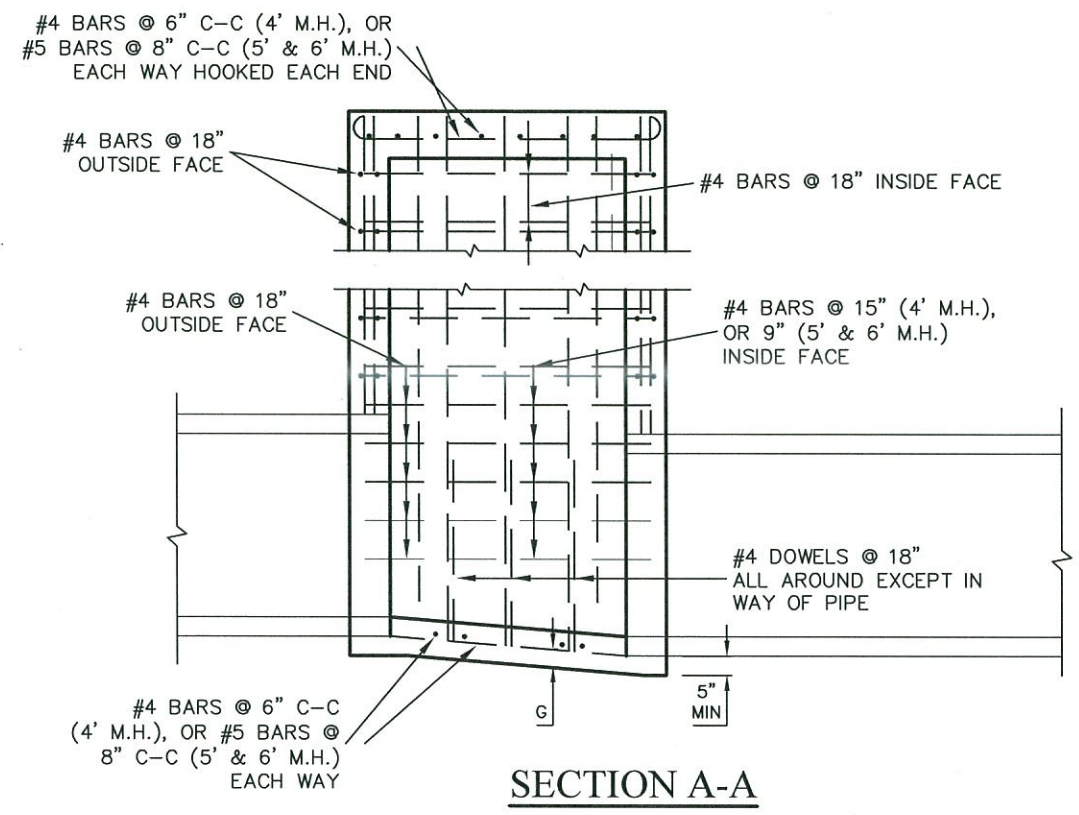
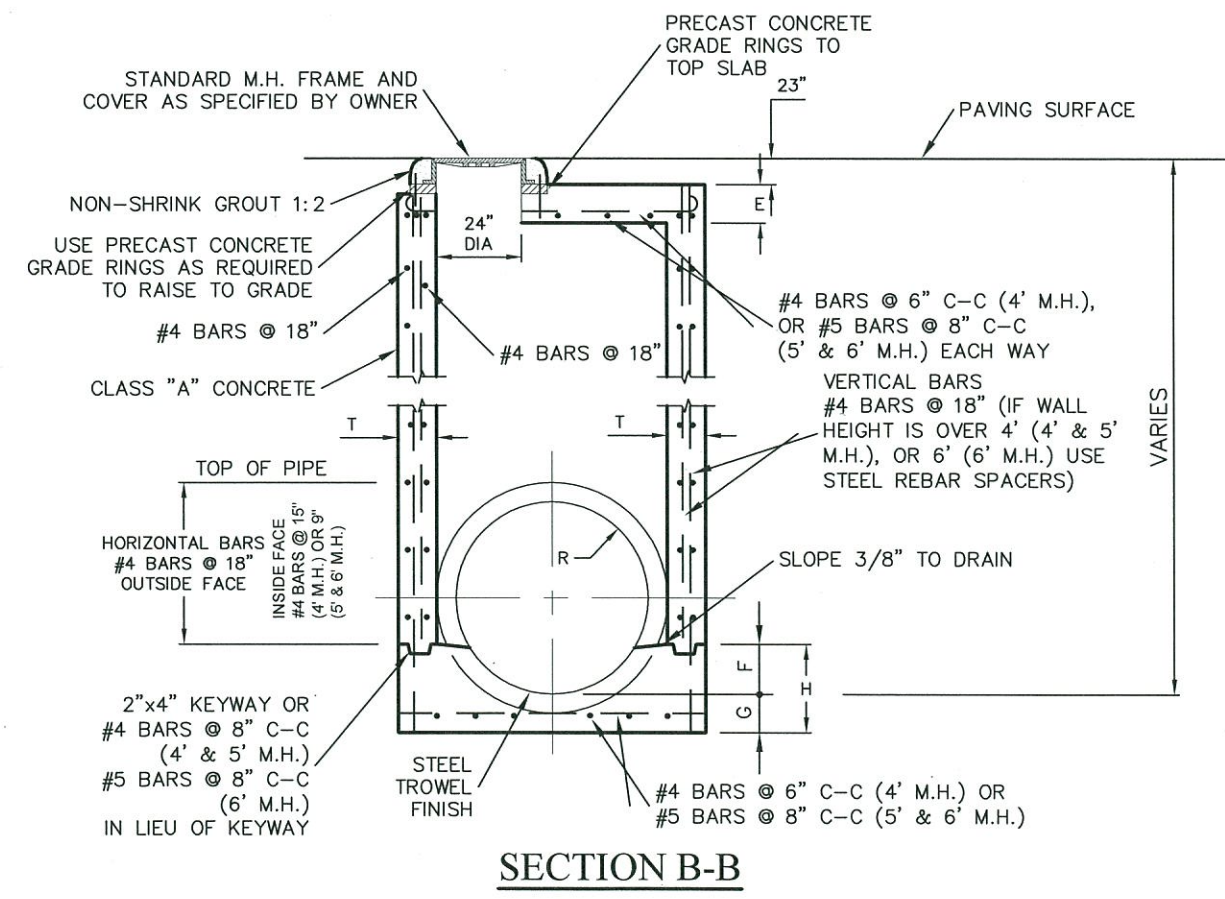


TABLE OF DIMENSIONS



- NOTES:
1. SLOPE INVERT OF MANHOLE AS INDICATED ON PLAN-PROFILE SHEET.
 2. LAYERS OF REINFORCING STEEL NEAREST THE INTERIOR AND EXTERIOR SURFACE SHALL HAVE A COVER OF 2" TO THE CENTER OF BARS, UNLESS OTHERWISE NOTED.
 3. CONCRETE SHALL BE CLASS "A".

STORMWATER MANHOLE
2', 4', 5', OR 6' SQUARE
NOT TO SCALE

REVISIONS		DESCRIPTION		DATE	BY

Wichita Falls
Blue Sticks Golden Opportunities
TEXAS

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

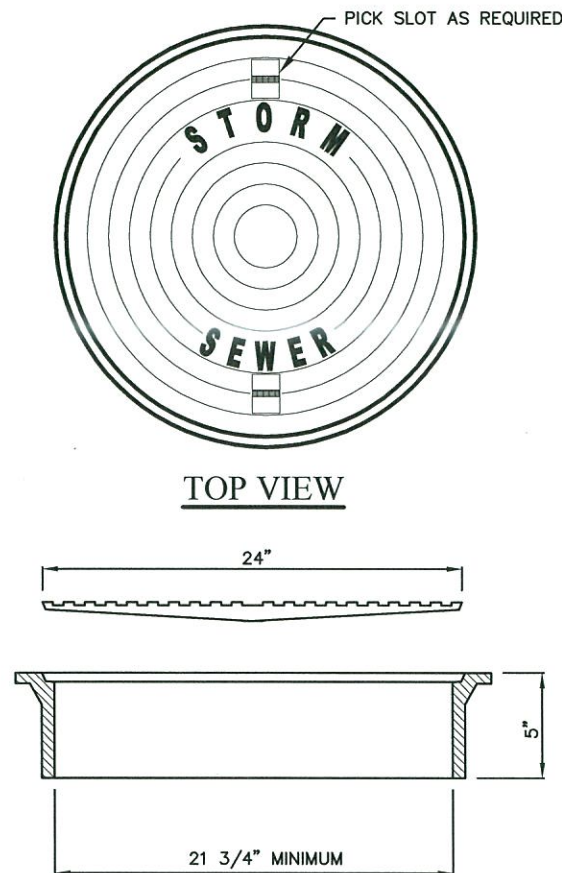
STORM WATER DETAILS - 2

PROJECT MANAGER: TW
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: STORM DETAILS-2

STATE OF TEXAS
DAVIS L. POWELL
79255
REGISTERED PROFESSIONAL ENGINEER
11-30-18
ENGINEERS SEAL

SHEET 77 OF 150

\\Antares2\Share\Eng\Drawings\Terry Walters\Land Projects\2017\Trail by the Railroad\DWG\Trail.dwg, Storm Details-3, 11/30/2018 9:29:06 AM



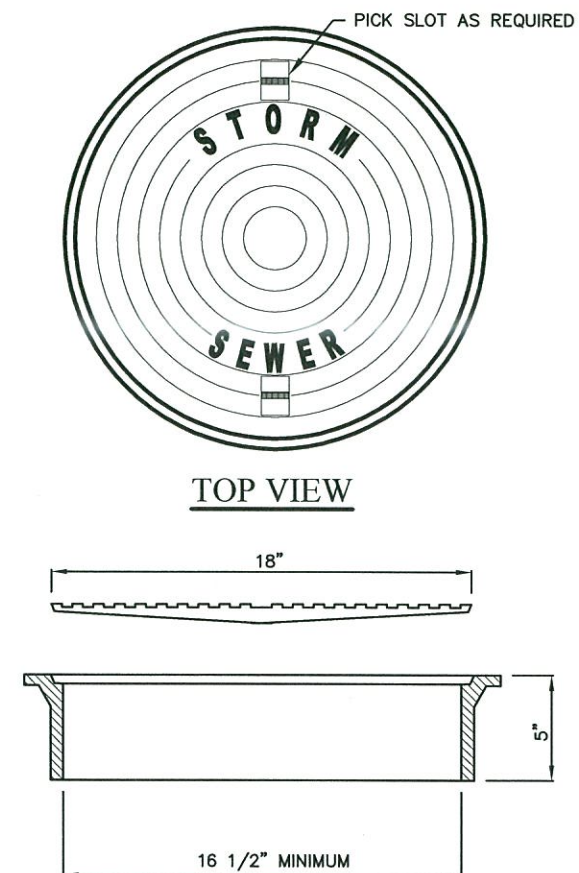
SECTION VIEW

GENERAL NOTES:

1. MANHOLE COVERS AND FRAMES MATERIAL SHALL BE DUCTILE OR CAST IRON.
2. MANHOLE COVERS WILL BE A STANDARD 24" DIAMETER WITH 21 3/4" MINIMUM ACCESS.
3. DUCTILE IRON MANHOLE COVERS SHALL BE HINGED PAMREX/PAMTIGHT OR APPROVED EQUAL.
4. CAST IRON MANHOLES COVERS SHALL HAVE A MINIMUM WEIGHT OF 435 LBS AND MADE OF GRAY CAST IRON MEETING ASTM A48, CLASS 35B REQUIREMENTS. COVER SHALL HAVE A TWO 2" X 3 3/4" PICK SLOTS WITH 1" DIAMETER STEEL RODS.
5. WHEN REQUIRED BY ENGINEER, GASKETED AND BOLTED MANHOLE COVERS SHALL HAVE A MINIMUM 1/4" THICK RUBBER OR NEOPRENE CIRCULAR GASKET OR SEATING RING SHALL BE PROVIDED TO EFFECTIVELY SEAL THE COVER TO THE FRAME. BOLTS SHALL BE STAINLESS STEEL WITH 3/8" DIAMETER COARSE THREADED AND 15/16" HEX HEADS AND RUBBER OR NEOPRENE WASHERS.
6. ALL LOAD BEARING MANHOLES AND MANHOLE COVERS AND FRAMES SHALL MEET H-20 LOAD RATINGS.
7. CONTRACTOR SHALL PROTECT SEWER MAINS FROM CONSTRUCTION DEBRIS.
8. ANY DEBRIS WHICH ENTERS SEWER MAIN SHALL BE IMMEDIATELY REMOVED BY THE CONTRACTOR.

MODIFIED INLET STA. 5+23
DROP INLET STA. 7+10

**STORM SEWER
MANHOLE COVER**
NOT TO SCALE



SECTION VIEW

GENERAL NOTES:

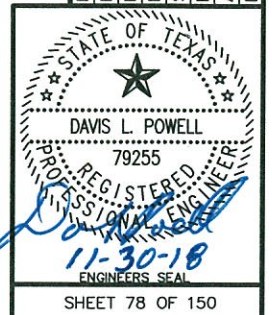
1. MANHOLE COVERS AND FRAMES MATERIAL SHALL BE DUCTILE OR CAST IRON.
2. MANHOLE COVERS WILL BE A STANDARD 18" DIAMETER WITH 16 1/2" MINIMUM ACCESS.
3. DUCTILE IRON MANHOLE COVERS SHALL BE HINGED PAMREX/PAMTIGHT OR APPROVED EQUAL.
4. CAST IRON MANHOLES COVERS SHALL HAVE A MINIMUM WEIGHT OF 435 LBS AND MADE OF GRAY CAST IRON MEETING ASTM A48, CLASS 35B REQUIREMENTS. COVER SHALL HAVE A TWO 2" X 3 3/4" PICK SLOTS WITH 1" DIAMETER STEEL RODS.
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6. ALL LOAD BEARING MANHOLES AND MANHOLE COVERS AND FRAMES SHALL MEET H-20 LOAD RATINGS.
7. CONTRACTOR SHALL PROTECT SEWER MAINS FROM CONSTRUCTION DEBRIS.
8. ANY DEBRIS WHICH ENTERS SEWER MAIN SHALL BE IMMEDIATELY REMOVED BY THE CONTRACTOR.

DROP INLET STA. 5+23
DROP INLET STA. 78+15.51

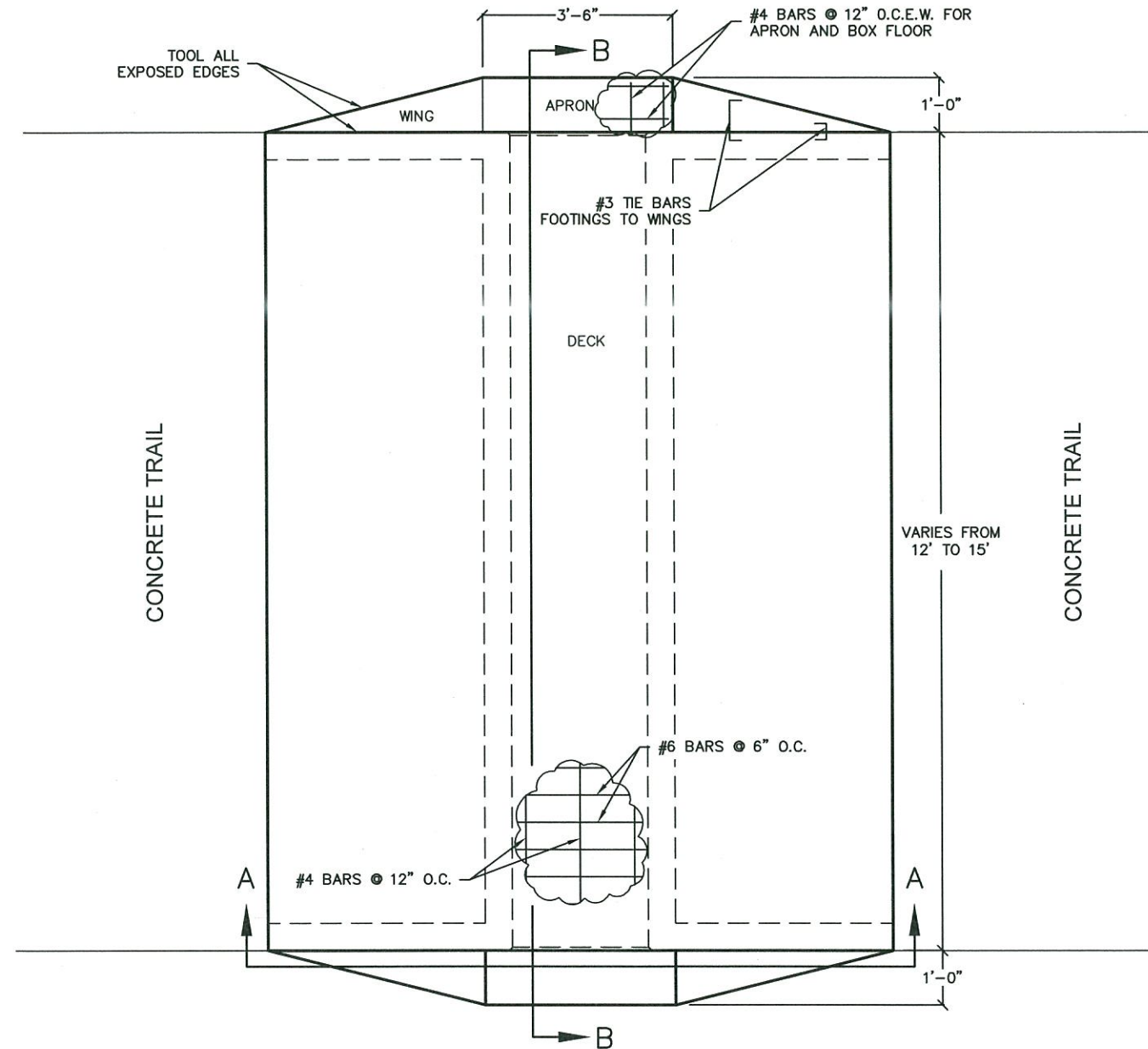
HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

STORM WATER DETAILS - 3

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: STORM DETAILS-3

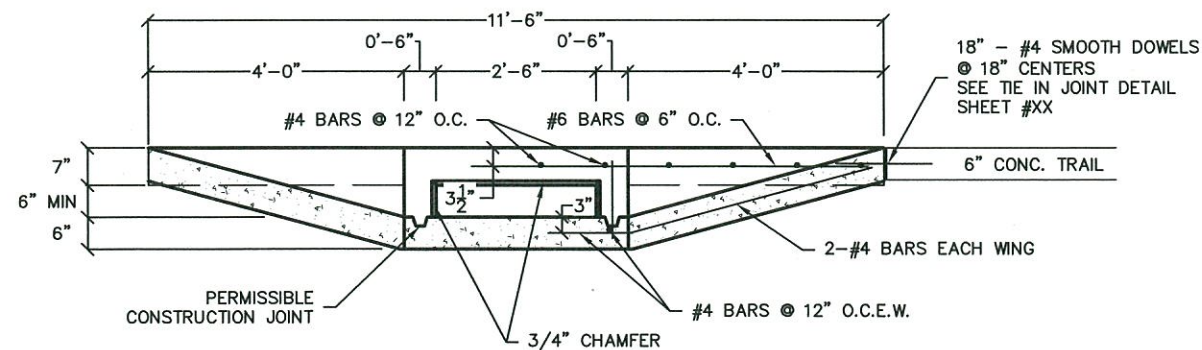


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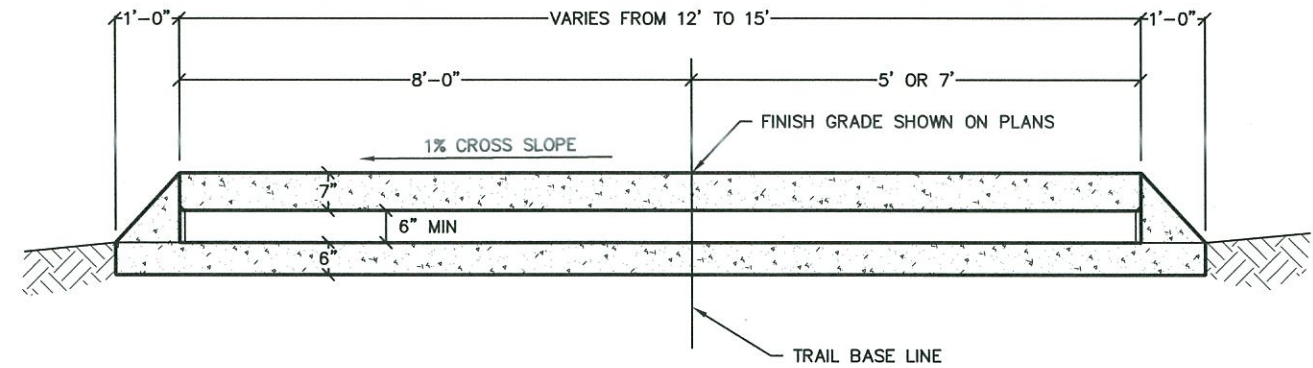
BOX CULVERT PLAN VIEW

SCALE: 1"=3'



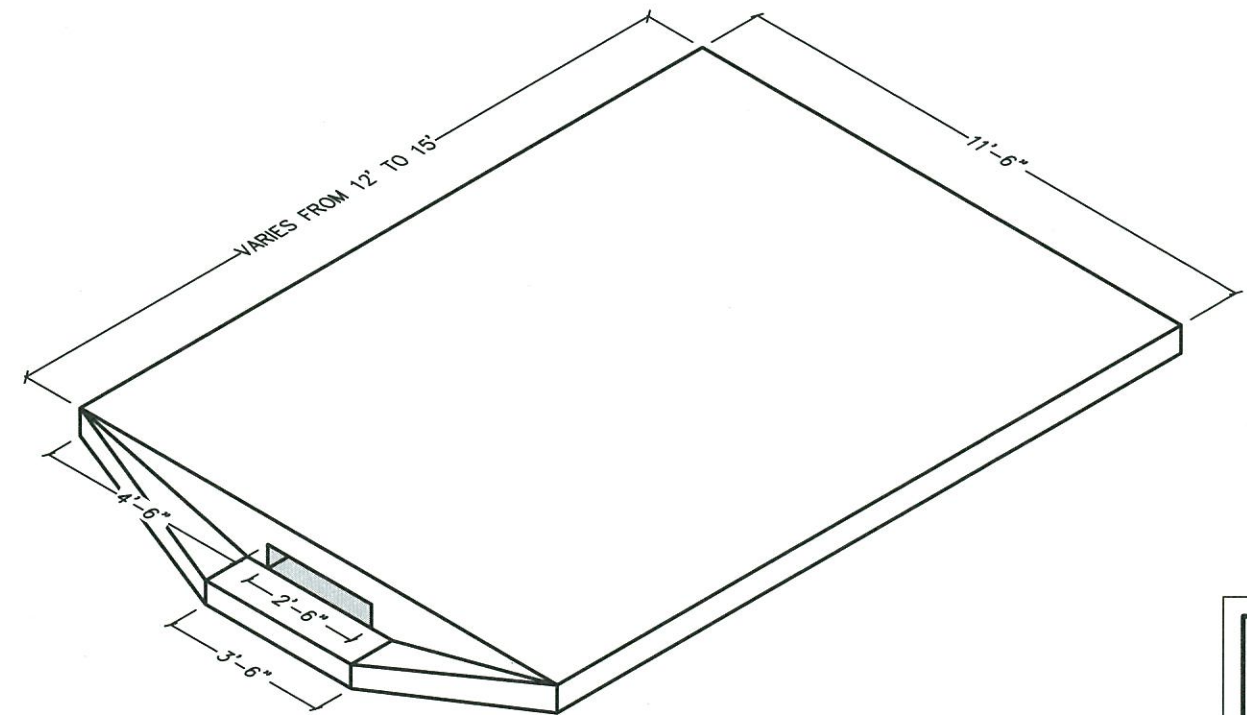
SECTION A-A

SCALE: 1"=3'



SECTION B-B

SCALE: 1"=3'



ISOMETRIC

SCALE: 1"=4'

SIDEWALK FLUME DETAIL

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

SIDEWALK FLUME DETAIL

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: SW FLUME



SHEET 79 OF 150



NO. DATE DESCRIPTION BY
REVISIONS

Diagram illustrating a cross-section of a slope stabilization structure. The structure consists of a layer of **ROCK RIP RAP** (24" thick) placed over a **GEOSYNTHETIC FILTER FABRIC**. The filter fabric is placed over the **UNDISTURBED OR COMPACTED SOIL (90% STANDARD PROCTOR)**. The top surface of the rock rip rap is labeled **MATCH EXISTING OR PROPOSED SLOPE**.

Diagram illustrating the cross-section of a rock rip rap structure, showing dimensions and components:

- Top Width:** 8'-6"
- Side Slopes:** 1'-0" (horizontal) to 6" (vertical)
- Rock Layer Thickness:** 24"
- Base Width:** 6'-6"
- Downstream Distance:** 3'-6" DOWNSTREAM OF SIDEWALK FLUME
- Labels:**
 - ROCK RIP RAP
 - GEOSYNTHETIC FILTER FABRIC
 - UNDISTURBED OR COMPACTED SOIL (90% STANDARD PROCTOR)

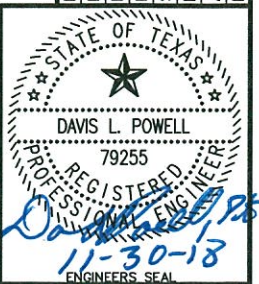
NOT TO SCALE

[illegible]

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

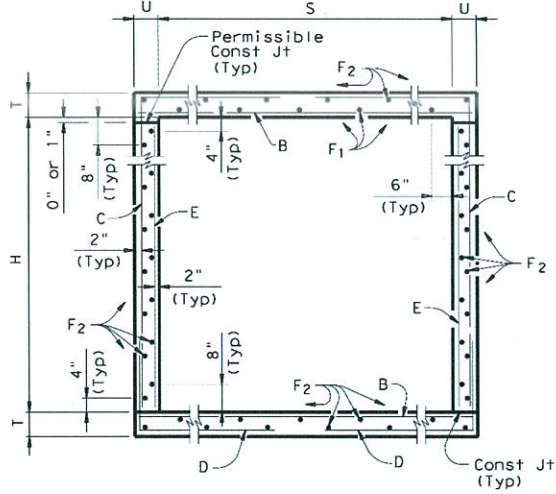
ROCK RIP RAP

LAYOUT: ROCK

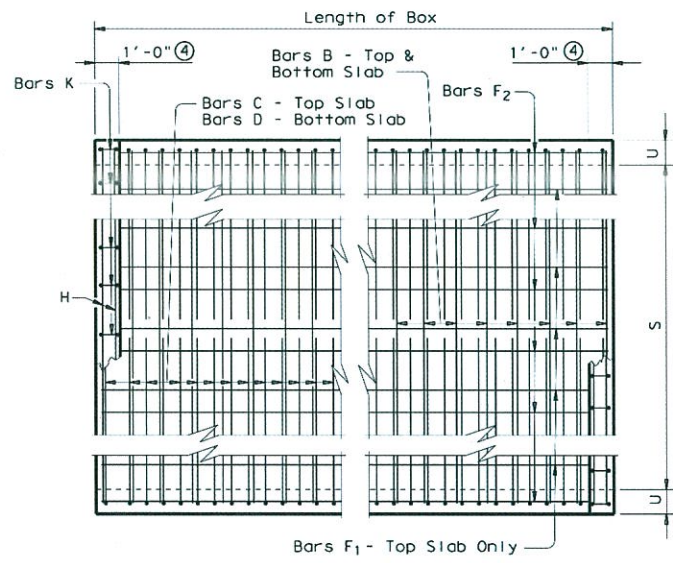


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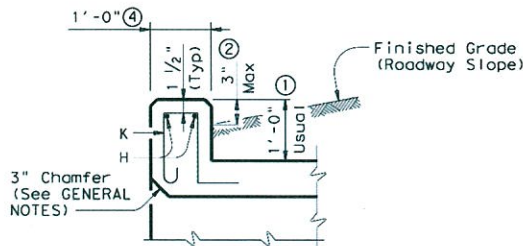
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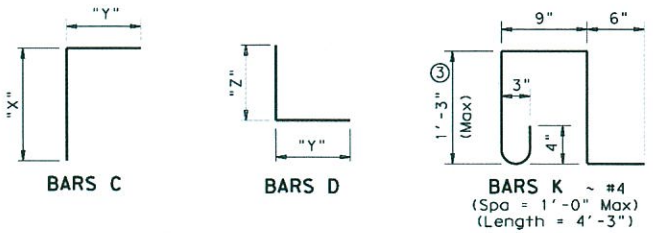
TYPICAL SECTION



PLAN OF REINF STEEL



SECTION THRU CURB



- ① 0" min to 5'-0" max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail or curbs taller than 1'-0", refer to ECD standard. For structures with T6 bridge rail, refer to T6-CM standard. For structures with traffic rail, other than T6, refer to RAC standard.
- ② For vehicle safety, the following requirements must be met:
 - For structures without bridge rail, curbs shall project no more than 3" above finished grade.
 - For structures with bridge rail, curbs shall be flush with finished grade.Curb heights shall be reduced, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
- ③ For curbs less than 1'-0" high, tilt bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, bars K may be omitted.
- ④ 1'-0" typical, 2'-0" when RAC standard is referred to elsewhere in the plans.

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

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

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

HL93 LOADING

SHEET 1 OF 2

Bridge Division Standard

SINGLE BOX CULVERTS
CAST-IN-PLACE
0' TO 30' FILL

SCC-3 & 4

FILE: SCC34std.dgn	DR: GAF	CK: LHM	DN: BWH/TxDOT	CK: GAF
©TxDOT February 2010	COAT	SECT	JOB	HIGHWAY
REVISIONS				
10-12: ARDND WWR	DIST	COUNTY		SHEET NO.

Blue Skies Golden Opportunities

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

SINGLE BOX CULVERT - 1
SCC - 3 & 4

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: SCC-3 & 4 -1

STATE OF TEXAS
79255
DAVIS L. POWELL
REGISTERED PROFESSIONAL ENGINEER
11-30-18
ENGINEERS SEAL

SHEET 81 OF 150

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DATE: _____
FILE: _____

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

Example Conversion: Replacement of No. 6 Gr 60 at 6" Spacing with WWR
WWR required = $(0.44 \text{ sq in/ } 0.5') \times (60 \text{ ksi}/70 \text{ ksi})$
= 0.754 sq in/ft.

If D30.6 wire is used to meet the 0.754 sq in/ft requirement in this example, the required spacing = $(0.306 \text{ sq in/ } 0.754 \text{ sq in/ft}) \times 12 \text{ in/ft} = 4.87"$
Max spacing.

Required lap length for the provided D30.6 wire is 2'-2" (Lap required for uncoated No. 5 bars, as shown in Item 440).

 **Texas Department of Transportation**

*SINGLE BOX CULVERTS
CAST-IN-PLACE
0' TO 30' FILL*

SCC-3 & 4

FILE	SCC34ste.dgn	DN: GAF	CK: LWN	DW: BWH/TXDOT	CK: GAF
(C)TxDOT	February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS					
10-12: Added WDR		DIST	COUNTRY		SHEET #

SINGLE BOX CULVERT - 2
SCC - 3 & 4

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: C
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX

STATE OF TEXAS
DAVIS L. POWELL
79255
REGISTERED PROFESSIONAL ENGINEER
12-30-18
ENGINEER'S SEAL

SHEET 82 OF 150



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DATE: FILE:

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

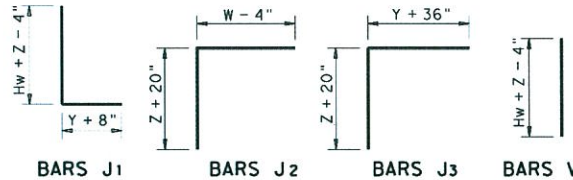
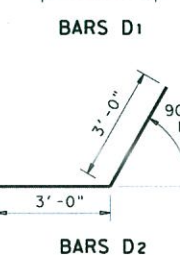
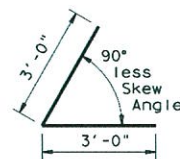
Dimensions					Variable Reinforcing		Estimated Quantities per ft of wing (2-Wings)		Estimated Quantities per ft of Toewall (1-Toewall)	
Maximum Wingwall Height Hw	W	X	Y	Z	Bars J1	Bars J2	Reinf (Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-10"	10"	1'-0"	7"	#4 1'-0"	#4 1'-0"	48.64	0.406	6.85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

TABLE OF WINGWALL REINFORCING (2-Wings)

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

TABLE OF TOEWALL REINFORCING

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



WING DIMENSION CALCULATIONS:

Formulas: (All values are in Feet)

$$Hw = H + T + C$$

$$Lw = (Hw) (SL) \div \cosine \theta \text{ for Ty PW-1}$$

$$= (Hw - 1') (SL) \div \cosine \theta \text{ for Ty PW-2 and } Hw \geq 4'$$

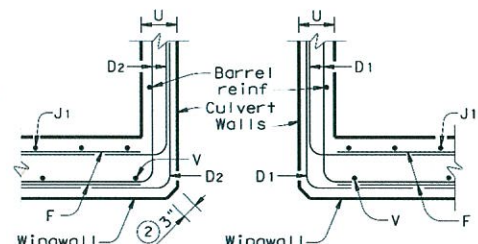
$$= (Hw - 0.5') (SL) \div \cosine \theta \text{ for Ty PW-2 and } Hw < 4'$$

For Cast-in-place culverts:
 $Ltw = [(N) (S) + (N + 1) (U)] \div \cosine \theta$

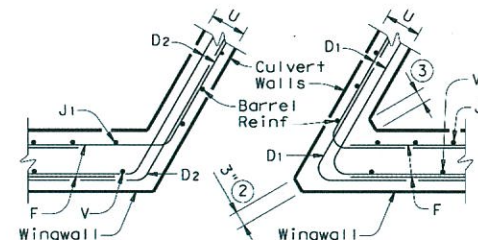
For Precast culverts:
 $Ltw = [(N) (2U + S) + (N - 1) (0.5')] \div \cosine \theta$
 Total Wingwall Area (Two Wings ~ SF)
 $= (2) (Hw) (Lw) \text{ for Ty PW-1}$
 $= (2) (Hw) (Lw) - 6 \text{ SF for Ty PW-2 and } Hw \geq 4'$
 $= (2) (Hw) (Lw) - 1.5 \text{ SF for Ty PW-2 and } Hw < 4'$

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

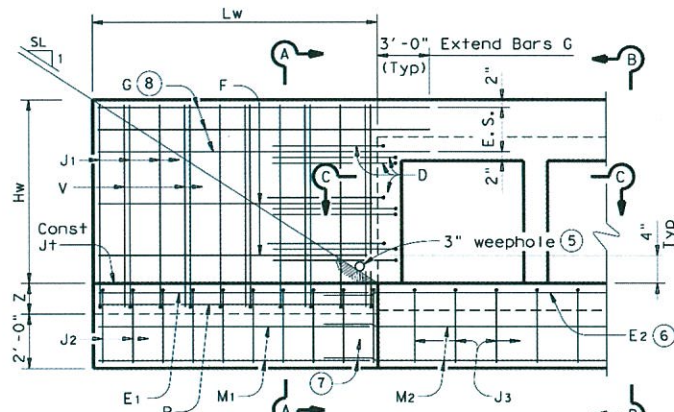
See applicable box culvert standard for S, H, T and U values.



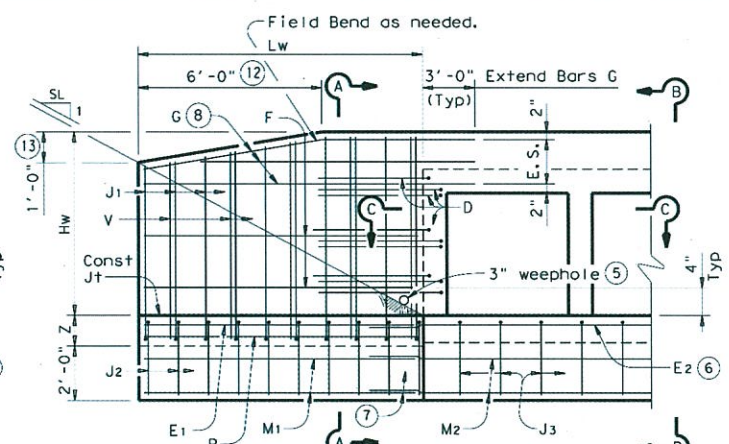
SECTION C-C



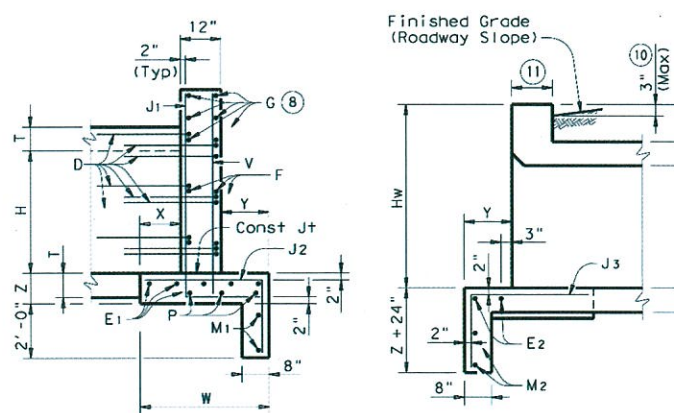
SECTION C-C



PARTIAL ELEVATION - PW-1

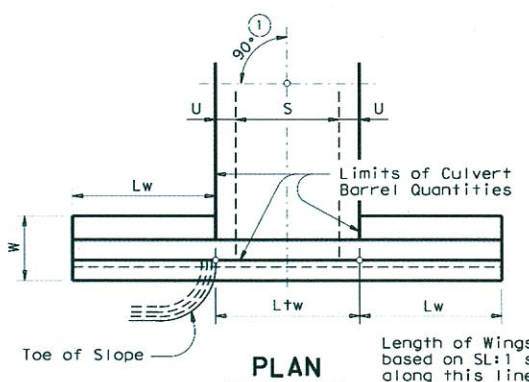


PARTIAL ELEVATION - PW-2

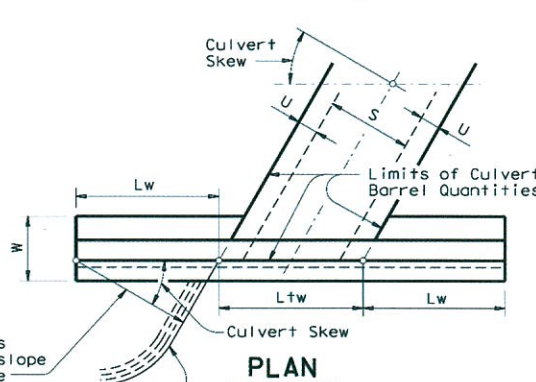


SECTION A-A
(Showing Wing Reinf)

SECTION B-B
(Showing Wing Reinf)



DETAILS FOR NON-SKEWED BOX CULVERTS



DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° Skew)

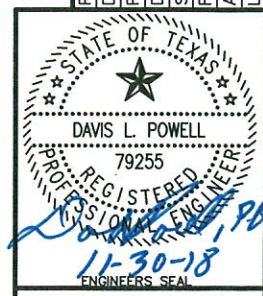
GENERAL NOTES:

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 1/4" Min clear cover to reinforcing steel.
 Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
 See BCS sheet for wingwall type and additional dimensions and information.
 The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

DESIGNER NOTES:

Type PW-1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
 Type PW-2 can only be used for applications without a railing mounted to the wingwall.

Texas Department of Transportation		Bridge Division Standard	
CONCRETE WINGWALLS WITH PARALLEL WINGS FOR BOX CULVERTS TYPES PW-1 AND PW-2			
PW			
FILE: pwstd01.dgn	GN: GAF	CK: CAT	CHK: TxDOT
REV: February 2010	CONT: SECT	JOB: HIGHWAY	
11-10: Reinforcing Quantities 01-12: PW-1 & PW-2		DIST: COUNTY:	SHEET NO:



HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

CONCRETE WINGWALLS
PW

PROJECT MANAGER:
DRAWN BY: TW

PROJECT NUMBER: CWF17-444-11

DATE: DEC 2018

SCALE: AS SHOWN

FIELD BOOK: ACAD: XX

LAYOUT: PW

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DATE: FILE:

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

Maximum Wingwall Height Hw	Dimensions				Variable Reinforcing		Estimated Quantities per ft of wing length (2-Wings)	Conc (CY/Ft)
	W	X	Y	Z	Bars J1	Bars J2		
2'-6"	2'-5"	1'-0"	9"	7"	#4 1'-0"	#4 1'-0"	33.73	0.248
3'-0"	2'-5"	1'-0"	9"	7"	#4 1'-0"	#4 1'-0"	37.07	0.261
3'-6"	2'-5"	1'-0"	9"	7"	#4 1'-0"	#4 1'-0"	37.74	0.273
4'-0"	2'-5"	1'-0"	9"	7"	#4 1'-0"	#4 1'-0"	38.41	0.285
4'-6"	3'-2"	1'-6"	1'-0"	7"	#4 1'-0"	#4 1'-0"	41.75	0.330
5'-0"	3'-2"	1'-6"	1'-0"	7"	#4 1'-0"	#4 1'-0"	45.09	0.343
5'-6"	3'-2"	1'-6"	1'-0"	7"	#4 1'-0"	#4 1'-0"	45.75	0.355
6'-0"	3'-2"	1'-6"	1'-0"	7"	#4 1'-0"	#4 1'-0"	46.42	0.367
7'-0"	3'-8"	1'-9"	1'-3"	7"	#4 1'-0"	#4 1'-0"	52.77	0.414
8'-0"	4'-2"	2'-0"	1'-6"	8"	#5 1'-0"	#4 1'-0"	60.19	0.486
9'-0"	4'-8"	2'-3"	1'-9"	8"	#4 6"	#4 6"	81.49	0.535
10'-0"	5'-2"	2'-6"	2'-0"	8"	#5 6"	#4 6"	97.25	0.584
11'-0"	5'-8"	2'-9"	2'-3"	8"	#6 6"	#5 6"	133.65	0.634
12'-0"	6'-2"	3'-0"	2'-6"	9"	#7 6"	#5 6"	162.29	0.721
13'-0"	6'-8"	3'-3"	2'-9"	11"	#7 6"	#5 6"	178.80	0.856
14'-0"	7'-2"	3'-6"	3'-0"	1'-0"	#8 6"	#5 6"	216.78	0.959
15'-0"	7'-8"	4'-0"	3'-0"	1'-1"	#9 6"	#6 6"	283.06	1.068
16'-0"	8'-2"	4'-6"	3'-0"	1'-3"	#9 6"	#6 6"	297.02	1.234

TABLE OF WINGWALL REINFORCING (2-Wings)

Bar	Size	No.	Spa
D	#5	~	1'-0"
E	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	4	~
M	#4	4	~
P	#4	~	1'-0"
R	#5	6	~
V	#4	~	1'-0"

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

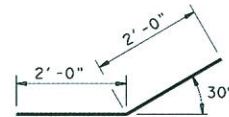
Bar	Size	No.	Spa
L	#4	~	1'-6"
Q	#4	1	~
Reinf (Lb/Ft)	2.45		
Conc (CY/Ft)	0.037		

WING DIMENSION CALCULATIONS:

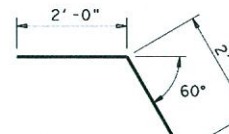
Formulas: (All values are in Feet)
 $Hw = H + T + C - 0.250'$
 $A = (Hw - 0.333') (SL)$
 $B = (A) \text{ Tangent } (30^\circ)$
 $Lw = (A) \div \text{Cosine } (30^\circ)$
 For Cast-in-place culverts:
 $Ltw = (N) (S) + (N+1) (U)$
 For Precast culverts:
 $Ltw = (N) (2U+S) + (N-1) (0.500')$
 Total Wingwall Area (Two Wings ~ S.F.) = $(Hw + 0.333') (Lw)$

Hw = Height of Wingwall
 SL:1 = Side Slope Ratio (Horizontal:1 Vertical)
 Lw = Length of Wingwall
 Ltw = Culvert Toewall Length
 N = Number of Culvert Spans

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



BARS D



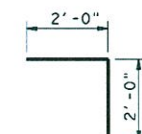
BARS R



BARS J1



BARS V



BARS L

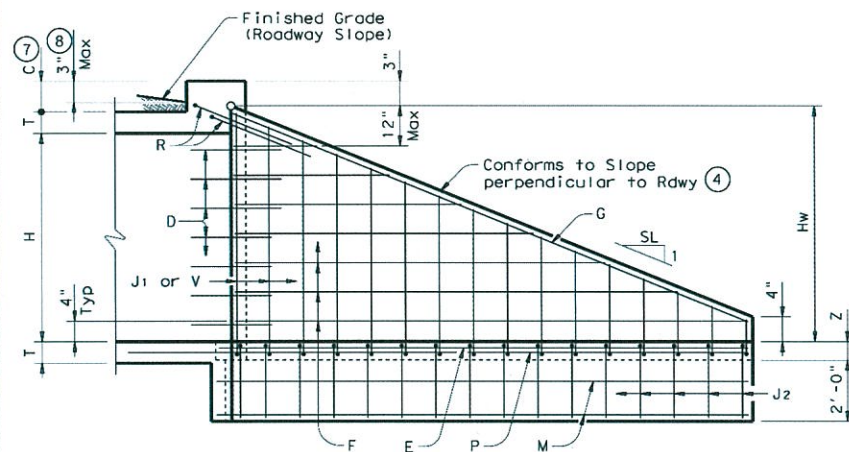


BARS J2

- Extend Bars P 3'-0" minimum into bottom slab of Box Culvert.
- Adjust to fit as necessary to maintain 1 1/4" clear cover and 4" minimum between bars.
- Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings multiply the tabulated values by Lw.
- Recommended values of Slope are: 2:1, 3:1, 4:1, & 6:1.
- When shown elsewhere on the plans, a 5" deep concrete riprap shall be constructed. Payment for riprap shall be as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, the riprap shall have a 6" wide by 1'-6" deep reinforced concrete toewall along all edges adjacent to natural ground; the toewall shall be reinforced by extending typical riprap reinforcing into the toewall; construction joints or grooved joints, oriented in the direction of flow, shall extend across the full distance of the riprap, at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B will not be required.
- At Contractor's option, Culvert Toewall may be ended flush with Wingwall Toewall. Adjust reinforcing from that shown as necessary.
- 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 16 bridge rail, refer to T6-CM standard. For structures with traffic rail, other than T6, refer to RAC standard.
- For vehicle safety, curb heights and wall heights shall be reduced, if necessary, to provide a maximum 3" projection above finished grade. No changes will be made in quantities and no additional compensation will be allowed for this work.

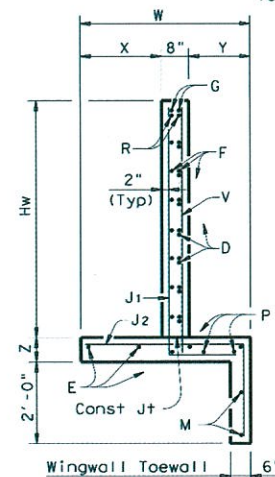
GENERAL NOTES:

Designed according to AASHTO LRFD Specifications. All reinforcing steel shall be Grade 60. Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise. All concrete shall be Class "C" and shall have a minimum compressive strength of 3600 psi. All reinforcing bars shall be adjusted to provide a minimum of 1 1/4" clear cover. When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer. See BCS sheet for additional dimensions and information. The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for Contractor's information only.

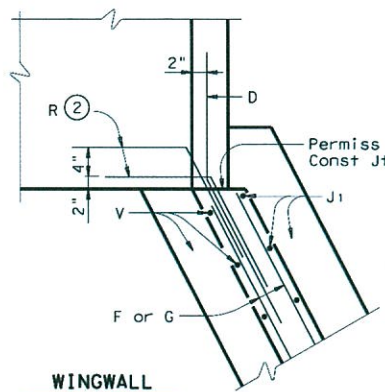


INSIDE ELEVATION

(Showing reinforcing. Culvert and Culvert Toewall reinforcing not shown for clarity.)



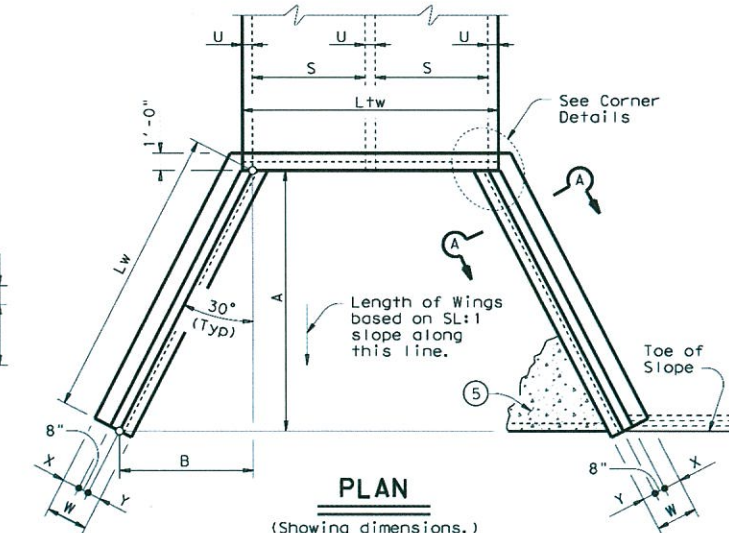
SECTION A-A



WINGWALL

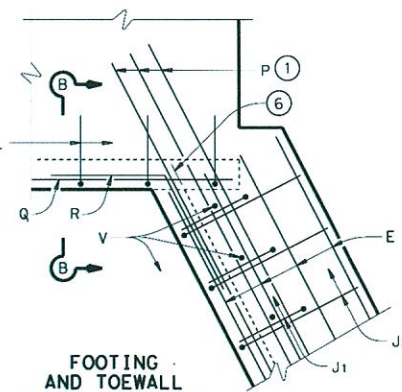
CORNER DETAILS

(Culvert and Culvert Toewall reinforcing not shown for clarity.)

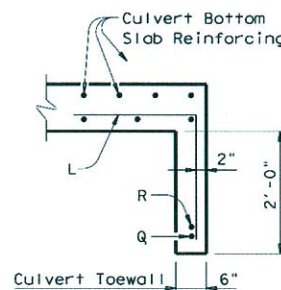


PLAN

(Showing dimensions.)

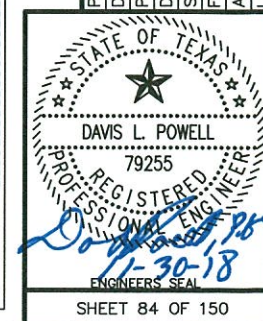


FOOTING AND TOEWALL



SECTION B-B

Texas Department of Transportation		Bridge Division Standard	
CONCRETE WINGWALLS WITH FLARED WINGS FOR 0° SKEW BOX CULVERTS			
FW-0			
FILE: fw-0std.dgn	DN: GAF	CK: CAT	CHK: TxDOT
©TxDOT February 2010	CONT	SECT	JOB
REVISIONS			
11-10: Add note for synthetic fibers.	DEST	COUNTY	SHEET NO.



HIKE AND BIKE TRAIL
 FROM BARNETT ROAD TO SEYMOUR HWY
 CWF17-444-11

CONCRETE WINGWALLS
 FW-0

PROJECT MANAGER: TW
 DRAWN BY: TW
 PROJECT NUMBER: CWF17-444-11
 DATE: DEC 2018
 SCALE: AS SHOWN
 FIELD BOOK:
 ACAD: XX
 LAYOUT: FW-0

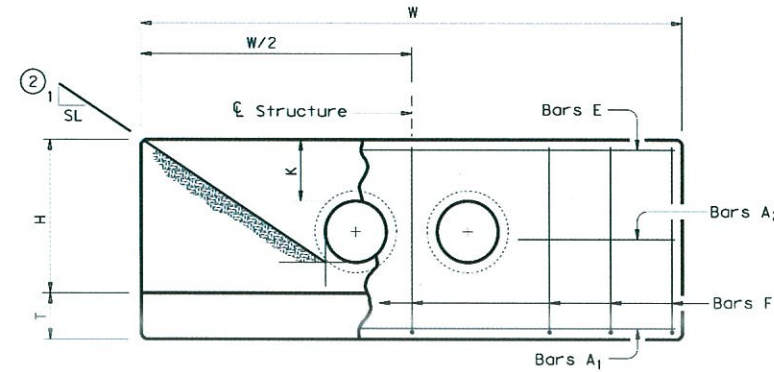
NO.	DATE	DESCRIPTION	BY



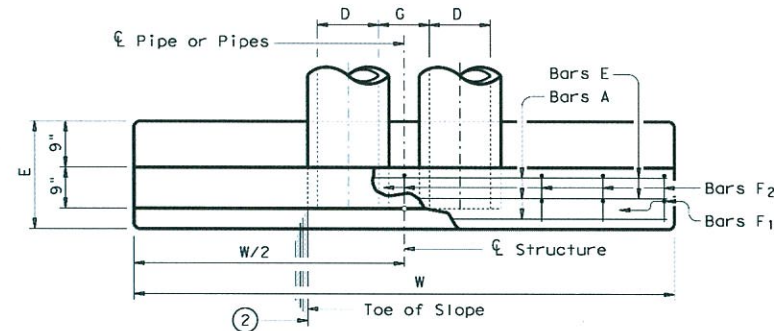
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DATE: FILE:

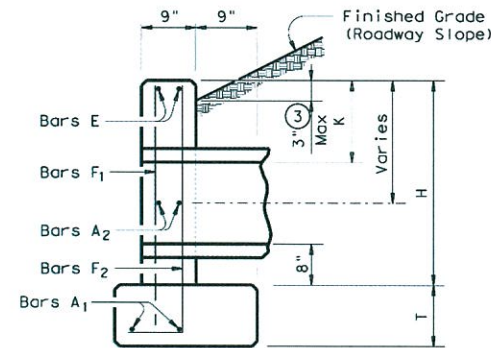
TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL ⁽⁴⁾							
SLOPE	DIA OF PIPE, D	Values for one Pipe			Values to be added for each add'l Pipe		
		W	Reinf (Lbs)	Conc (CY) (1)	W	Reinf (Lbs)	Conc (CY) (1)
2:1	12"	9'- 0"	122	1.1	1'- 9"	15	0.2
	15"	10'- 3"	136	1.3	2'- 2"	16	0.2
	18"	11'- 6"	163	1.5	2'- 8"	19	0.3
	21"	12'- 9"	200	1.8	3'- 1"	31	0.4
	24"	14'- 0"	217	2.1	3'- 7"	34	0.4
	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	4'- 8"	43	0.6
	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
3:1	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
	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
4:1	42"	30'- 6"	675	7.1	5'-10"	52	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	9'- 4"	103	2.3
	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
6:1	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	6'- 7"	61	1.3
	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
	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	3'- 1"	31	0.4	
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"	83	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	9'- 4"	101	2.3	



ELEVATION



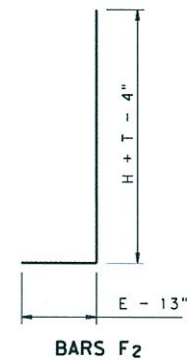
PLAN OF NON-SKEWED PIPES



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



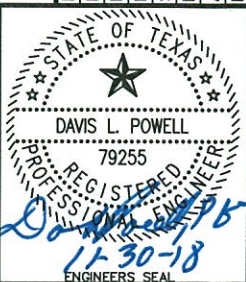
GENERAL NOTES:
Designed according to AASHTO LRFD Specifications.
Reinforcing steel shall be placed with the center of the outside layer of bars 2" from the surface of the concrete.
All reinforcing steel shall be Grade 60.
All concrete shall be Class "C" and shall have a minimum compressive strength of 3600 psi.
No bridge rails of any type may be mounted directly to these culvert headwalls.

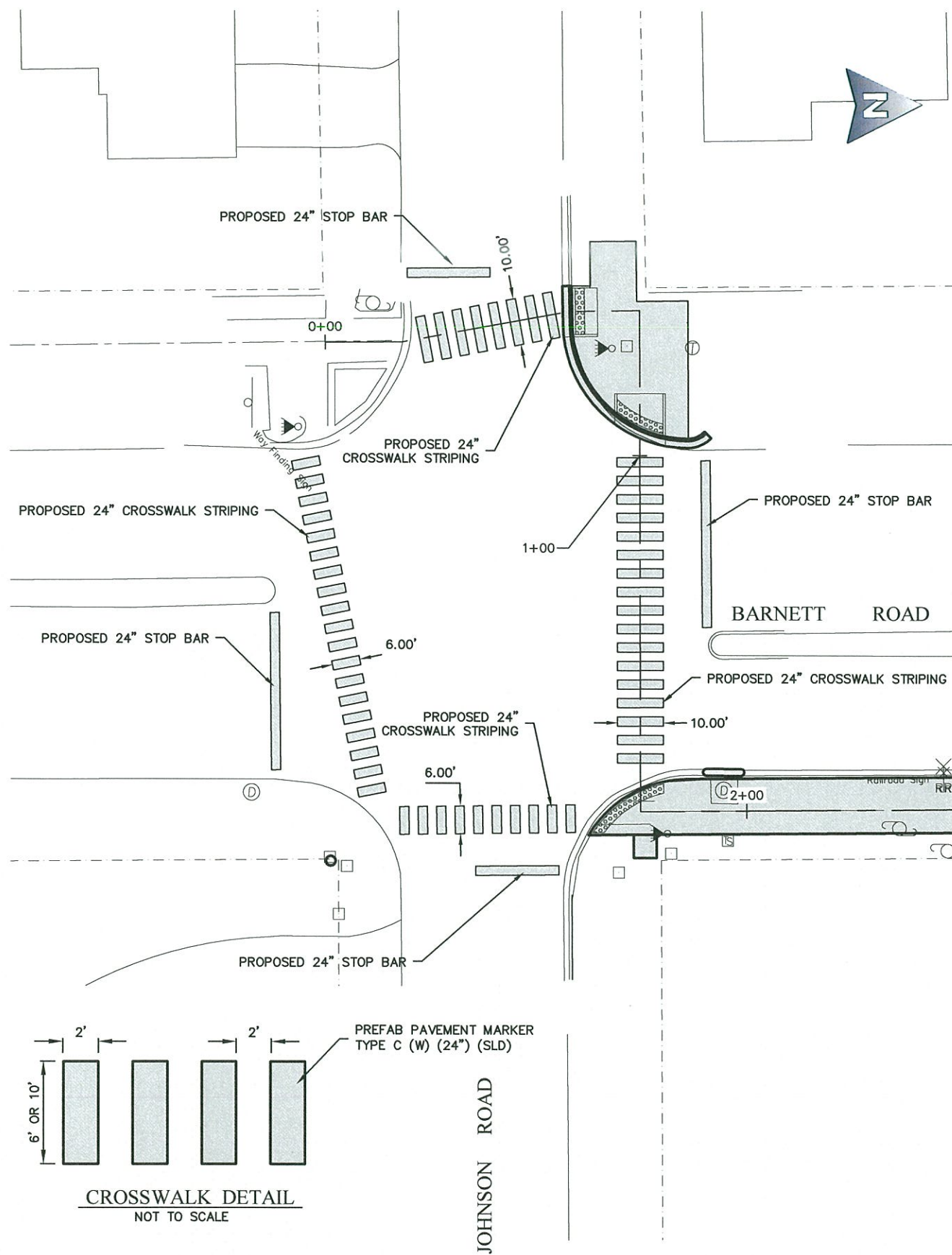
		Bridge Division Standard			
CONCRETE HEADWALLS WITH PARALLEL WINGS FOR NON-SKEWED PIPE CULVERTS					
CH-PW-0					
FILE: chpw0ste.dgn	DN: TxDOT	CK: TxDOT	CHK: GAF		
©TxDOT February 2010	CONT	SECT	JOB		
REVISIONS					
DIST	COUNTY		SHEET NO.		

- Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.
- Indicated slope is perpendicular to centerline Pipe or Pipes.
- 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.
- Quantities shown are for one structure end only (one headwall).

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11
CONCRETE HEADWALLS
CH-PW-0

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: CH-PW-0

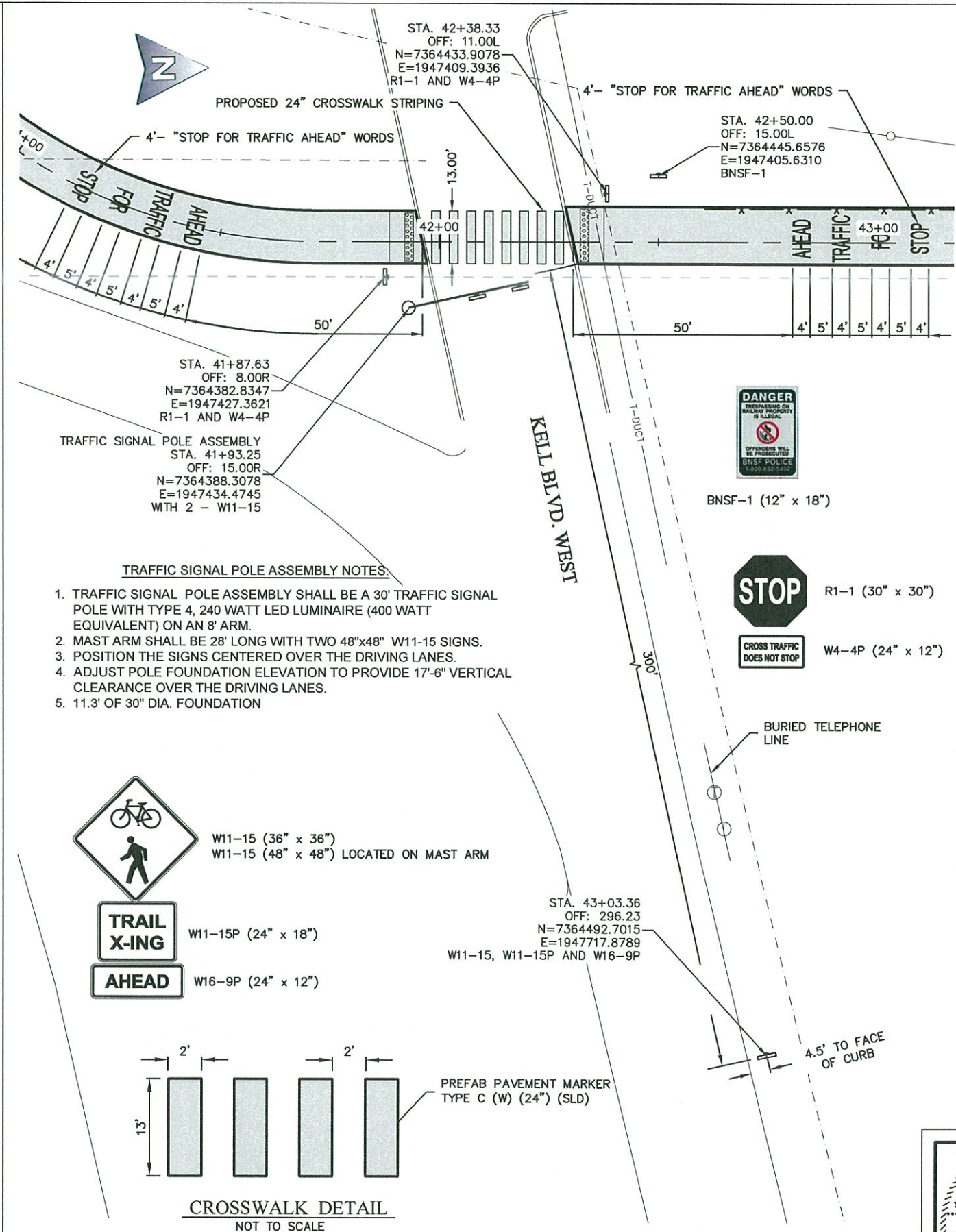




BARNETT ROAD AT JOHNSON ROAD

STRIPING AND SIGN PLAN

SCALE: 1"=30'



KELL BOULEVARD

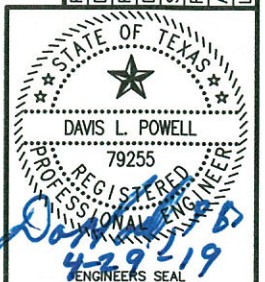
NO.	DATE	DESCRIPTION	BY

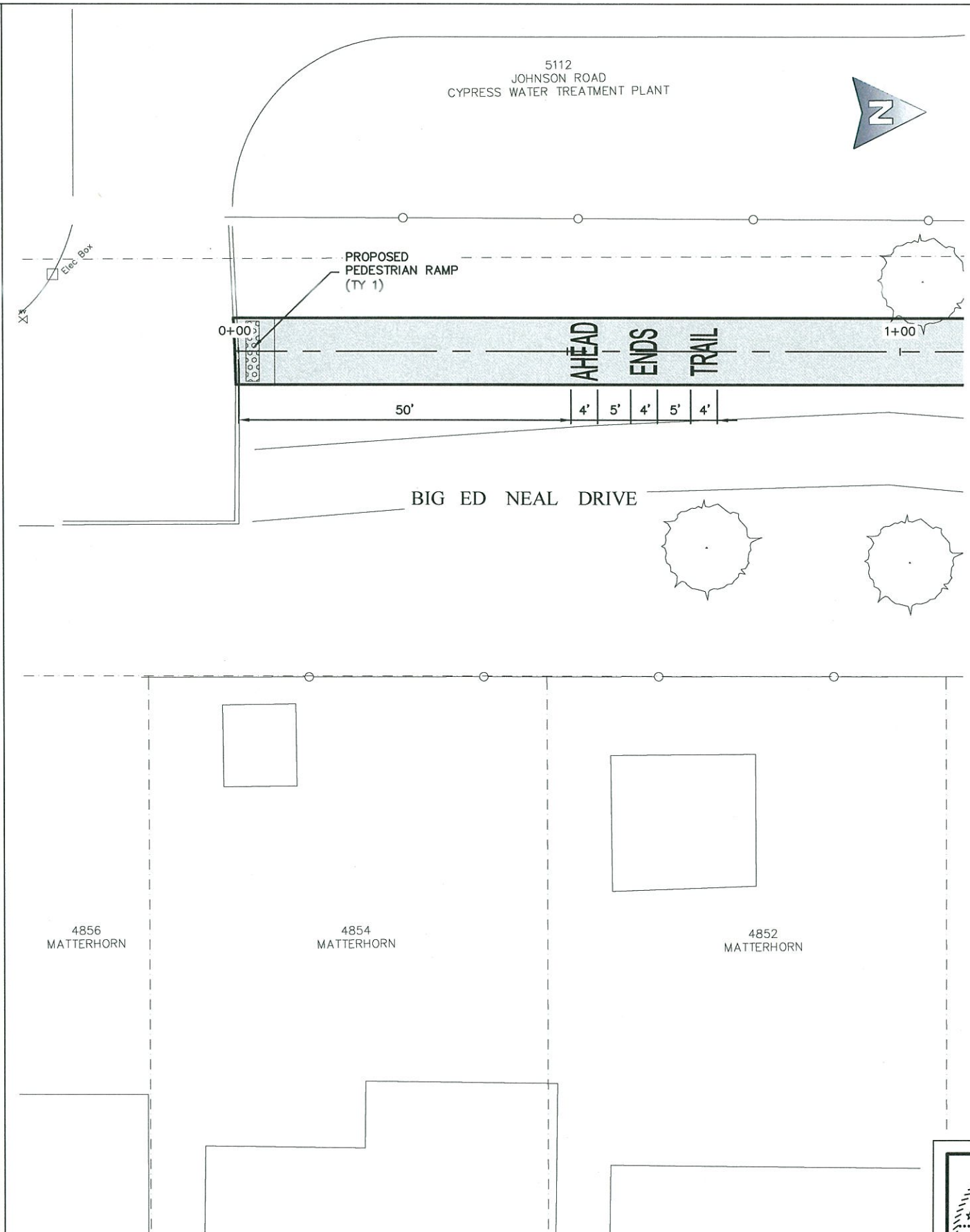
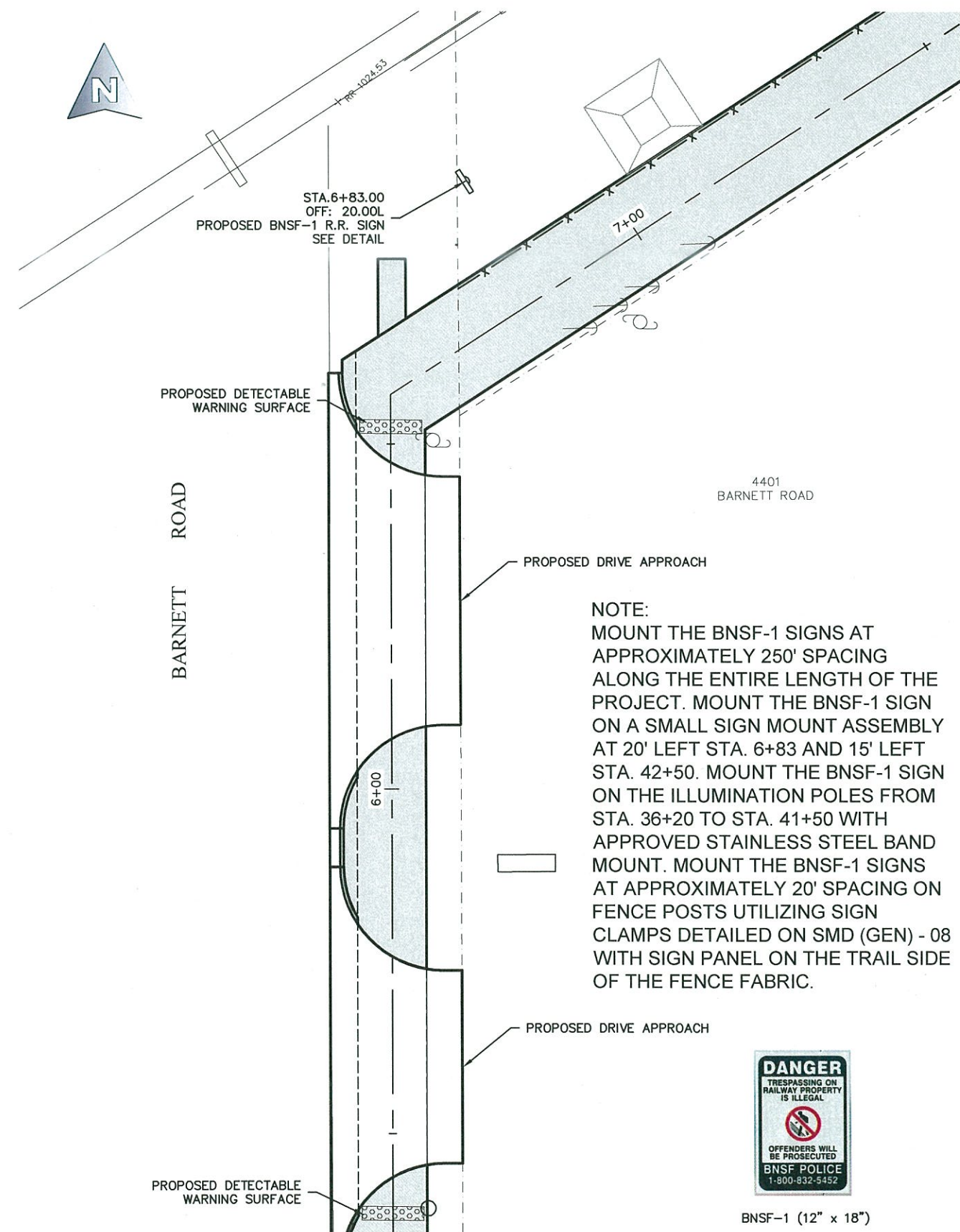


HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

SIGN AND STRIPING PLAN - 1

PROJECT MANAGER:	TW
DRAWN BY:	TW
PROJECT NUMBER:	CWF17-444-11
DATE:	DEC 2018
SCALE:	AS SHOWN
FIELD BOOK:	
ACAD:	XX
LAYOUT:	STRIPING-1





BARNETT ROAD RAILROAD SIGN

STRIPING AND SIGN PLAN

SCALE: 1"=20'

PAVEMENT MARKING WORDS ON BIG ED NEAL DRIVE

[illegible]

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

SIGN AND STRIPING PLAN - 2

PROJECT MANAGER:	
DRAWN BY:	TW
PROJECT NUMBER:	CWF17-444-11
DATE:	DEC 2018
SCALE:	AS SHOWN
FIELD BOOK:	
ACAD:	XX
LAYOUT:	STRIPING-2



ENGINEERS SEAL

SHEET 87 OF 150

\\Antares2\Share\EngDrafter\Terry Walters\Land Projects\2017\Trail by the Railroad\Drawings\Trail.dwg, Sign Details-1, 11/30/2018 9:42:19 AM



* See Symbol section
for symbol design

W11-15

A	B	C	D	E	F	G	H	J	K	L
18	.375	.625	6.25	1	9	0.125	1.5	2.524	2.25	1.5
24	.375	.625	8.5	1.375	12	0.125	7.438	3.366	3	1.5
30	.5	.75	10.75	1.75	15	0.25	9.41	4.207	3.75	1.875
36	.625	.875	12.75	2.125	18	0.375	11.156	5.049	4.50	2.25
48	.75	1.25	17	2.75	24	0.375	14.875	6.732	6	3

COLORS: LEGEND - BLACK
BACKGROUND - YELLOW

TEXAS



W11-15P

A	B	C	D	E	F	G	H	J	K
18	12	.375	.438	2.5	2.5 D	2	.375	.625	1.5
24	18	.375	.625	3.5	4 D	3	.5	1	1.5
30	24	.5	.75	5	5 D	4	.5	.625	1.5
36	30	.625	.875	6.5	6 D	5	.625	.75	1.875

COLORS: LEGEND - BLACK
BACKGROUND - YELLOW

TEXAS

SIGN DETAILS

NOT TO SCALE

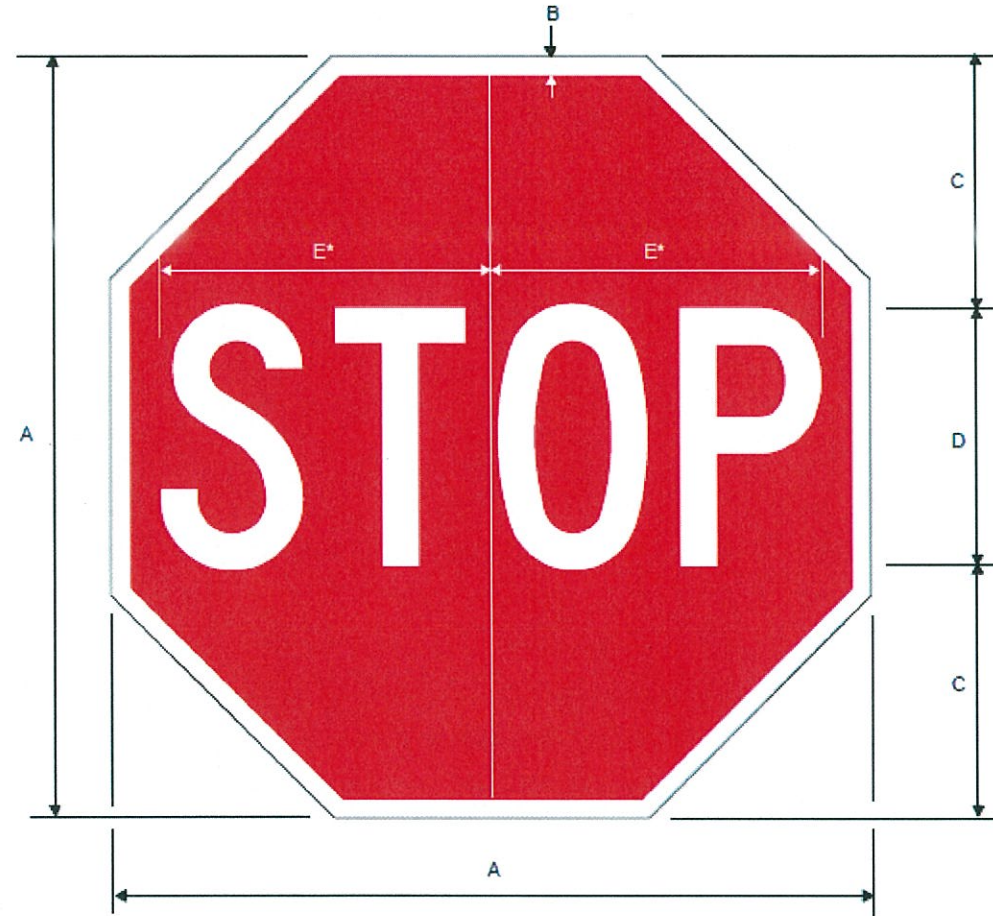
HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

SIGN DETAILS - 1

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: SIGN DETAILS-1



\\nterac2\Shw\Eng\Drawings\Terry Walters\Land Projects\2017\Trail by the Railroad\Drawings\trail.dwg, Sign Details-2, 11/30/2018 9:43:13 AM



R1-1

* Reduce spacing 40%

A	B	C	D	E
18	.375	6	6C	7.75
30	.75	10	10C	12.5
36	.875	12	12C	15
48	1.25	16	16C	20

COLORS: LEGEND - WHITE
BACKGROUND - RED



W4-4P

A	B	C	D	E	F	G	H	J	K	L	M	N	P
24	12	.375	0.625	2.875	2.25 C	1.75	9.314	9.875	1.5	10.054	10.176	9.889	2.25 B
36	18	.625	0.875	4	3.5 C	3	14.487	15.333	2.25	15.807	15.995	15.47	3.5 B
48	24	.75	1.25	5.75	4.5 C	3.5	18.628	19.749	3	20.104	20.35	19.778	4.5 B

COLORS: LEGEND - BLACK
BACKGROUND - YELLOW

TEXAS

SIGN DETAILS

NOT TO SCALE



HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

SIGN DETAILS - 2

PROJECT MANAGER:
DRAWN BY: TW

PROJECT NUMBER: CWF17-444-11

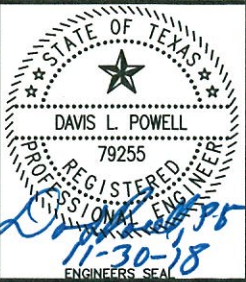
DATE: DEC 2018

SCALE: AS SHOWN

FIELD BOOK:

ACAD: XX

LAYOUT: SIGN DETAILS-2



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A	B	C	D	E	F	G
24	12	.375	.625	3.5	5 C	1.5
30	18	.5	.75	5.5	7 C	1.875
36	24	.625	.875	8	8 C	2.25



SIGN DETAILS
NOT TO SCALE

PROJECT MANAGER:		HIKE AND BIKE TRAIL		NO. DATE DESCRIPTION BY	
DRAWN BY: TW		FROM BARNETT ROAD TO SEYMOUR HWY		REVISIONS	
PROJECT NUMBER: CWF17-444-11		CWF17-444-11			
DATE: DEC 2018		SIGN DETAILS - 3			
SCALE: AS SHOWN					
FIELD BOOK:					
ACAD: XX					
LAYOUT: SIGN DETAILS-3					

STATE OF TEXAS

DAVIS L. POWELL

79255

REGISTERED PROFESSIONAL ENGINEER

11-30-18

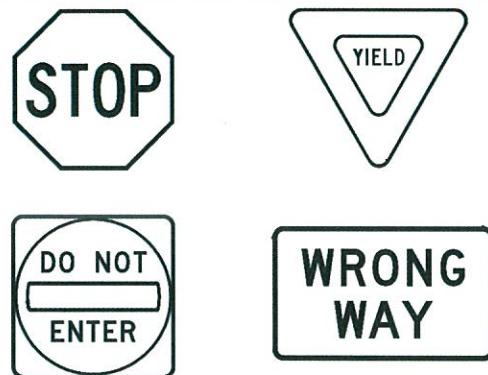
ENGINEERS SEAL

SHEET 90 OF 150

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DATE: FILE:

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS (STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

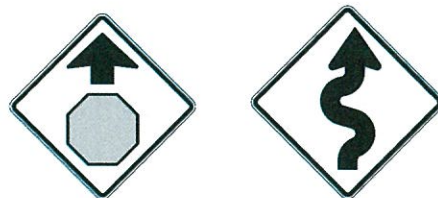
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS (EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B _{FL} OR C _{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B _{FL} OR C _{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

- Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
- Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
- Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
- Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
- White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
- Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
- Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
- Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

ALUMINUM SIGN BLANKS THICKNESS

Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

DEPARTMENTAL MATERIAL SPECIFICATIONS

ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

<http://www.txdot.gov/>

		Traffic Operations Division Standard	
TYPICAL SIGN REQUIREMENTS			
TSR (4) - 13			
FILE: tsr4-13.cgn	DW: TxDOT	CK: TxDOT	EW: TxDOT
©TxDOT October 2003	CONT	SECT	JOB
12-03 7-13	REVISIONS		
9-08		DIS*	COUNTY
			SHEET NO.

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

TYPICAL SIGN REQUIREMENTS

TSR (4) - 13

PROJECT MANAGER:

DRAWN BY: TW

PROJECT NUMBER: CWF17-444-11

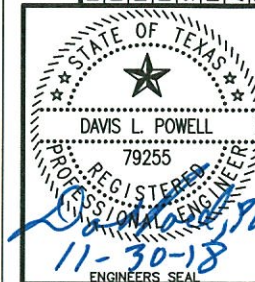
DATE: DEC 2018

SCALE: AS SHOWN

FIELD BOOK:

ACAD: XX

LAYOUT: TSR (4) -13



\\antares2\share\Eng\Drawings\Traffic\Signs\Sign Mounting Details.dwg, SMD(GEN)-08, 11/30/2018 9:46:30 AM

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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))

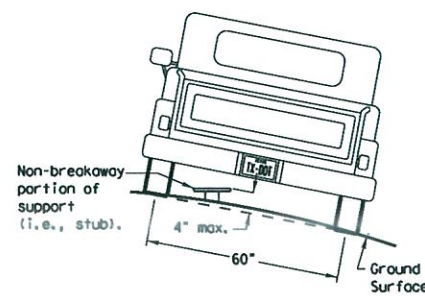
Number of Posts (1 or 2)

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
TEXT 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-3))

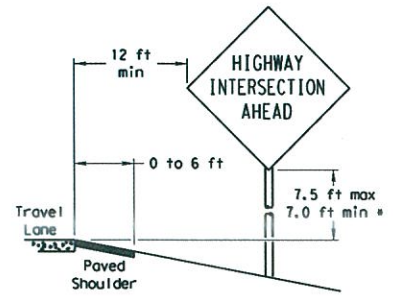
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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 wheel paths).

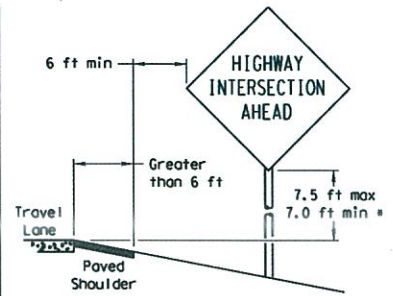
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

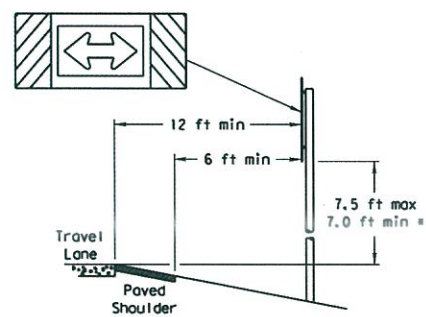
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



GREATER THAN 6 FT. WIDE

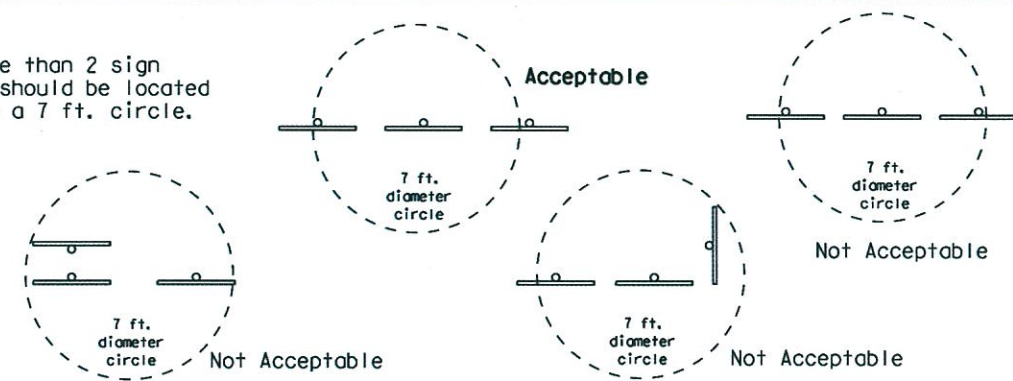
When the shoulder is greater than 6 ft. in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

T-INTERSECTION

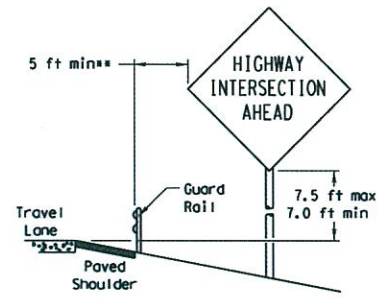


When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.

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

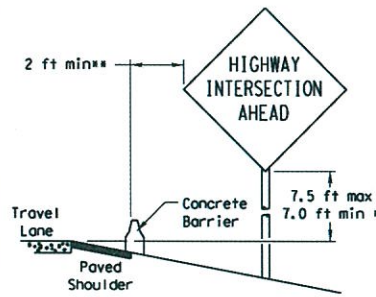


BEHIND BARRIER



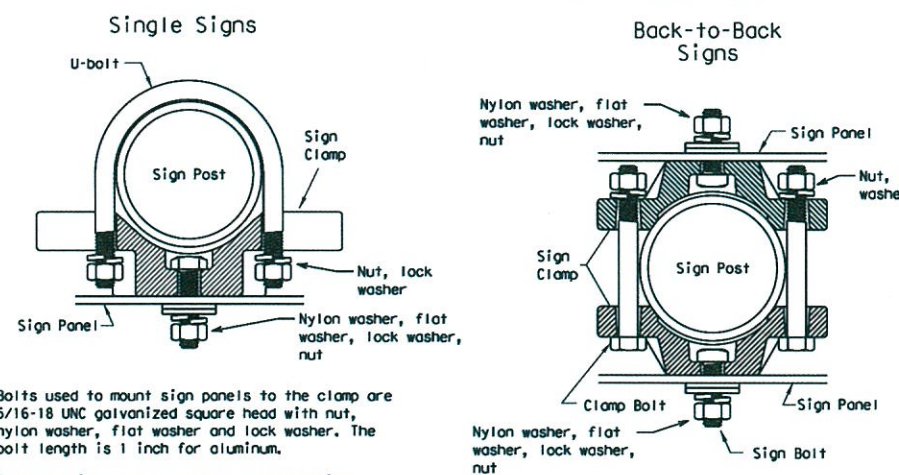
BEHIND GUARDRAIL

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



BEHIND CONCRETE BARRIER

TYPICAL SIGN ATTACHMENT DETAIL



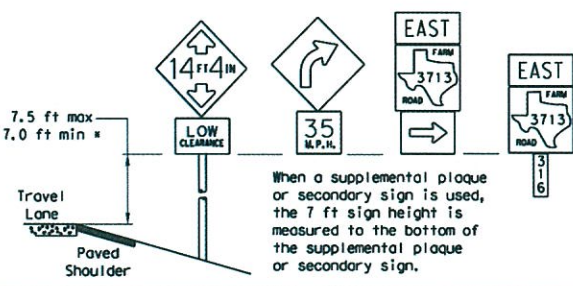
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

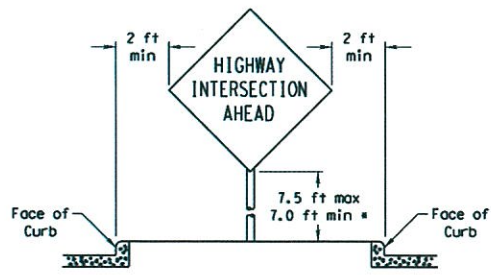
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES

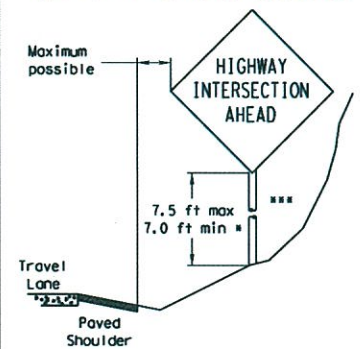


When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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 travel lane, 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.

* 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 travel lane 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>



SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD (GEN) -08

© TxDOT July 2002	REV	BY	DATE	REVISIONS
9-08	1	XXX	XXX	XXX

Wichita Falls
Blue Skies. Golden Opportunities.

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

SIGN MOUNTING DETAILS - 1
SMD (GEN) - 08

PROJECT MANAGER: TW
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK: ACAD: XX
LAYOUT: SMD (GEN) -08

STATE OF TEXAS
DAVIS L. POWELL
79255
11-30-18
ENGINEERS SEAL

SHEET 92 OF 150

\\Antares2\Share\EngDrafters\Terry Walters\Land Projects 2017\Trail by the Railroad\Drawg, SMD(SUP-1)-08, 11/30/2018 9:47:07 AM



NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.fxdot.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 t

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



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, "Epoxyes 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 1 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

268SHEET 93 OF 150

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

SIGN MOUNTING DETAILS - 2
SMD (SLIP-1) - 08

PROJECT MANAGER:

DRAWN BY: TW

PROJECT NUMBER:

DATE: DEC 2018
SCALE: AS SHOWN

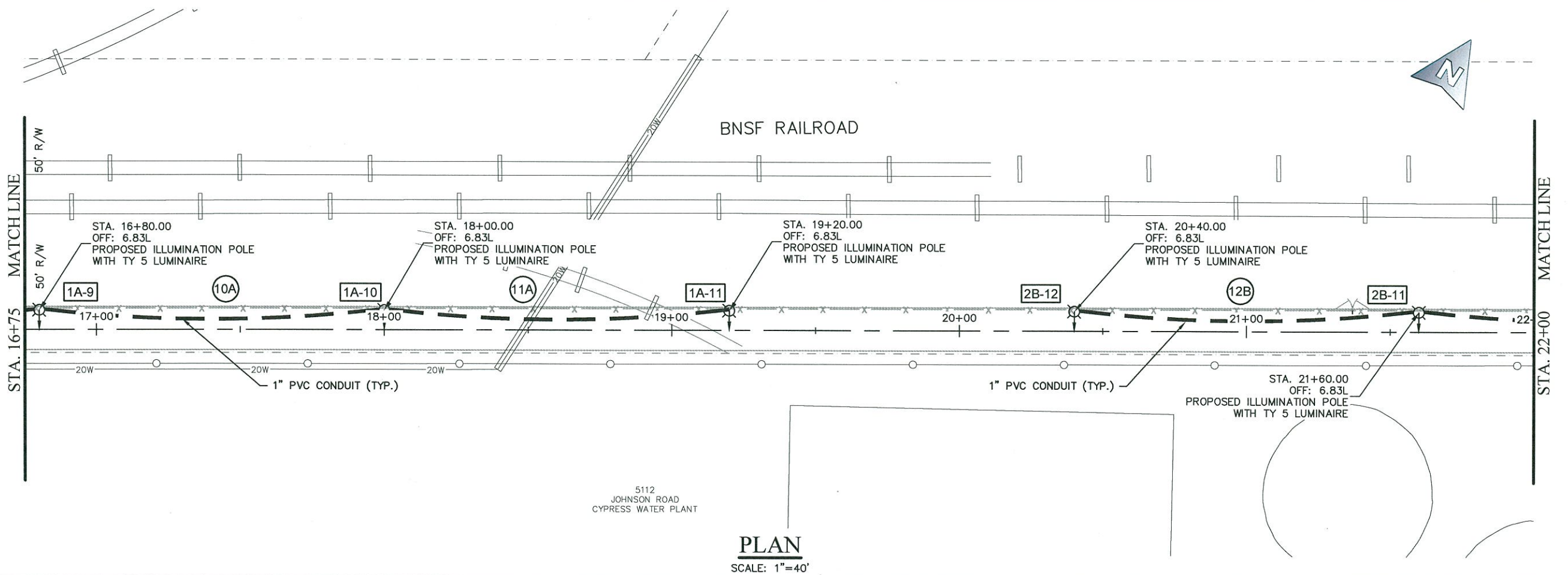
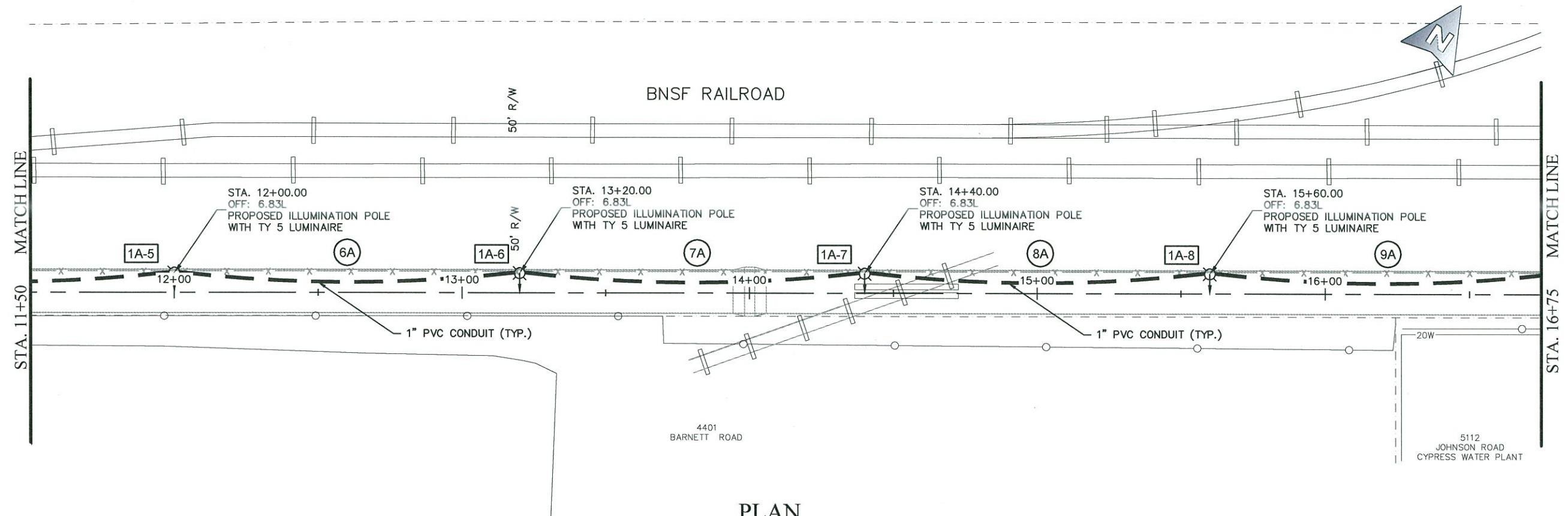
FIELD BOOK:

ACAD: XX
LAYOUT: SMD(SLIP-1)-08

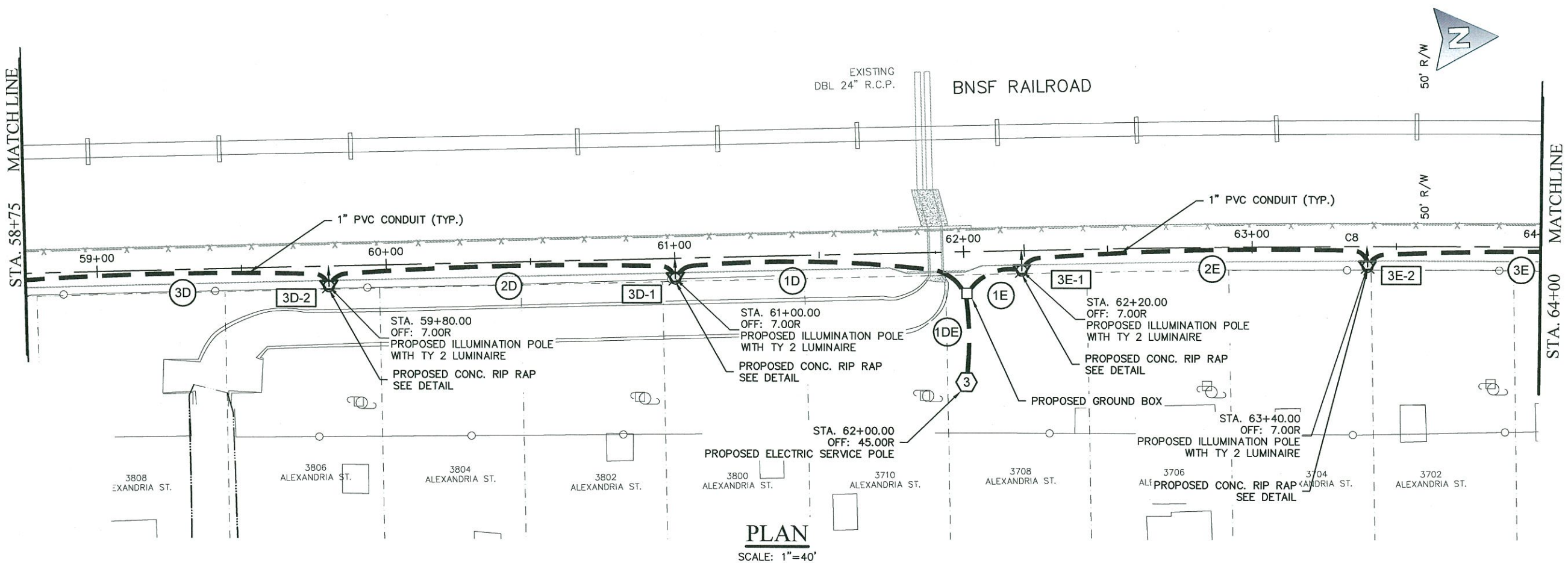
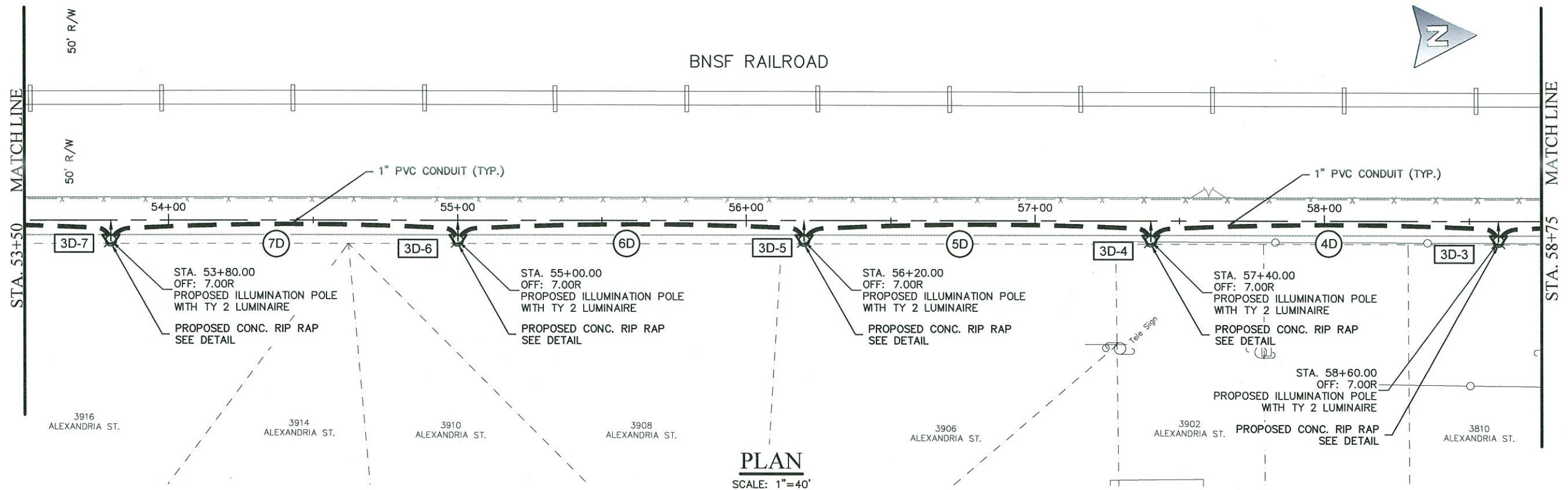
STATE OF TEXAS
DAVIS L. POWELL
79255
REGISTERED PROFESSIONAL ENGINEER
11-30-18
ENGINEERS SEAL

DATE: _____
FILE: _____





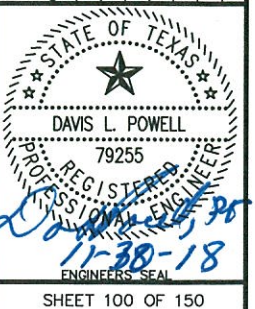
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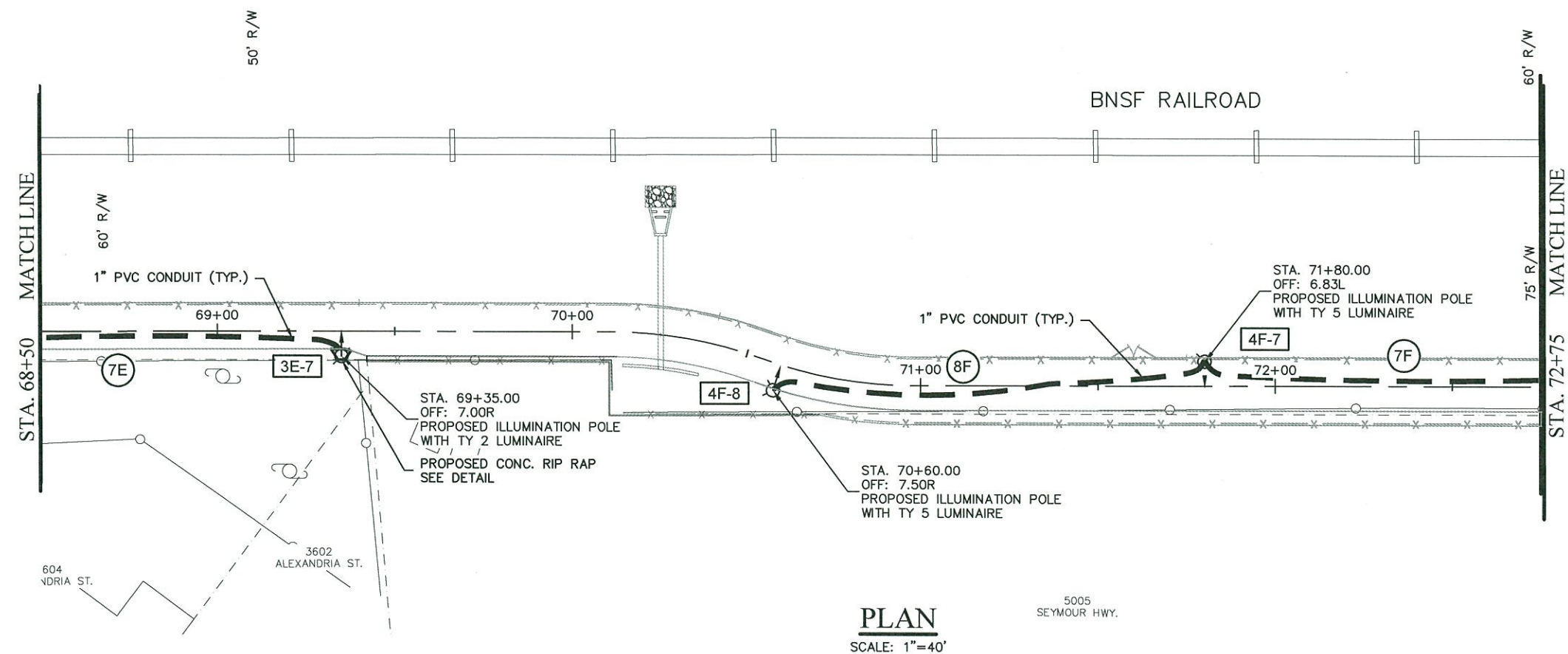
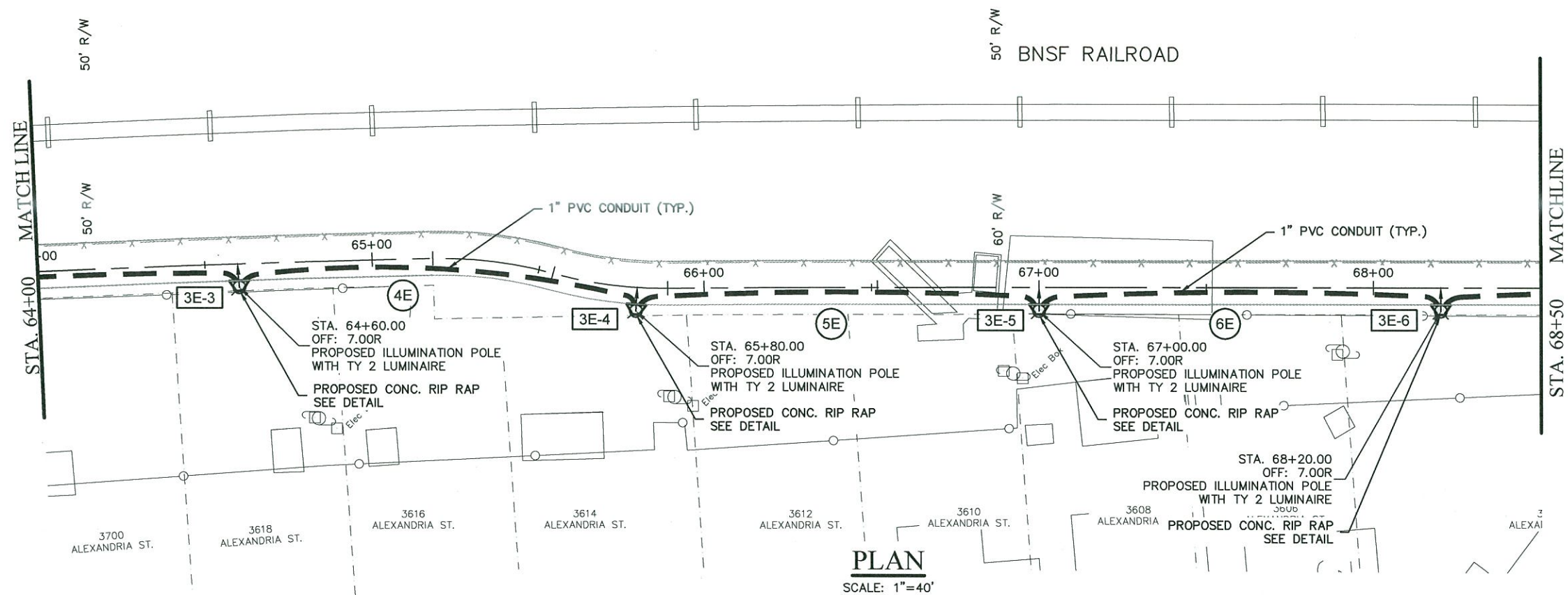


HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

ILLUMINATION PLAN - 6
STA. 53+50 TO STA. 64+00

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: ILLUM-6

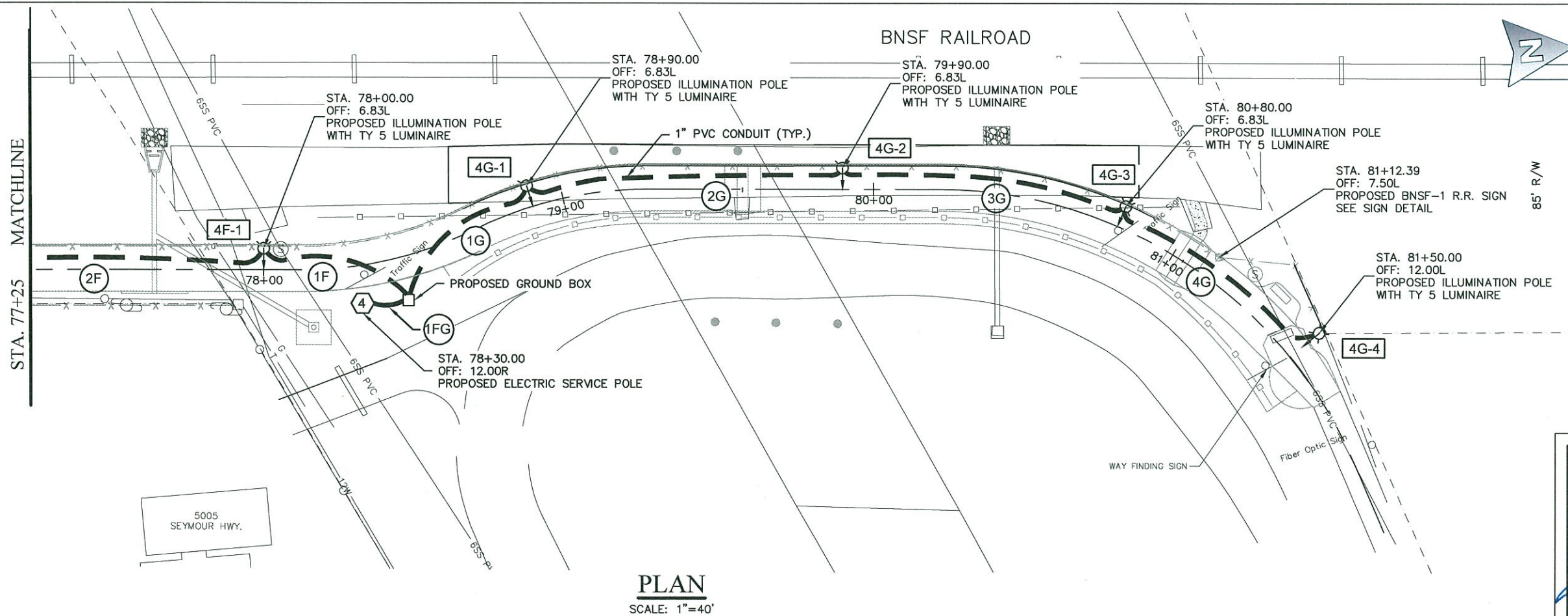
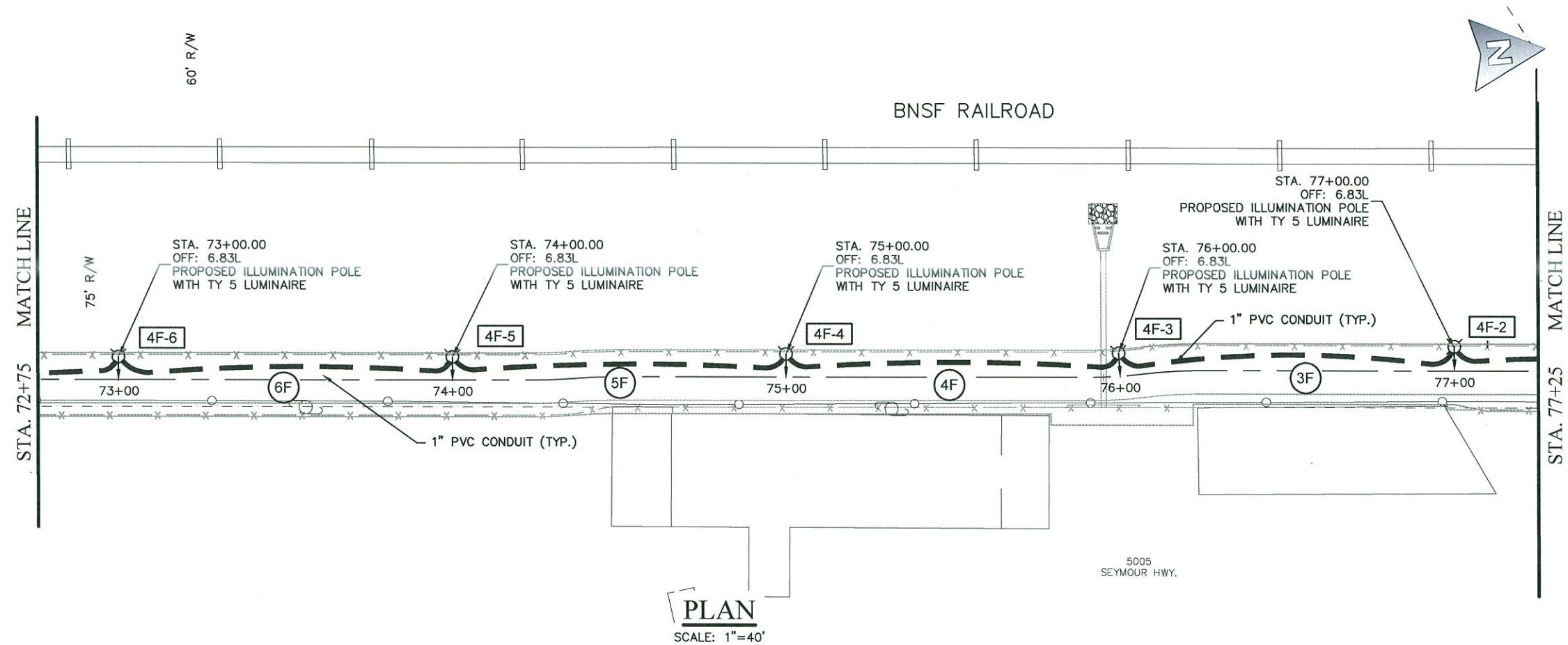




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STATE OF TEXAS
DAVIS L. POWELL
79255
PROFESSIONAL ENGINEER
11-30-18
ENGINEERS SEAL



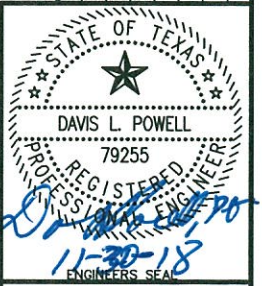
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HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

ILLUMINATION PLAN - 8
STA. 72+75 TO END

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: ILLUM-8



ROADWAY ILLUMINATION ASSEMBLY SUMMARY

POLE	STA.	Luminaire Type	TYPE	REMARKS
1A - 1	07+20	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
1A - 2	08+40	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
1A - 3	09+60	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
1A - 4	10+80	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
1A - 5	12+00	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
1A - 6	13+20	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
1A - 7	14+40	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
1A - 8	15+60	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
1A - 9	16+80	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
1A - 10	18+00	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
1A - 11	19+20	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
2B - 12	20+40	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
2B - 11	21+60	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
2B - 10	22+80	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
2B - 9	24+00	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
2B - 8	25+20	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
2B - 7	26+40	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
2B - 6	27+60	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
2B - 5	28+80	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
2B - 4	30+00	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
2B - 3	31+40	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
2B - 2	32+60	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
2B - 1	33+80	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
2C - 1	35+00	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
2C - 2	36+20	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
2C - 3	37+40	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
2C - 4	38+25	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
2C - 5	39+54	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
2C - 6	40+60	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
2C - 7	41+60	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
2C - 8	41+93	Type IV 400W EQ LED LUMINAIRE ASSEMBLY	TRF SIG PL AM (S) 1 ARM (24') (400 W EQ) LED	

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

ILLUMINATION SUMMARY - 1

[illegible]

PROJECT MANAGER:	
DRAWN BY:	TW
PROJECT NUMBER:	
DATE:	DEC 2018
SCALE:	AS SHOWN
FIELD BOOK:	
ACAD:	XX

STATE OF TEXAS
DAVIS L. POWELL
79255
REGISTERED PROFESSIONAL ENGINEER
11-30-18
ENGINEERS SEAL

ROADWAY ILLUMINATION ASSEMBLY SUMMARY

POLE	STA.	Luminaire Type	TYPE	REMARKS
3D - 16	43+00	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3D - 15	44+20	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3D - 14	45+40	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3D - 13	46+60	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3D - 12	47+80	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3D - 11	49+00	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3D - 10	50+20	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3D - 9	51+40	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3D - 8	52+60	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3D - 7	53+80	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3D - 6	55+00	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3D - 5	56+20	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3D - 4	57+40	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3D - 3	58+60	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3D - 2	59+80	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3D - 1	61+00	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3E - 1	62+20	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3E - 2	63+40	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3E - 3	64+60	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3E - 4	65+80	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3E - 5	67+00	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3E - 6	68+20	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
3E - 7	69+35	Type II 150W EQ LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (150 W EQ) LED	
4F - 8	70+60	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
4F - 7	71+80	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
4F - 6	73+00	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
4F - 5	74+00	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
4F - 4	75+00	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
4F - 3	76+00	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
4F - 2	77+00	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
4F - 1	78+00	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
4G - 1	78+90	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
4G - 2	79+90	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
4G - 3	80+80	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	
4G - 4	81+65	Type V 250W LED LUMINAIRE ASSEMBLY	(Type ST 20 S - 0 - 0) (250 W EQ) LED	

ELECTRICAL SERVICE DATA

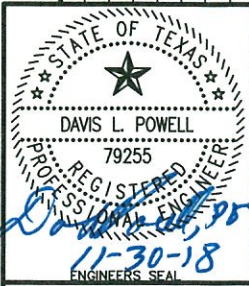
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A		ELC SRV TY C 120/240 60 (SS) SS (E) SP (O)	2 "	3/#4	60	2P/60	60	100	1A	2P/30	14	1.77672
BC		ELC SRV TY C 120/240 60 (SS) SS (E) SP (O)	2 "	3/#4	60	2P/60	60	100	2B	2P/30	14	1.86072
									2C	2P/20	9	1.14288
DE		ELC SRV TY C 120/240 60 (SS) SS (E) SP (O)	2 "	3/#4	60	2P/60	60	100	3D	2P/20	11	1.344
									3E	2P/15	5	0.588
FG		ELC SRV TY C 120/240 60 (SS) SS (E) SP (O)	2 "	3/#4	60	2P/60	60	100	4F	2P/20	10	1.29216
									4G	2P/15	5	0.64608

[illegible]

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

ILLUMINATION SUMMARY - 2

PROJECT MANAGER:	DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11	
DATE: DEC 2018	
SCALE: AS SHOWN	
FIELD BOOK:	
ACAD: XX	
LAYOUT: ILLUMIN SUM-2	



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RUN	GROUND LENGTH (FEET)		CONDUCTOR NO. & LENGTH (FEET)		CONDUIT (FEET)	
	#8	#10	#8	#10	1" PVC	2" PVC
	BARE	BARE	XHHW	XHHW	SCH 40	SCH 40
1A	65		2 - 65		60	
2A	125		2 - 125		120	
3A	125		2 - 125		120	
4A	125		2 - 125		120	
5A	125		2 - 125		120	
6A	125		2 - 125		120	
7A	125		2 - 125		120	
8A	125		2 - 125		120	
9A	125		2 - 125		120	
10A	125		2 - 125		120	
11A	125		2 - 125		120	
12B	125		2 - 125		120	
11B	125		2 - 125		120	
10B	125		2 - 125		120	
9B	125		2 - 125		120	
8B	125		2 - 125		120	
7B	125		2 - 125		120	
6B	125		2 - 125		120	
5B	125		2 - 125		120	
4B	145		2 - 145		140	
3B	125		2 - 125		120	
2B	125		2 - 125		120	
1B	85		2 - 85		80	
1BC	10	10	2 - 10	2 - 10		10
1C		45		2 - 45	40	
2C		125		2 - 125	120	
3C		125		2 - 125	120	
4C		90		2 - 90	85	
5C		134		2 - 134	129	
6C		111		2 - 111	106	
7C		95		2 - 95	90	
8C		55		2 - 55	50	

RUN	GROUND LENGTH (FEET)		CONDUCTOR NO. & LENGTH (FEET)		CONDUIT (FEET)	
	#8	#10	#8	#10	1" PVC	2" PVC
	BARE	BARE	XHHW	XHHW	SCH 40	SCH 40
16D	125		2 - 125		120	
15D	125		2 - 125		120	
14D	125		2 - 125		120	
13D	125		2 - 125		120	
12D	125		2 - 125		120	
11D	125		2 - 125		120	
10D	125		2 - 125		120	
9D	125		2 - 125		120	
8D	125		2 - 125		120	
7D	125		2 - 125		120	
6D	125		2 - 125		120	
5D	125		2 - 125		120	
4D	125		2 - 125		120	
3D	125		2 - 125		120	
2D	125		2 - 125		120	
1D	108		2 - 108		103	
1DE	30	30	2 - 30	2 - 30		30
1E		25		2 - 25	20	
2E		125		2 - 125	120	
3E		125		2 - 125	120	
4E		125		2 - 125	120	
5E		125		2 - 125	120	
6E		125		2 - 125	120	
7E		120		2 - 120	115	
8F		125		2 - 125	120	
7F		125		2 - 125	120	
6F		105		2 - 105	100	
5F		105		2 - 105	100	
4F		105		2 - 105	100	
3F		105		2 - 105	100	
2F		105		2 - 105	100	
1F		45		2 - 45	40	
1FG		2-10		4-10		10
1G		75		2 - 75	70	
2G		105		2 - 105	100	
3G		95		2 - 95	90	
4G		85		2 - 85	80	

CONDUIT AND CONNECTOR RUNS

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: ILLUMIN SUM-3

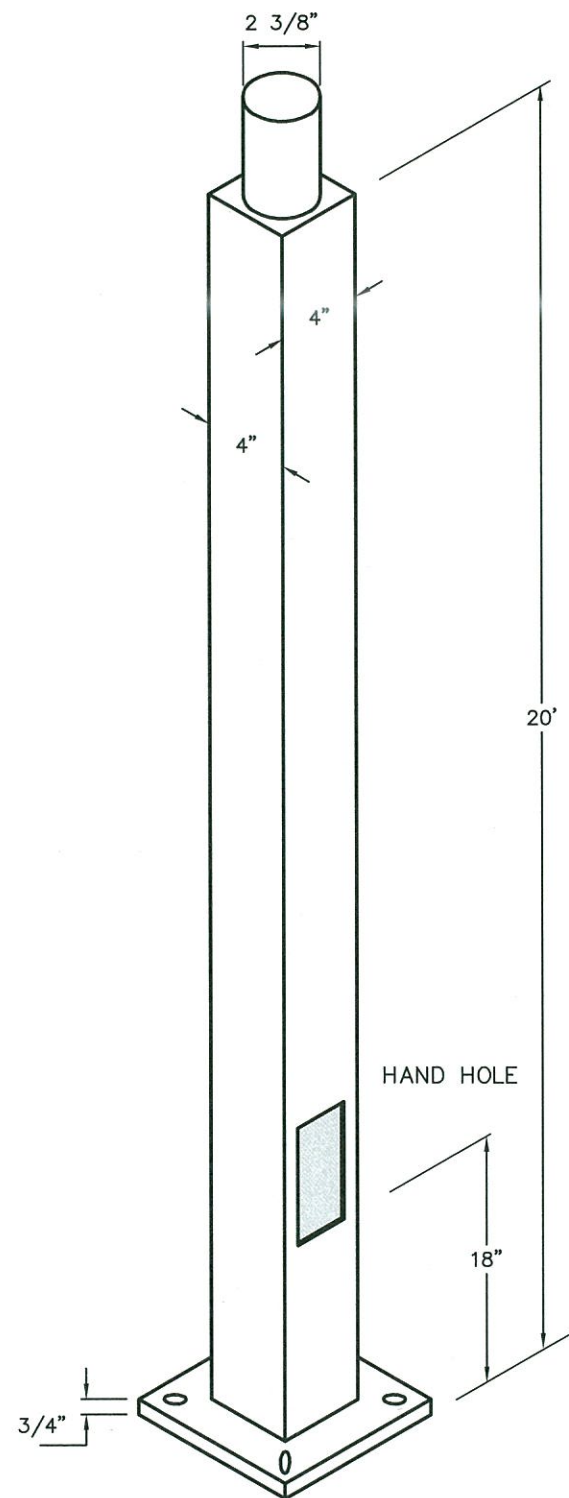
STATE OF TEXAS
★
DAVIS L. POWELL
79255
REGISTERED
PROFESSIONAL ENGINEER
11-30-18
ENGINEERS SEAL

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11
CONDUIT AND CONNECTOR RUNS

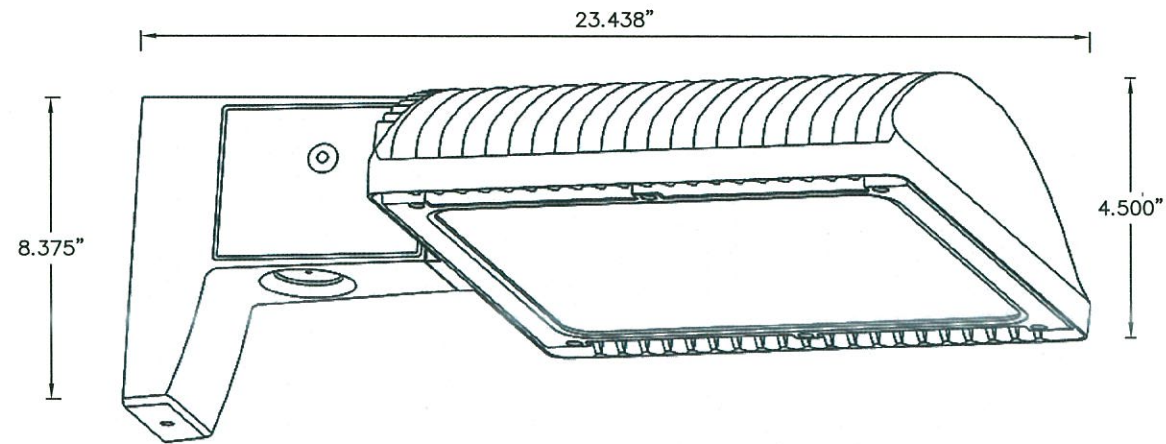
Wichita Falls
TEXAS
Blue Skies. Golden Opportunities

REVISIONS
NO. DATE DESCRIPTION BY

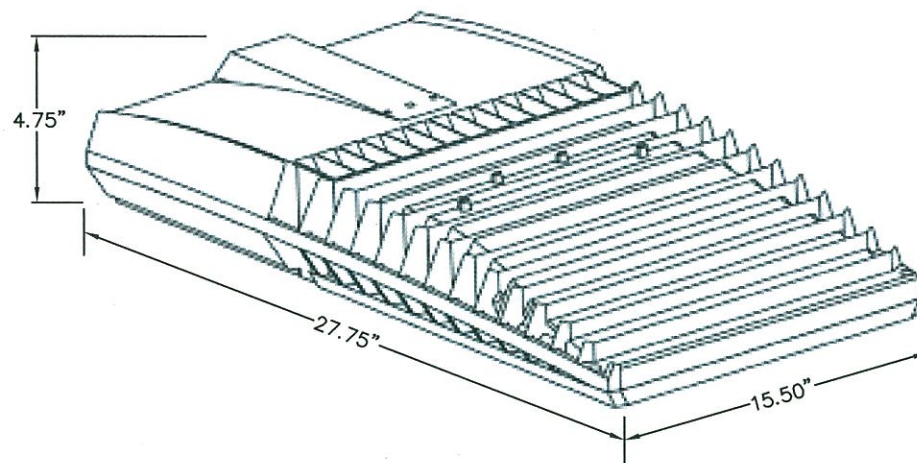
SHEET 105 OF 150



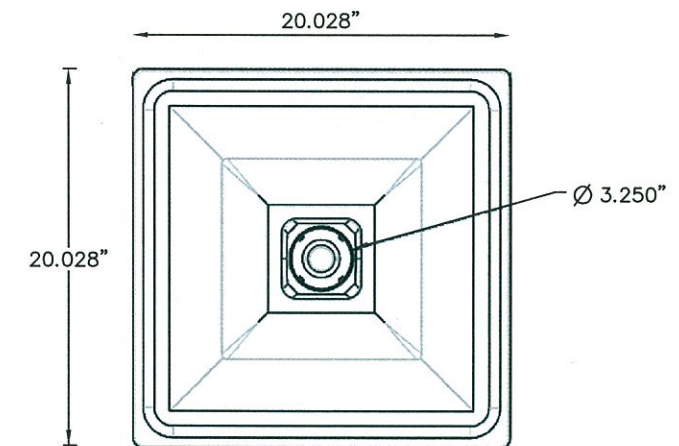
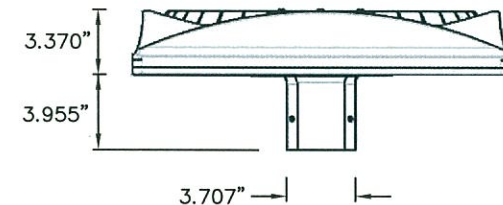
ILLUMINATION POLE DETAIL
NOT TO SCALE



TYPE II LUMINAIRE DETAIL
NOT TO SCALE



TYPE IV LUMINAIRE DETAIL
NOT TO SCALE



TYPE V LUMINAIRE DETAIL
NOT TO SCALE

NOTES:

Pole and luminaire dimensions and details may vary between manufacturers.

Type 2, Type 4 and Type 5 Luminaires shall be LED:
Architectural Style with full cutoff, fully shielded luminaire
LED with 100,000 hour lifespan and 3000 K color temperature
Operate on 240 volt power with internal surge protection
Dimmer and photocell not required at luminaire

TxDOT approved luminaire manufacturer and brands are TraStar Duralight, Eaton Streetworks, GreenStar GreenStar, GE Lighting Solutions Evolve, Philips Lumec, and Acuity American Electric

Install luminaires at 20' height on 4" square steel poles with base plates that are designed for 80 MPH wind loading. Poles shall be manufactured of ASTM A500 grade gauge 7 steel that is circumferentially welded to the base plate. The pole shall have top cap, reinforced hand hole and grounding lug. The base plate shall utilize 4 - 3/4" anchor bolts and have an opening to accept two 1" conduits. Anchor bolts, nuts and washers shall be hot dipped galvanized.

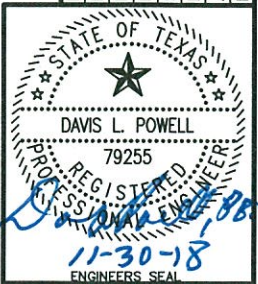
Luminaires, mounting brackets, poles and anchor bolt assemblies shall be supplied by the same manufacturer. The Illumination Assembly shall be powder coated in Grey or Bronze finish

NO.	DATE	DESCRIPTION	BY

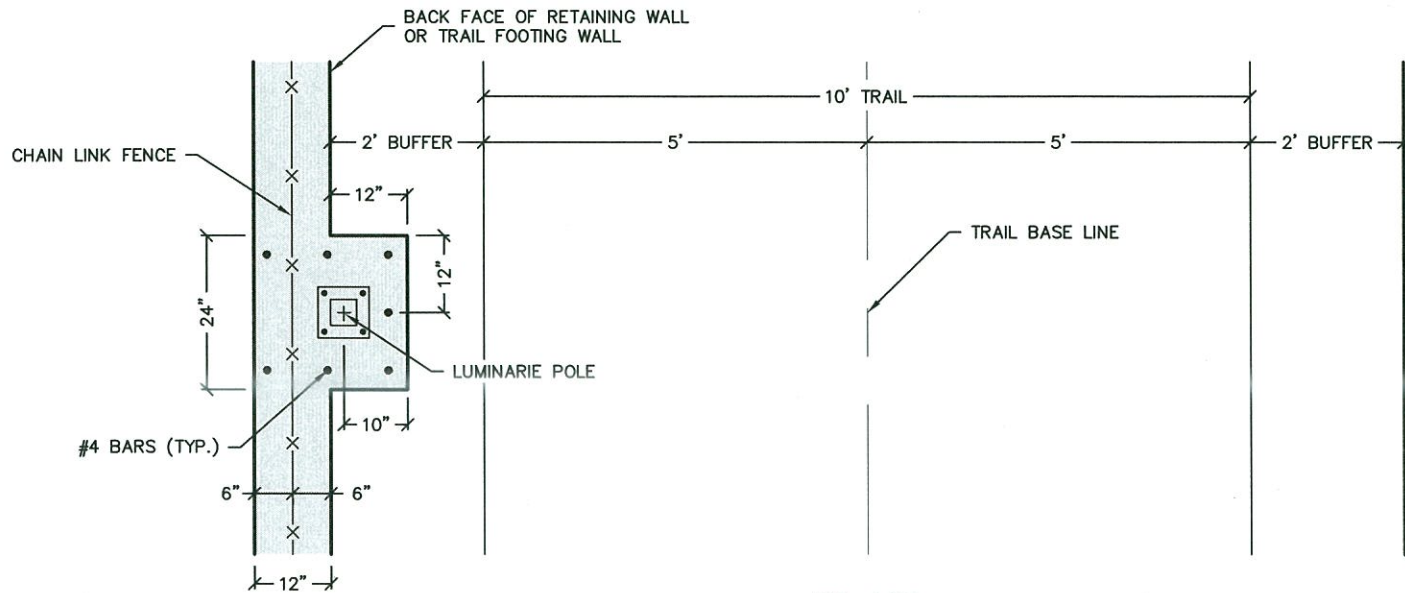


HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11
ILLUMINATION DETAIL

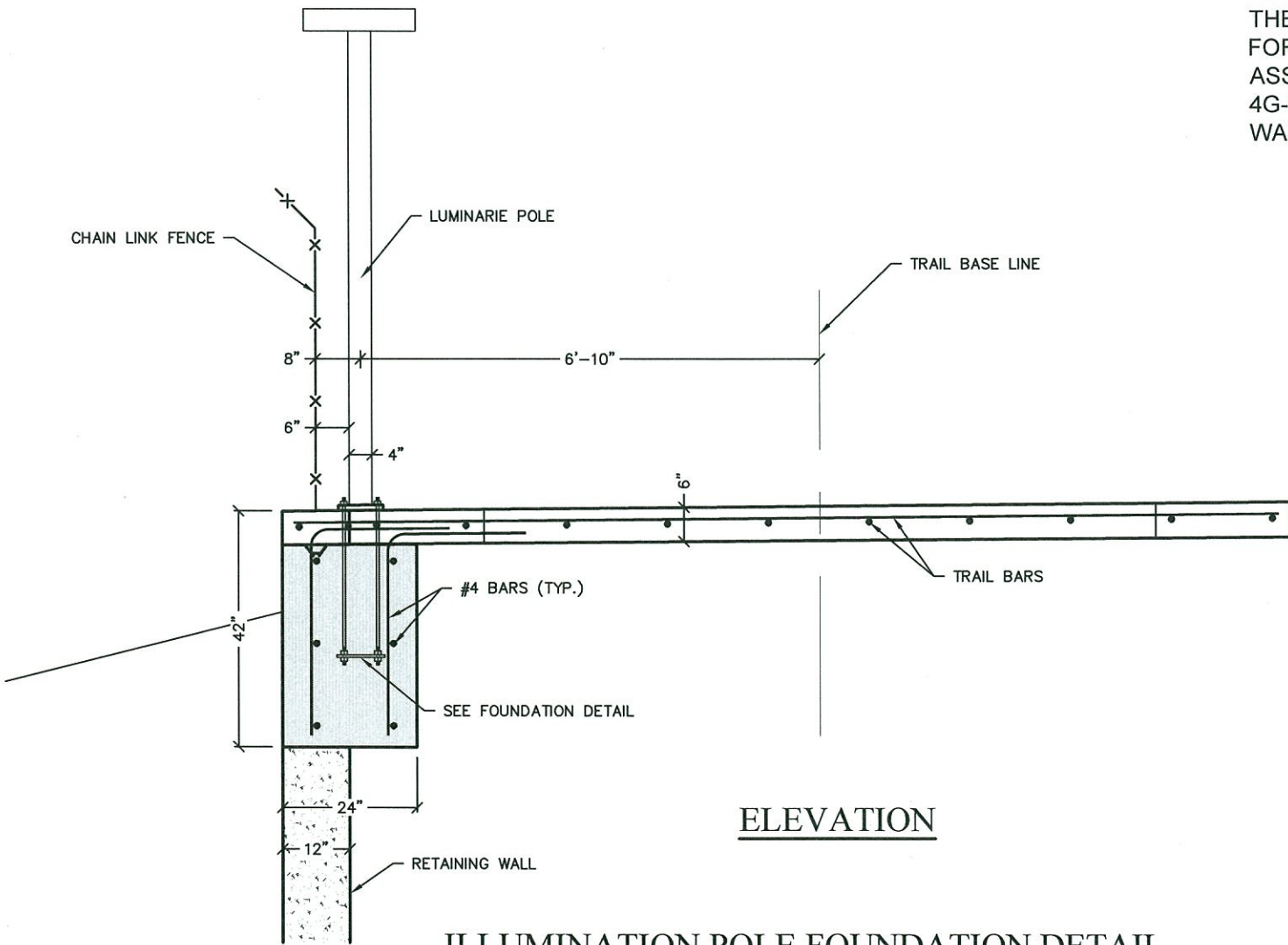
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PROJECT NUMBER: CWF17-444-11	DATE: DEC 2018
SCALE: AS SHOWN	FIELD BOOK:
ACAD: XX	LAYOUT: ILLUM DETAIL



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PLAN



ELEVATION

ILLUMINATION POLE FOUNDATION DETAIL
AT RETAINING WALL AND TRAIL FOOTING WALL

NOT TO SCALE

NOTE:
THE MODIFIED ILLUMINATION FOUNDATION WILL BE PAID
FOR UNDER ITEM 416 DRILL SHAFT (24 INCH) FOR LUMINAIRE
ASSEMBLIES 4F-7, 4F-6, 4F-5, 4F-4, 4F-3, 4F-2, 4G-1, 4G-2, AND
4G-3. CONTINUE NORMAL RETAINING WALL OR FOOTING
WALL REINFORCEMENT THRU THE FOUNDATION.

PROJECT MANAGER:		DRAWN BY: TW		PROJECT NUMBER: CWF17-444-11		DATE: DEC 2018		SCALE: AS SHOWN		FIELD BOOK: XX		ACAD: XX		LAYOUT: ILLUM FDN-1	
HIKE AND BIKE TRAIL		FROM BARNETT ROAD TO SEYMOUR HWY		CWF17-444-11		ILLUMINATION FOUNDATION - 1		REVISIONS		NO.		DATE		DESCRIPTION	
Wichita Falls TEXAS		Blue Skies Golden Opportunities													

STATE OF TEXAS

DAVIS L. POWELL

79255

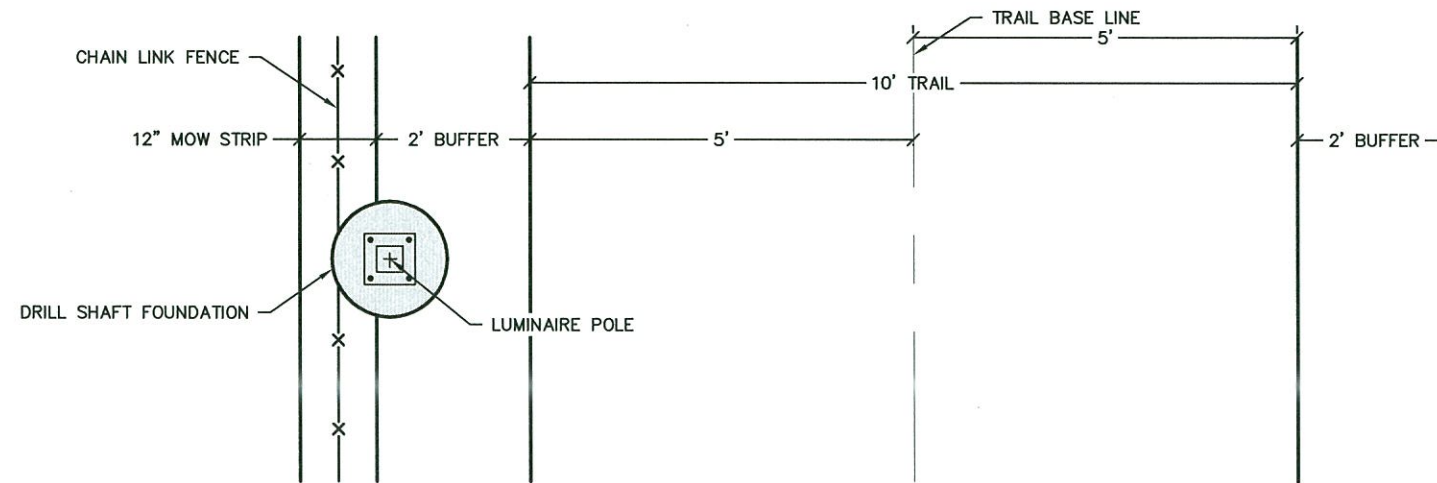
REGISTERED PROFESSIONAL ENGINEER

11-30-18

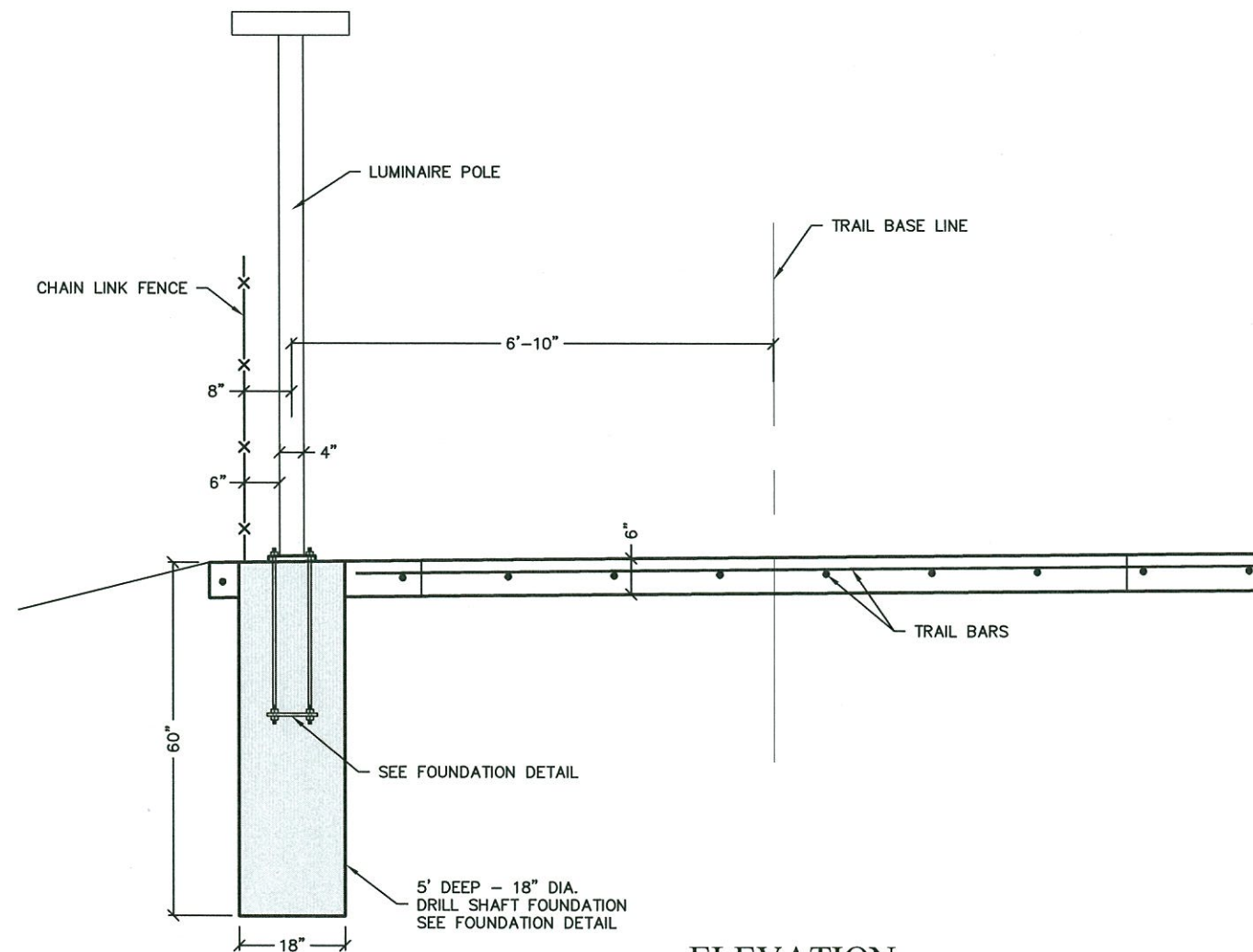
ENGINEERS SEAL

SHEET 107 OF 150

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PLAN



ELEVATION

ILLUMINATION POLE FOUNDATION DETAIL

NOT TO SCALE

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

ILLUMINATION FOUNDATION - 2

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: ILLUM FDN-2





HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

ILLUMINATION FOUNDATION - 3

DRAWN BY: TW

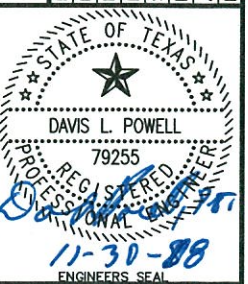
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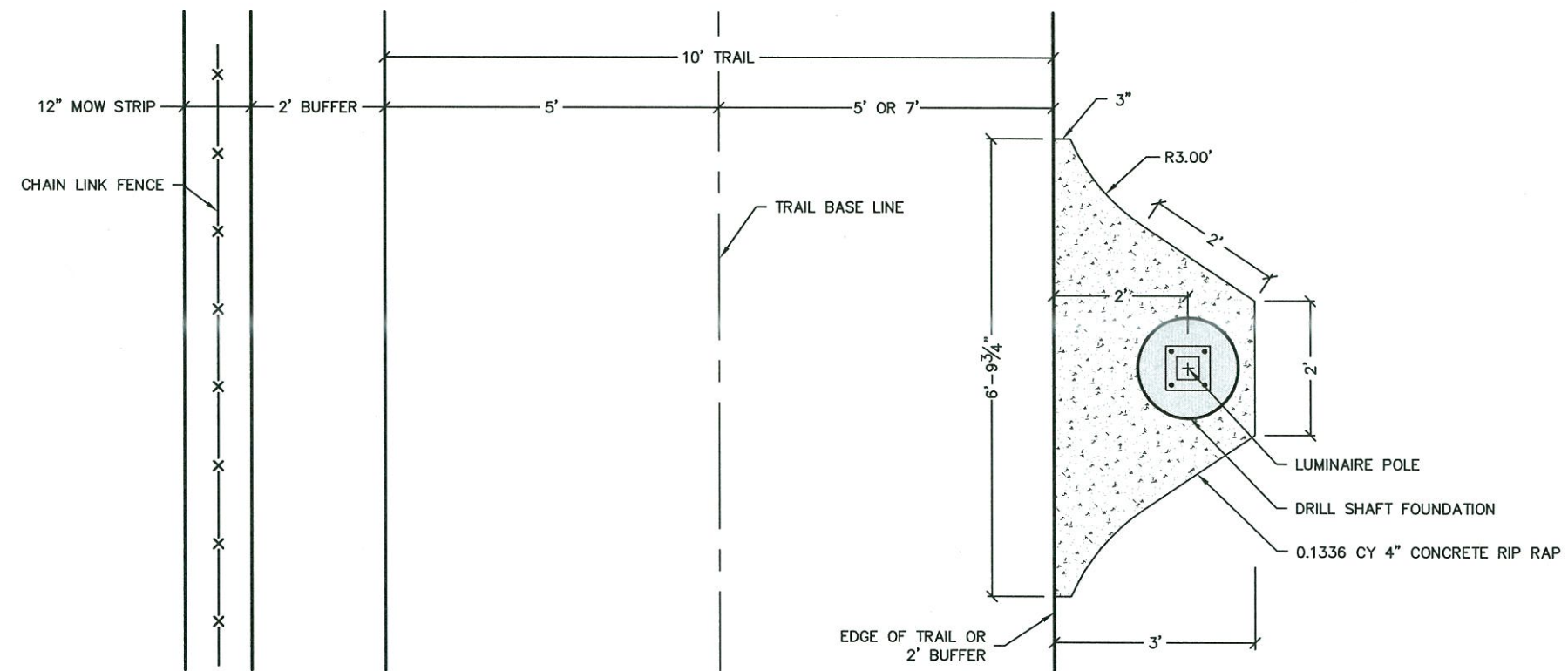
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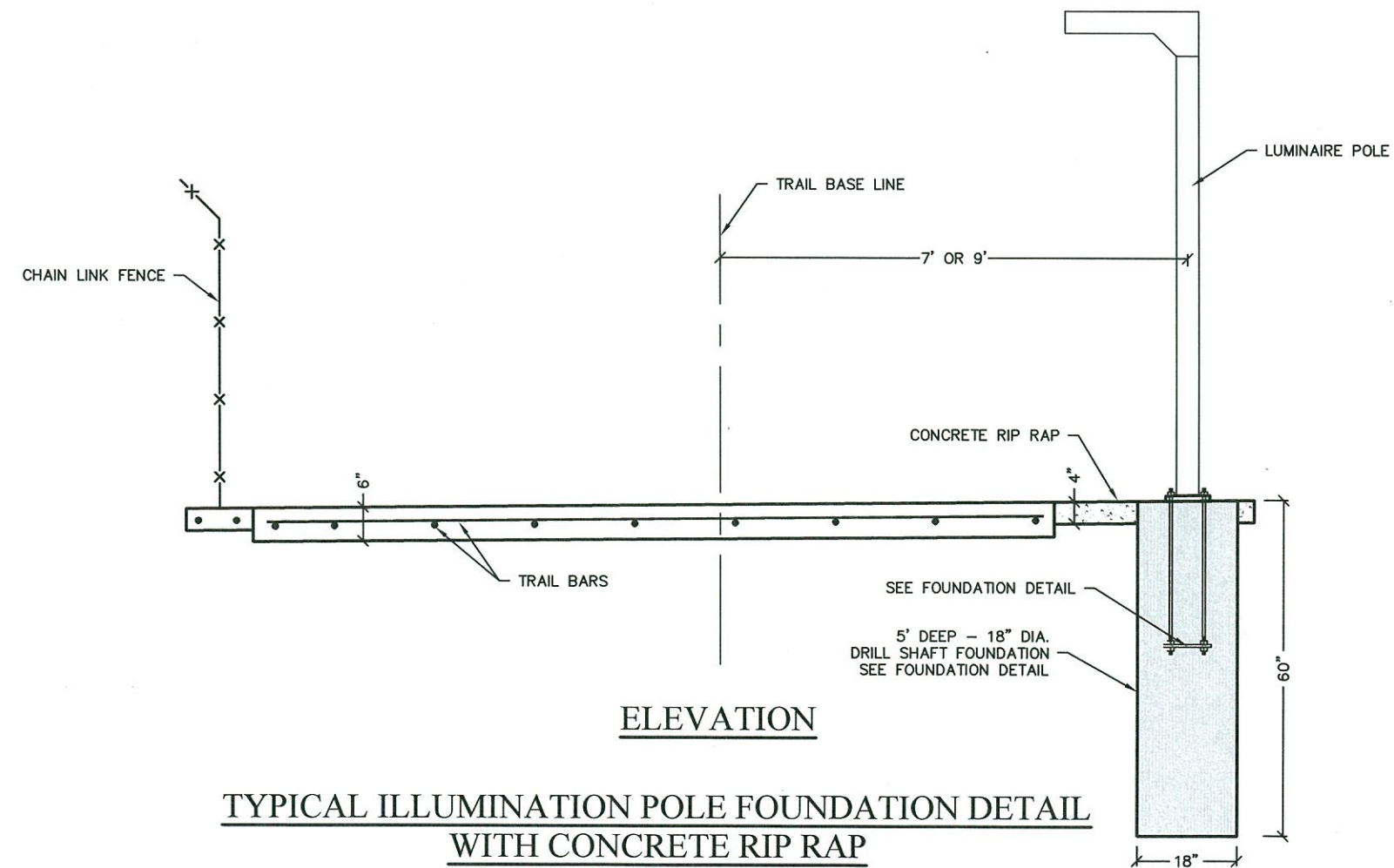
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SHEET 109 OF 150



PLAN



ELEVATION

TYPICAL ILLUMINATION POLE FOUNDATION DETAIL
WITH CONCRETE RIP RAP

NOT TO SCALE

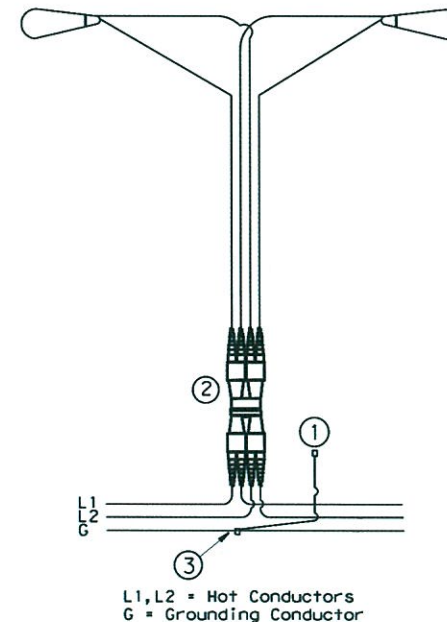
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DATE:
FILE:

ROADWAY ILLUMINATION ASSEMBLY NOTES

- Details apply to roadway lighting installations bid or referenced under Item 610, "Roadway Illumination Assemblies." Provide, furnish, and install all other materials not shown on the plans which may be necessary for complete and proper construction. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the State such warranties or guarantees.
- The locations of poles and fixtures may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.
- Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association, Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection.
- Provide Roadway Illumination Light Fixtures as per TxDOT Departmental Material Specification (DMS) 11010, Item 610, and as shown on the Material Producers List (MPL) for Roadway Illumination and Electrical Supplies.
- Fabricate steel roadway illumination poles in accordance with Roadway Illumination Poles (RIP) standards and Item 610. Poles fabricated according to RIP standards do not require shop drawing submittals.
 - Alternate designs to RIP standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop Drawing Submittal" on the TxDOT web site.
 - Limitations on use of the RIP standard: The RIP standard details were developed for installations in locations where the 3-second gust basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than (i.e. not more than) 25' above the elevation of the surrounding terrain, in accordance with the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 4th Edition (2001) (AASHTO Design Specifications). For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25' above the surrounding terrain, provide poles meeting the following requirements:
 - Submittals. Following the electronic shop drawing submittal process (see Guide to Electronic Shop Drawing Submittal on the TxDOT web site), submit to the Engineer for approval fabrication drawings and calculations for the poles, sealed by a Texas licensed professional engineer (P.E.).
 - Luminaire Structural Support Requirements. Provide light poles, arms, and anchor bolt assemblies with a 25 year design life to safely resist dead loads, ice loads and the required basic wind speeds at the location of installation in accordance with the 6th edition (2013) of the AASHTO Design Specifications. For transformer base poles, include transformer base and connecting hardware in calculations and shop drawing submittals. Structurally test all transformer bases to resist the theoretical plastic moment capacity of the pole. Submit certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished with the shop drawings. Show breakaway base model number, manufacturer's name, and logo on shop drawings. Include on manufacturer's shop drawings the ASTM designations for all materials to be used.
- For both transformer and shoe-base type illumination poles, provide and install double-pole breakaway fuse holders as specified by DMS-11040. Breakaway fuse holders are listed on the MPL for Roadway Illumination and Electrical Supplies under Items 610 & 620. Provide 10 amp time delay fuses for breakaway connectors in light poles, or inside the light fixture for underpass luminaires. In each pole, connect luminaires to the breakaway connector with continuous stranded 12 AWG copper conductors as listed on the MPL. Bond all equipment grounding conductors together and to the ground lug in the transformer base or hand hole.
- Tighten anchor bolts for shoe base, concrete traffic barrier base, and bridge mount roadway illumination poles, in accordance with Item 449.
- Install T-Base with following procedure:
 - Anchor Bolt Tightening.
 - Coat the threads of the anchor bolts with electrically conductive lubricant.
 - Place the T-base over the anchor bolts. Foundation must be level and flat. The maximum permissible gap under any one corner of the t-base is 1/8" before nuts are tightened.
 - Coat the bearing surfaces of the nuts and washers with electrically conductive lubricant. Install (1) 1/2" hold down washer, (1) lock washer, and (1) nut on each anchor bolt. Turn the nuts onto the bolts so that each is hand-tight against the washer.
 - Using a torque wrench, tighten each nut to 150 ft-lb. Uniform contact is required between the foundation and the T-base in the corner regions of the T-base, and all corner gaps must be closed after applying torque. If a gap still exists after torquing to 150 ft-lbs, continue torquing each bolt incrementally until gap is closed or maximum allowable torque of 250 ft. pound is reached, whichever comes first. If 250 ft-lbs is not enough to close the gap the foundation must be leveled. Gaps along the straight sides of the T-bases and the foundation are permissible. Ensure that no high point of contact occurs between the straight sides of the T-base and the foundation.
 - Check top of T-base for level. If not level then foundation must be leveled.
 - Top Bolt Procedure
 - Erect pole over T-base with crane. Coat bolts, nuts, washers, and lock washers with electrically conductive lubricant.

- Install bolts and 1/2" connecting washers from the inside of the T-base, thread up through the pole base. Install flat washers, lock washers and nuts snug tight according to Item 447, "Structural Bolting."
 - Tighten each nut to 150 ft-lb. using a torque wrench.
- Level and Plumb
 - Ensure pole is plumb and mast arm is perpendicular to the roadway according to plans to within 5 degrees.
- Construct luminaire pole foundations in accordance with Item 416, "Drilled Shaft Foundations," and TxDOT standard sheet RID(2).
 - Provide and install underpass luminaires in accordance with Item 610, DMS-11010, and TxDOT standard sheet RID(3). Typical luminaire size for underpass luminaires is 150W HPS or 150W EQ LED.
 - Mount luminaires on arms level as shown by the luminaire level indicator.
 - Orient luminaires perpendicular to the roadway intended to be lit unless otherwise shown on the plans.

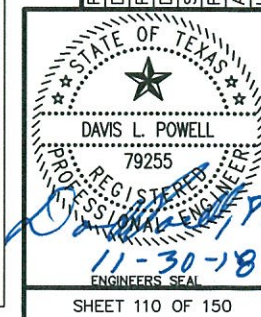


TYPICAL WIRING DIAGRAM
LUMINAIRES SERVED AT 480V ON 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR 120/240 VOLT SERVICE.

NOTES:

- Use 1/2 in.-13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors, bonded to T-base, or use ground lug in handhole as available.
- Use pre-qualified two-pole breakaway connectors for all luminaire pole installations. For luminaires fed by a circuit with a neutral conductor, use double pole breakaway connectors with the neutral side unfused and marked white.
- Split Bolt or other connector.

		Traffic Operations Division Standard	
ROADWAY ILLUMINATION DETAILS			
RID(1)-17			
FILE: rid(1)-17.dgn	DN: 7-17	EXT: 7-17	OBJ: 7-17
© TxDOT January 2007		CON: 7-17	SECT: 7-17
REVISIONS		JOB: 7-17	HIGHWAY: 7-17
7-17		DIST: 7-17	COUNTY: 7-17
		SHEET NO. 7-17	



HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11
ROADWAY ILLUMINATION - 1
RID (1) - 17

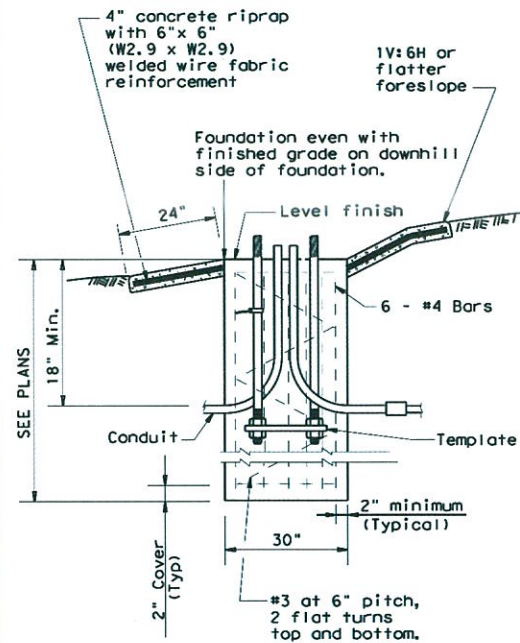
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DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: RID(1)-17

NO.	DATE	DESCRIPTION	BY

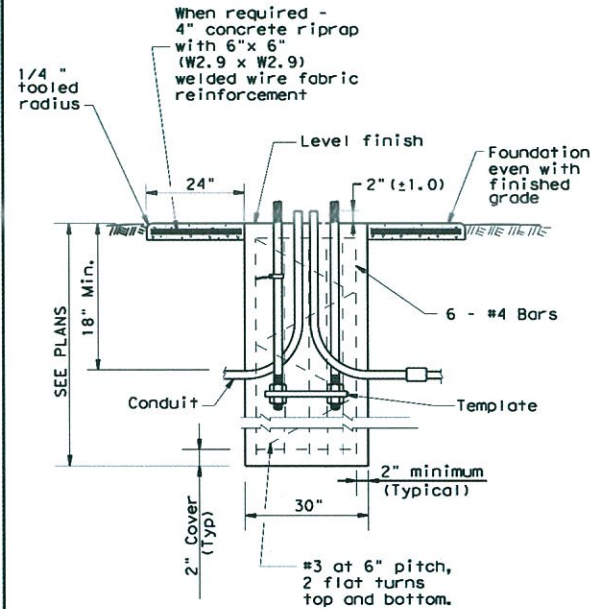


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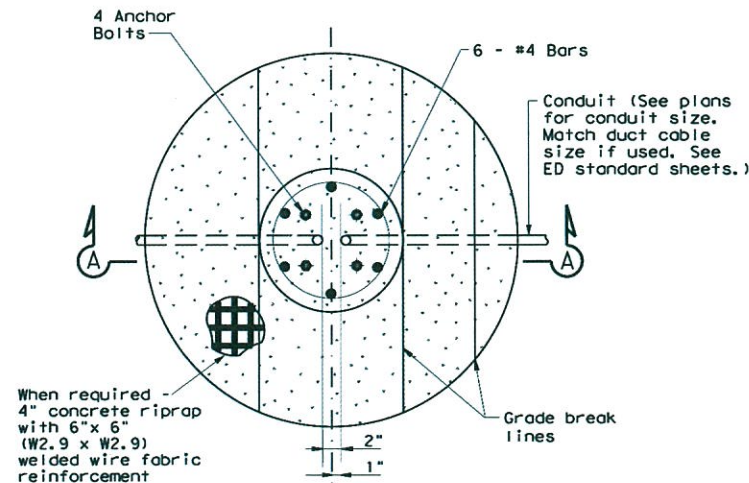
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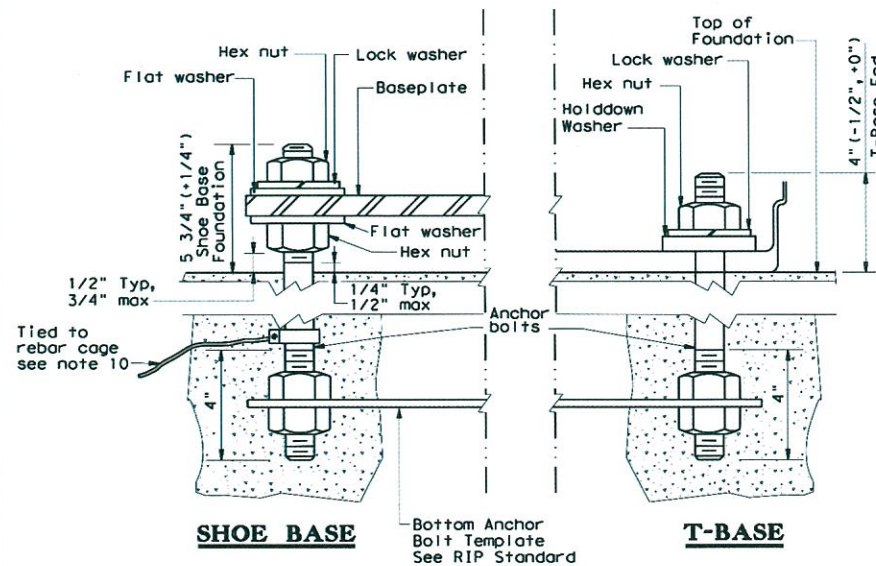
SECTION A-A
SHOWING SLOPED GRADE



SECTION A-A
SHOWING CONSTANT GRADE



FOUNDATION DETAIL



ANCHOR BOLT DETAIL

TABLE 1
ANCHOR BOLTS

POLE MOUNTING HEIGHT	BOLT CIRCLE		ANCHOR BOLT SIZE
	Shoe Base	T-Base	
<40 ft.	13 in.	14 in.	1 in. x 30 in.
40-50 ft.	15 in.	17 1/4 in.	1 1/4 in. x 30 in.

TABLE 2
RECOMMENDED FOUNDATION LENGTHS (See note 1)

MOUNTING HEIGHT	TEXAS CONE PENETROMETER N Blows/ft		
	10	15	40
<20 ft.	6'	6'	6'
>20 ft. to 30 ft.	8'	6'	6'
>30 ft. to 40 ft.	8'	8'	6'
>40 ft. to 50 ft.	10'	8'	6'

TABLE 3
PAY QUANTITY OF RIPRAP PER FOUNDATION (Install only when shown on the plans)

Foundation Diameter	RIPRAP DIAMETER	RIPRAP (CONC) (CL B)
30 in.	78 in.	0.35 CY

GENERAL NOTES:

- "Recommended Foundation Lengths" table is for information purposes only. Foundation lengths shall be as shown on the plans, or as directed by the Engineer. Foundations will be paid for under Item 416, "Drilled Shaft Foundations," unless otherwise shown on the plans.
- Erect roadway illumination assembly poles plumb and true. Form and level the top 6" of the foundation so the pole will be plumb. Use leveling nuts to plumb shoe base poles. Do not use shims or leveling nuts under transformer bases. Do not grout between baseplate and the foundation.
- Ensure Class 2A and 2B fit for anchor bolts and nuts. Tap and chase nuts after galvanizing. Anchor bolt body with rolled threads need not be full size.
- Use appropriate class of concrete as specified in Items 416 and 432. Concrete for riprap may be upgraded to Class C at no extra cost to the Department.
- Place riprap around the foundation when called for elsewhere in the plans. Riprap will be paid for under Item 432.
- Locate breakaway roadway illumination assemblies as shown in the placement table, unless otherwise dimensioned on the plans. Protect non-breakaway illumination assemblies from vehicular impact (i.e. 2.5 ft. behind guard rail or mounted on traffic barrier), or located outside the clear zone, except that 2.5 ft. from curb face is minimum desired for light poles on city streets, 45 mph or less. See Roadway Design Manual for further information.
- Use 4 hold down and 4 connecting washers on transformer base poles as recommended by the manufacturer and supplied with base.
- Install a minimum of 2 conduits in each foundation. See lighting layout sheets for locations of foundations with more than 2 conduits. Cap unused conduits in foundations on both ends.
- Conduit location in foundations is critical for breakaway devices. Place conduits 2 in. apart on centerline as shown.
- Bond anchor bolt to rebar cage with #6 bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. The bonded steel in the foundation creates a concrete encased grounding electrode which replaces the ground rod.
- Use riprap on T-base foundations that are located on sloped grades.

TABLE 4
BREAKAWAY POLE PLACEMENT (See note 6)

ROADWAY FUNCTIONAL CLASSIFICATION	** POLE OFFSET (DISTANCE TO FACE OF TRANSFORMER BASE)
Freeway Mainlanes (roadway with full control of access)	15 ft. (minimum and typical) from lane edge
All curbed, 45 mph or less design speed	2.5 ft. minimum (15 ft. desirable) from curb face
All others	10 ft. minimum (15 ft. desirable) from lane edge

* or as close to ROW line as is practical

** provide 2/5 of the luminaire mounting height behind the pole for "falling area" to prevent encroachment on the other travel lanes. See design guidelines.

Texas Department of Transportation
Traffic Operations Division Standard

ROADWAY ILLUMINATION DETAILS (RDWY ILLUM FOUNDATIONS) RID(2)-17

FILE: rid2-17.dgn	DW: CK: DW: CK:
1-11	CON: SECT: JOB: HIGHWAY:
7-17	DIS: COUNTY: SHEET NO.

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

ROADWAY ILLUMINATION - 2
RID (2) - 17

PROJECT MANAGER: TERRY WALTERS
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: RID(2)-17

STATE OF TEXAS
DAVIS L. POWELL
79255
REGISTERED PROFESSIONAL ENGINEER
11-30-18
ENGINEER'S SEAL

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DATE:
FILE:

GENERAL NOTES FOR ALL ELECTRICAL WORK

- The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.
- Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.
- Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is 1/2 in. or less in diameter.
- Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.
- Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.
- When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

- Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.
- Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.
- Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.


AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

- Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.
- Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.
- Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.
- Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

- Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.
- When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.
- Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

- Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.
- Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.
- Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.
- Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.
- When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."
- Provide and place warning tape approximately 10 in. above all trench conduit as per Item 618.
- During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.
- Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.
- Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.
- Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.
- At all electrical services, install a 6 AWG solid copper grounding electrode conductor.
- Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).
- Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.
- File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

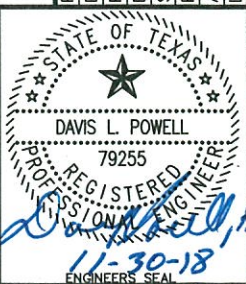
 Texas Department of Transportation		Traffic Operations Division Standard	
ELECTRICAL DETAILS CONDUITS & NOTES			
ED(1)-14			
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©TxDOT October 2014	CONT SECT	JOB	HIGHWAY
REVIEWS	DIST	COUNTY	SHEET NO.

71A

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

ELECTRICAL & CONDUIT DETAIL
ED(1)-14

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: ED(1)-14



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DATE: FILE:

ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS) 11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.
2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.
3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.
4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.
2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.
3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.
4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.
5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.
6. Support conductors in illumination poles with a J-hook at the top of the pole.
7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.
8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.
9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.
10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.
11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.
- ### C. TEMPORARY WIRING
1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.
 2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.
 3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.
 4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.
 5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

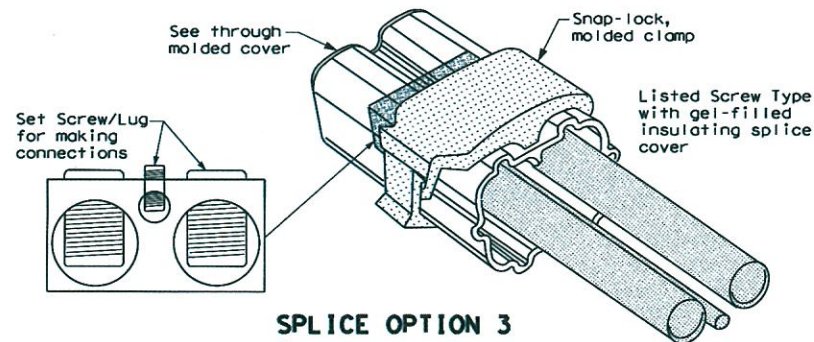
GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

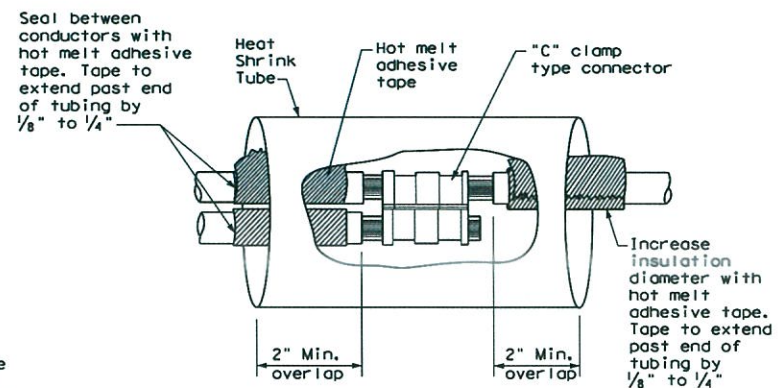
1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

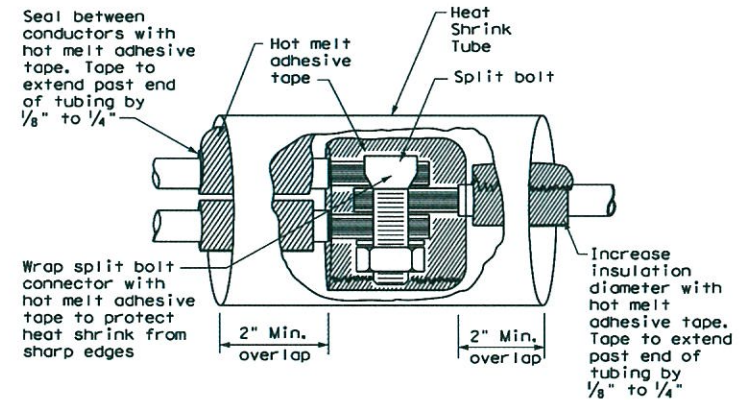
1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.
2. Do not place ground rods in the same drilled hole as a timber pole.
3. Install ground rods so the imprinted part number is at the upper end of the rod.
4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.
6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 3
Listed Screw Type



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type

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ELECTRICAL DETAILS CONDUCTORS			
ED(3)-14			
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REVISIONS		DIST	COUNTY
			SHEET NO.

71C

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

CONDUCTORS DETAIL
ED (3) - 14

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: ED(3)-14



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ELECTRICAL SERVICES NOTES

1. Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.
2. Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services," DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)," and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.
3. Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.
4. Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.
5. The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed #2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock #2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.
6. Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.
7. When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.
8. Provide wiring and electrical components rated for 75°C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.
9. All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.
10. Provide rigid metal conduit (RMC) for all conduits on service, except for the 1/2 in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.
11. Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.
12. Ensure all mounting hardware and installation details of services conform to utility company specifications.
13. For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 1/2 in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.
14. When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 1/2 in. x 11 in. before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.
15. Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

1. Provide threaded hub for all conduit entries into the top of enclosure.
2. Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.
3. Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.
4. Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1. Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.
2. When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

1. Provide photocell as listed on the MPL. Move, adjust, or shield the photocell from stray or ambient night time light to ensure proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

* ELECTRICAL SERVICE DATA

Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 100(SS)AL(E)SF(U)	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28.1
									Lighting SB	2P/40	25	
									Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 060(NS)SS(E)TS(O)	1 1/4"	3/#6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
							30		Luminaires	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 1/4"	3/#6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

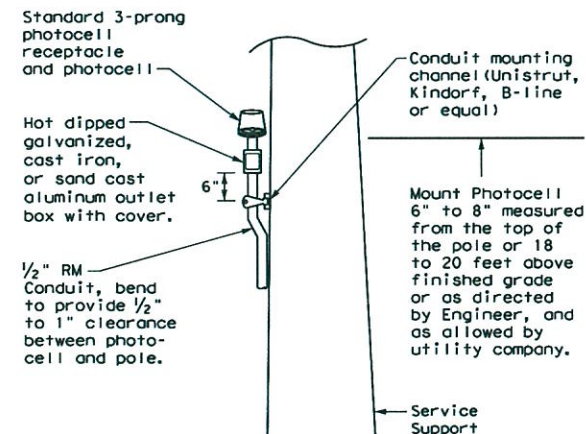
* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National Electrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)

- Schematic Type _____
- Service Voltage V / V _____
- Disconnect Amp Rating _____
000 indicates main lug only/
Typically Type T
- (SS) = Safety Switch Ahead of Meter-Check with Utility
(NS) = No safety Switch Ahead of Meter-Check with Utility
- Enclosure Type _____
GS = Galvanized steel ("off the shelf")
SS = Stainless steel (Custom Enclosure) See MPL
AL = Aluminum (Custom Enclosure) See MPL
- Photocell Mounting Location _____
(E) = Inside Service/Enclosure Mounted
(T) = Top of pole
(L) = Luminaire mounted
(N) = None/No Photocell or Lighting Contactor Required
- Service Support Type _____
GC = Granite concrete
OC = Other concrete
TP = Timber pole
SP = Steel pole
SF = Steel frame
OT = Pole by others or paid for separately
EX = Existing pole
TS = Service on traffic signal pole
PS = Pedestal Service
- O = Overhead Service Feed from Utility
U = Underground Service Feed from Utility



TOP MOUNTED PHOTOCELL

Install conduit strap maximum 3 feet from box. 5 foot maximum spacing between straps supporting conduit.

Texas Department of Transportation		Traffic Operations Division Standard	
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ED(5) - 14			
FILES: ed5-14.dgn	DW: TxDOT	CK: TxDOT	DW: TxDOT
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REVISIONS		HIGHWAY	
DIST		COUNTY	SHEET NO.

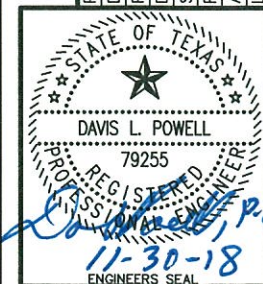
71E

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

ELECTRICAL SERVICE NOTES & DATA

ED (5) - 14

PROJECT MANAGER: TW
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: ED(5)-14



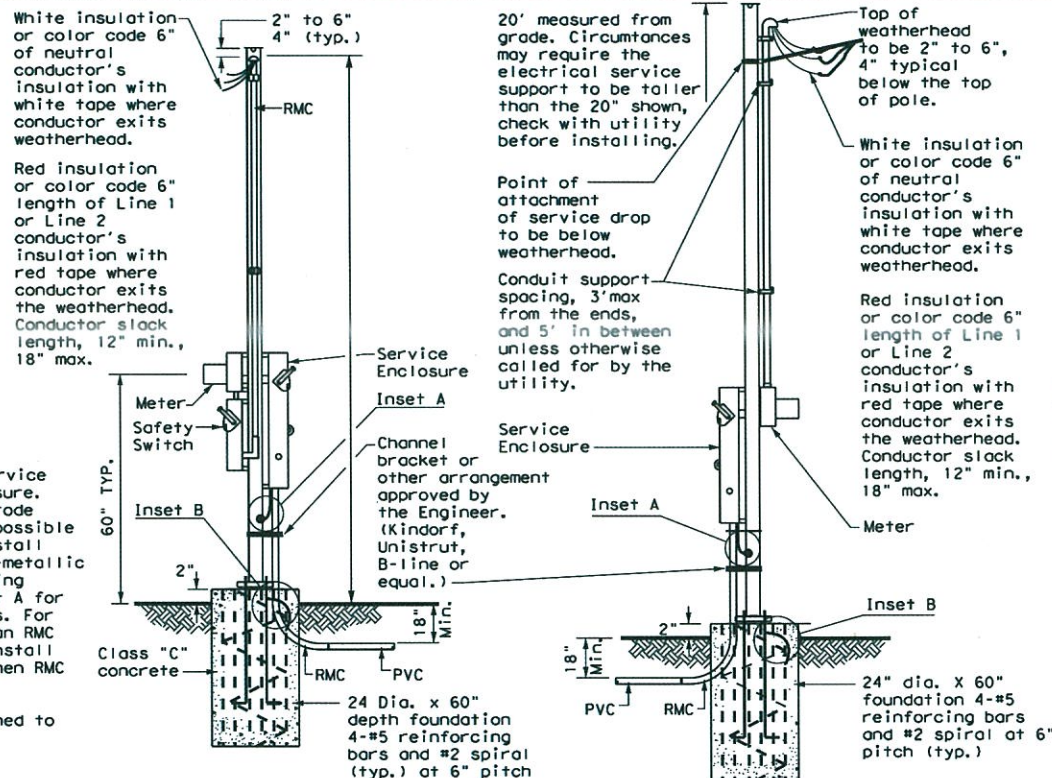
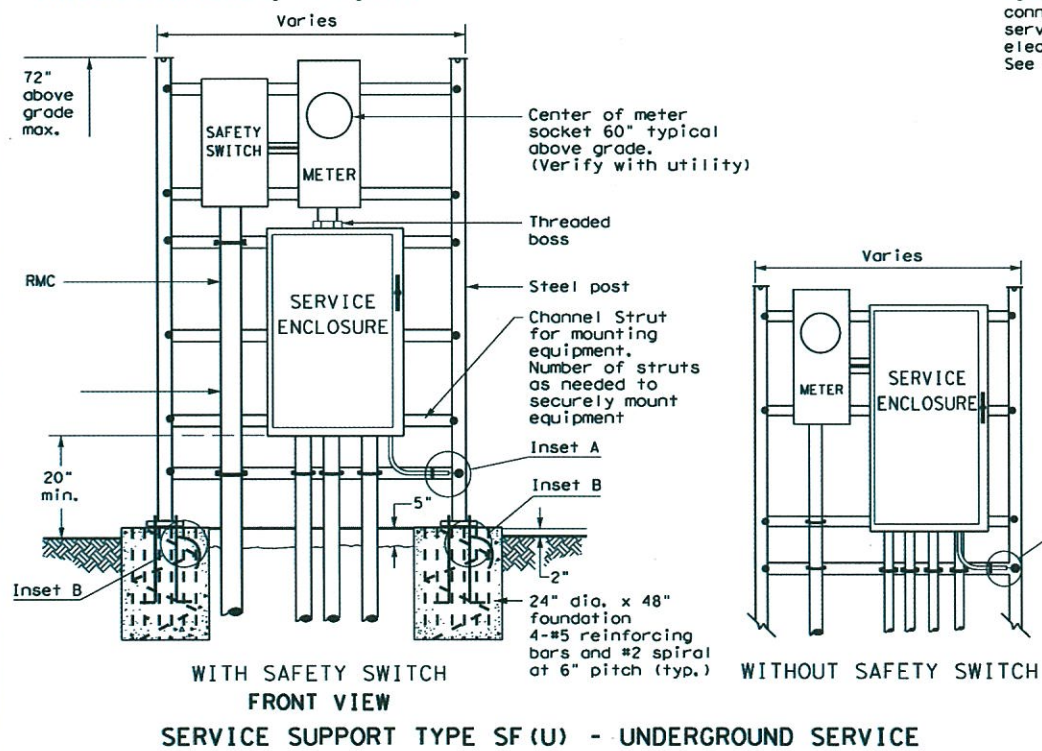
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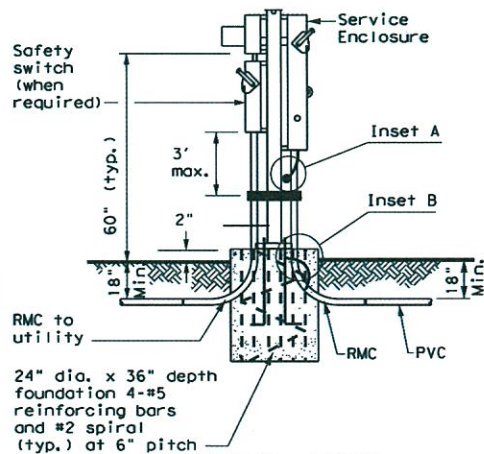
SUPPORT TYPE STEEL POLE (SP) AND STEEL FRAME (SF)

1. Provide steel pole and steel frame supports as per TxDOT Departmental Material Specification (DMS) 11080 "Electrical Services." Mount all equipment and conduit on 12 gauge galvanized steel or stainless steel channel strut, 1 1/2 in. or 1 3/4 in. wide by 1 in. up to 3 3/4 in. deep Unistrut, Kindorf, B-line or equal. Bolt or weld all channel and hardware to vertical members as approved. Do not stack channel. File smooth and paint field cut ends of all channel with zinc-rich paint before installing.
2. Provide poles for overhead service with an eyebolt or similar fitting for attachment of the service drop to the pole in conformance with the electric utility provider's specifications.
3. Provide and install galvanized 3/4 in. x 18 in. x 4 in. (dia. x length x hook length) anchor bolts for underground service supports. Ensure anchor bolts have 3 in. of thread, with 3 1/4 in. to 3 1/2 in. of the exposed anchor bolt projecting above finished foundation. Provide and install leveling nuts for all anchor bolts.
4. Bond one of the anchor bolts to the rebar cage with 6 AWG bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. See Inset B.
5. Furnish and install rigid metallic bells in all steel pole and steel frame foundations for all conduits entering the service from underground.
6. Use class C concrete for foundations. Ensure reinforcing steel is Grade 60 with 3" of unobstructed concrete cover.
7. Drill and tap steel poles and frames for 1/2 in. x 13 UNC tank ground fitting. For steel pole service supports, provide and install tank ground fitting 4 in. to 6 in. below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. For steel frame service supports, provide and install tank ground fitting on steel frame post. Install service grounding electrode conductor in a non-metallic conduit or tubing from the enclosure to the steel frame post. Connect electrical service grounding electrode conductor to the tank ground fitting. See steel frame and steel pole details and Inset A for more information. Size service entrance conduit and branch circuit conduit as shown in the plans. For underground conduit runs from the electrical service, extend RMC from the service enclosure to an RMC elbow, and then connect the schedule type and size of conduit shown in the plans. Provide and install grounding bushings where RMC terminates in the enclosure. Grounding bushings are not required when RMC is fitted into a sealing hub or threaded boss.
8. If Steel pole or frame is painted, bond each separate painted piece with a bonding jumper attached to a tapped hole.
9. Provide 1/4" - 20 machine screws for bonding. Do not use sheet metal screws. Remove all non-conductive material at contact points. Terminate bonding jumpers with listed devices. Install minimum size 6 AWG stranded copper bonding jumpers. Make up all threaded bonding connections wrench tight.
10. Avoid contact of the service drop and service entrance conductors with the metal pole to prevent abrasion of the insulated conductors.
11. Shop drawings are not required for service support structure unless specifically stated elsewhere or directed by the Engineer.

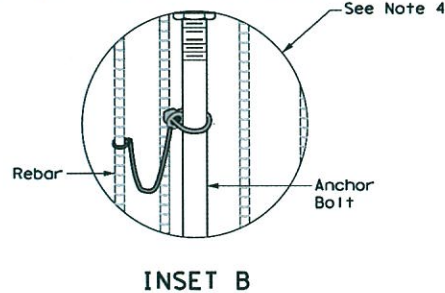


Drill, tap, and thread 1/2" x 13 UNC. Install tank ground fitting, connect electrical service grounding electrode conductor. See Note 7.

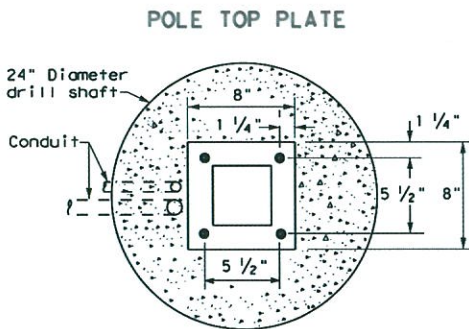
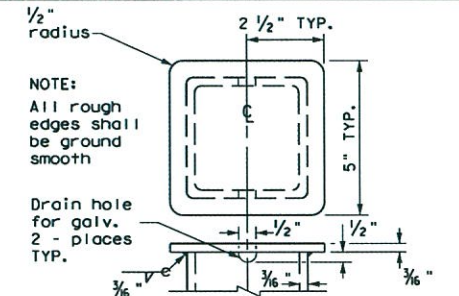
FRONT VIEW INSET A



WITH SAFETY SWITCH SERVICE SUPPORT TYPE SP(U) - UNDERGROUND SERVICE



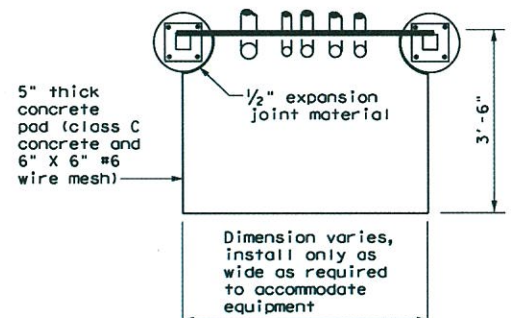
HOOKED ANCHOR DETAIL



BASE PLATE DETAIL

BOTTOM OF POLE

SERVICE SUPPORT TYPE SF & SP



TOP VIEW SERVICE SUPPORT TYPE SF(O) & SF(U)

Texas Department of Transportation		Traffic Operations Division Standard	
ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF & SP			
ED(7)-14			
FILE: ed7-14.dgn	DN: TxDOT	CK: TxDOT	DN: TxDOT
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REVISIONS	DIST	COUNTY	SHEET NO.

716

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

ELECTRICAL SERVICE SUPPORT

ED(7)-14

PROJECT MANAGER: TW

DRAWN BY: TW

PROJECT NUMBER: CWF17-444-11

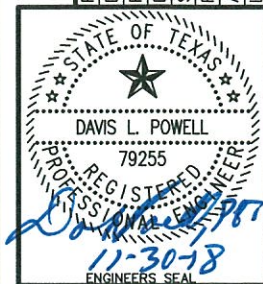
DATE: DEC 2018

SCALE: AS SHOWN

FIELD BOOK: XX

ACAD: XX

LAYOUT: ED(7)-14



SHEET 117 OF 150

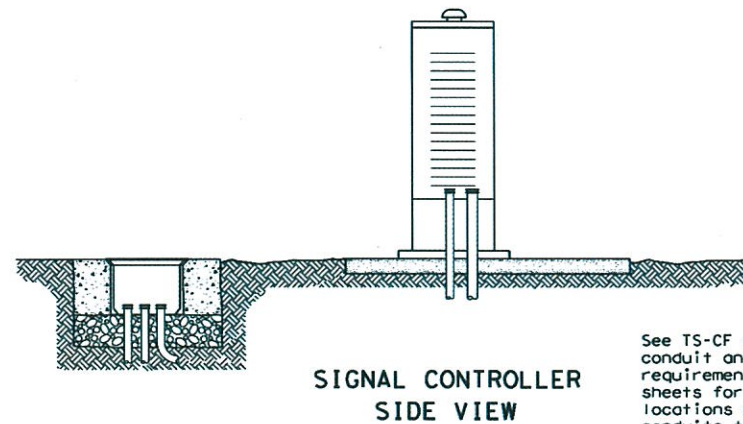
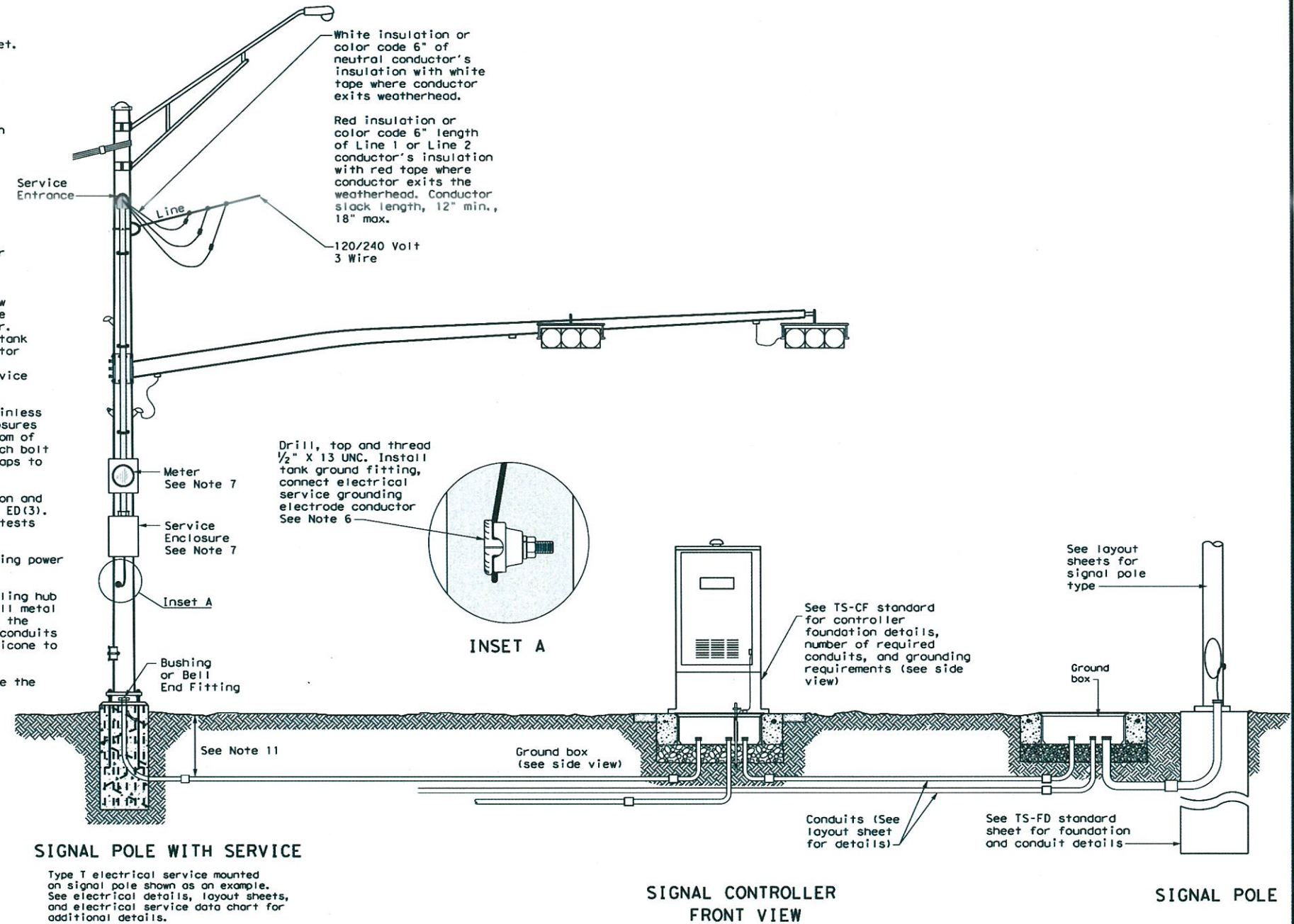
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DATE: FILE:

TRAFFIC SIGNAL NOTES

1. Do not pass luminaire conductors through the signal controller cabinet.
2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
3. Provide roadway luminaires, when required, in accordance with the material and construction sections of Item 610, "Roadway Illumination Assemblies," except for performance testing of luminaires. Test installed roadway luminaires for proper operation as a part of the associated traffic signal system test.
4. If internally illuminated street name signs are approved for use, ground the fixture to the pole with a 12 AWG green XHHW conductor.
5. Bond anchor bolts to rebar cage in two locations using #3 bars or 6 AWG stranded copper conductors. Use listed mechanical connectors rated for embedment in concrete. See TxDOT standard TS-FD for further details.
6. Drill and tap signal poles for $\frac{1}{2}$ in. X 13 UNC tank ground fitting. Provide and install tank ground fitting 4 in. to 6 in. directly below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Connect the electrical service grounding electrode conductor to the tank ground fitting. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. See Inset A detail for further information. Size service entrance conduit and branch circuit conduit as shown in the plans.
7. Mount electrical service enclosure and meter to signal pole with stainless steel bands. Ensure bands are a minimum width of $\frac{3}{4}$ in. Secure enclosures to bands using two-bolt brackets. Install brackets near top and bottom of each enclosure. Install properly sized stainless steel washers on each bolt in the enclosure. Band or drill and tap properly sized stand-off straps to signal pole for attaching conduit.
8. Conduct pull tests and insulation resistance tests on all illumination and power conductors as required in Item 620 "Electrical Conductors" and ED(3). To prevent electronics damage, do not conduct insulation resistance tests on traffic signal cables after termination.
9. Lock all enclosures and bolt down all ground box covers before applying power to the signal installation.
10. Terminate conduits entering the top of enclosures with a conduit-sealing hub or threaded boss such as meter hub. Install a grounding bushing on all metal conduits not connected to conduit-sealing hub or threaded boss. Bond the grounding bushing to the ground bus with a bonding jumper. Seal all conduits entering enclosures with duct seal or expanding foam. Do not use silicone to seal conduit ends.
11. For all conduits, ensure the burial depth is a minimum of 18". Ensure the minimum burial depth for conduit placed under a roadway is 24".



Texas Department of Transportation		Traffic Operations Division Standard	
ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS			
ED(8) - 14			
FILE: ed8-14.dgn	DN: TxDOT	CK: TxDOT	CR: TxDOT
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REVISIONS	DIST	COUNTY	SHEET NO.



PROJECT MANAGER:	HIKE AND BIKE TRAIL
DRAWN BY: TW	FROM BARNETT ROAD TO SEYMOUR HWY
PROJECT NUMBER: CWF17-444-11	CWF17-444-11
DATE: DEC 2018	TRAFFIC SIGNAL SYSTEM
SCALE: AS SHOWN	ED (8) - 14
FIELD BOOK:	
ACAD: XX	
LAYOUT: ED(8)-14	

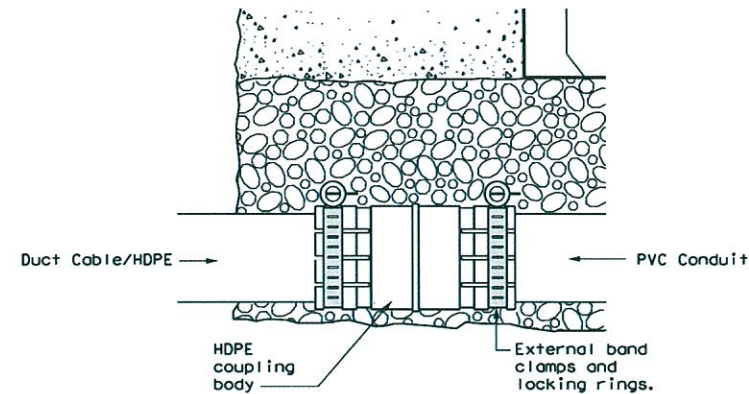
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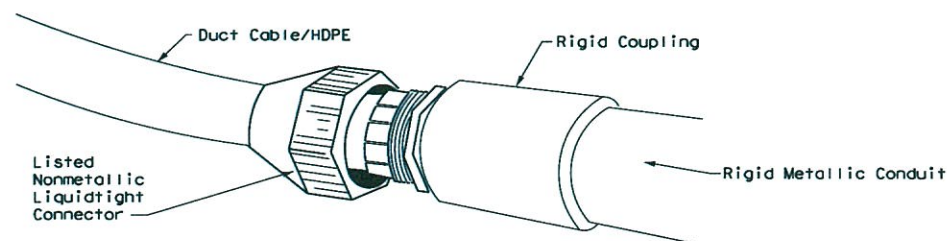
DATE: 11/30/18
FILE: ED(11)-14.dgn

DUCT CABLE & HDPE CONDUIT NOTES

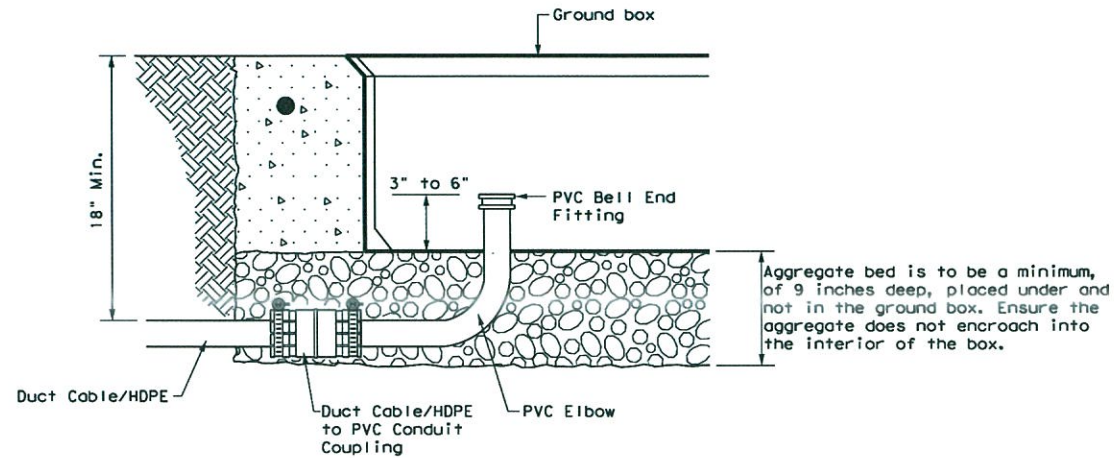
1. Provide duct cable in accordance with Departmental Material Specification (DMS) 11060 "Duct Cable" and Item 622 "Duct Cable." Provide duct cable as listed on the Material Producer List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 622.
2. Provide High-Density Polyethylene (HDPE) conduit in accordance with DMS 11060 and Item 618, "Conduit." Provide HDPE as listed on the MPL on the Department web site under "Roadway Illumination and Electrical Supplies," Item 618.
3. Supply duct cable with a minimum 2 in. diameter, unless otherwise shown in the plans. Provide duct cable and HDPE conduit as shown by descriptive code or on the plans. Bend duct cable and HDPE conduit as recommended by the manufacturer, with a minimum bending radius of 26 in. for 2 in. duct. Follow manufacturers' recommendations when handling duct cable and HDPE conduit reels and during installation of duct cable and HDPE conduit.
4. Do not splice conductors within duct cable or HDPE conduit. Couple duct cable and HDPE entering a ground box or foundation to a PVC elbow. When galvanized steel RMC elbows are called for in the plans and any portion of the RMC elbow is buried less than 18" from possible contact, ground the RMC elbow.
5. Furnish and install duct cable with factory installed conductors, sized as shown in the plans and as required by the National Electrical Code (NEC). The NEC contains specific requirements for duct cable in Article, "Nonmetallic Underground Conduit with Conductors: Type NUCC."
6. When conduit casing is called for in the plans, extend duct cable or HDPE conduit through the conduit casing in one continuous length without connection to the casing.
7. Seal the ends of duct cable or HDPE conduit with duct seal, expandable foam, or other approved method after completing the pull tests required by Item 622.
8. Provide minimum cover of 24 in. under roadways, 18 in. in other locations, or as shown on the plans.
9. Furnish and install listed fittings to couple duct cable or HDPE conduit to other types of conduit. Duct cable and HDPE conduit may be field-threaded and spliced with PVC or RMC threaded couplings; connected with listed tie-wrap fittings; connected using listed coupling made of HDPE with stainless steel external banding clamps and locking rings; connected with approved electrofusion conduit couplings; or connected using an approved chemical fusion method using an epoxy or adhesive specifically designed for HDPE couplings and connectors all installed in accordance with their manufacturer's instructions. Do not use PVC glue on HDPE. Do not use water pipe fittings, or connect conduit with heat shrink tubing.



DUCT CABLE/HDPE TO PVC

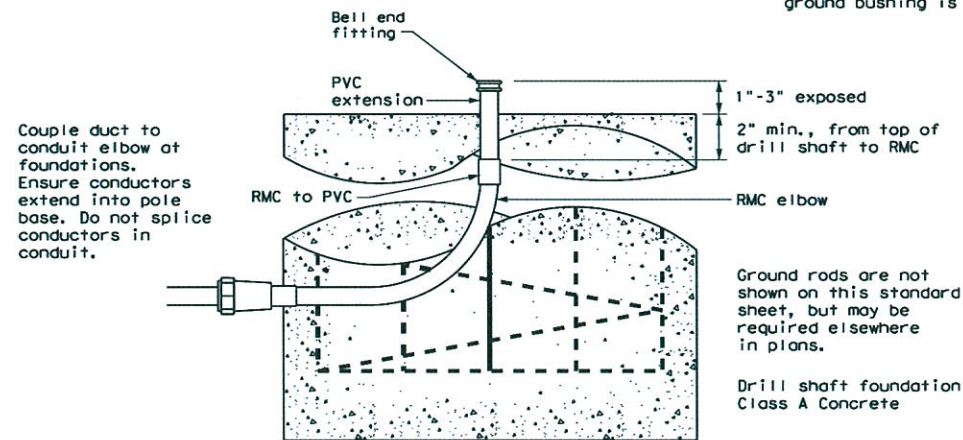


DUCT CABLE/HDPE TO RMC

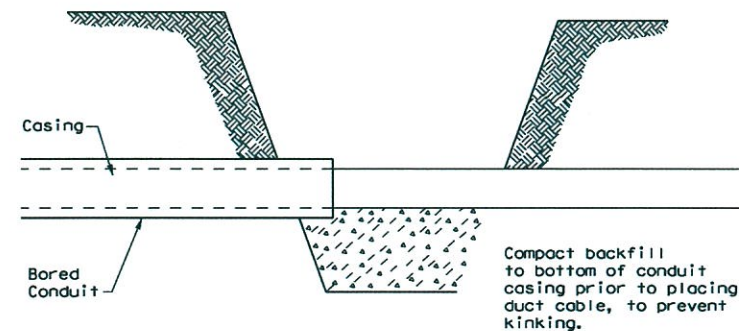


DUCT CABLE/HDPE AT GROUND BOX

When the upper end of an RMC Ell does not enter the ground box, it may be extended with a SCH-40 PVC conduit nipple and bell end, provided there is a minimum of 18" of cover over all parts of the elbow. If not, a rigid extension and ground bushing is required.



DUCT CABLE / HDPE AT FOUNDATION



BORE PIT DETAIL

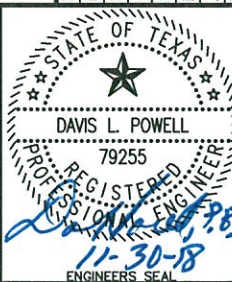
Texas Department of Transportation		Traffic Operations Division Standard	
ELECTRICAL DETAILS			
DUCT CABLE/HDPE CONDUIT			
ED(11)-14			
FILE: ed11-14.dgn	DW: TxDOT	CK: TxDOT	DW: TxDOT
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REVISIONS	DIST	COUNTY	SHEET NO.

71L

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

DUCT CABLE / HDPE CONDUIT
ED(11)-14

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: ED(11)-14



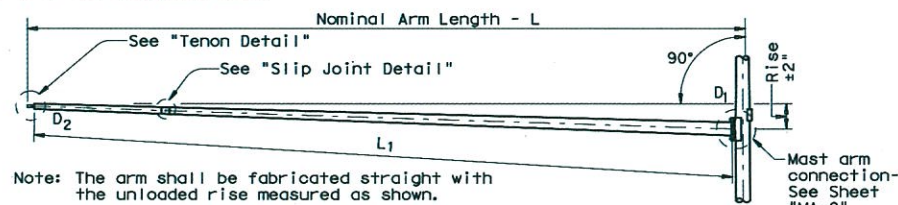
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DATE: FILE:

Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D ₈	D ₁₉	D ₂₄	D ₃₀	① thk	D ₈	D ₁₉	D ₂₄	D ₃₀	① thk	
ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
20	10.5	7.8	7.1	6.3	.179	11.5	8.5	7.7	6.8	.179	30-A
24	11.0	8.3	7.6	6.8	.179	12.0	9.0	8.2	7.3	.179	30-A
28	11.5	8.8	8.1	7.3	.179	12.5	9.5	8.7	7.8	.179	30-A
32	12.5	9.8	9.1	8.3	.179	12.0	9.0	8.2	7.3	.239	30-A
36	12.0	9.3	8.6	7.8	.239	12.5	9.5	8.7	7.8	.239	36-A
40	12.0	9.3	8.6	7.8	.239	13.5	10.5	9.7	8.8	.239	36-A
44	12.5	9.8	9.1	8.3	.239	14.0	11.0	10.2	9.3	.239	36-A
48	13.0	10.3	9.6	8.8	.239	15.0	12.0	11.2	10.3	.239	36-A

Arm Length	ROUND ARMS					POLYGONAL ARMS					Rise
	L ₁	D ₁	D ₂	① thk		L ₁	D ₁	D ₂	① thk		
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.		
20	19.1	6.5	3.8	.179	1'-9"	19.1	7.0	3.5	.179	1'-8"	
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	3.5	.179	1'-9"	
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	3.5	.179	1'-10"	
32	31.0	9.0	4.7	.179	2'-1"	31.0	9.0	3.5	.179	2'-0"	
36	35.0	9.5	4.6	.179	2'-4"	35.0	10.0	3.5	.179	2'-1"	
40	39.0	9.5	4.1	.239	2'-8"	39.0	9.5	3.5	.239	2'-3"	
44	43.0	10.0	4.1	.239	2'-11"	43.0	10.0	3.5	.239	2'-6"	
48	47.0	10.5	4.1	.239	3'-4"	47.0	11.0	3.5	.239	2'-9"	

- D₈ = Pole Base O.D.
D₁₉ = Pole Top O.D. with no Luminaire and no ILSN
D₂₄ = Pole Top O.D. with ILSN w/out Luminaire
D₃₀ = Pole Top O.D. with Luminaire
D₁ = Arm Base O.D.
D₂ = Arm End O.D.
L₁ = Shaft Length
L = Nominal Arm Length
① Thickness shown are minimums, thicker materials may be used.
② D₂ may be increased by up to 1" for polygonal arms.



TRAFFIC SIGNAL ARM
(Fixed Mount)

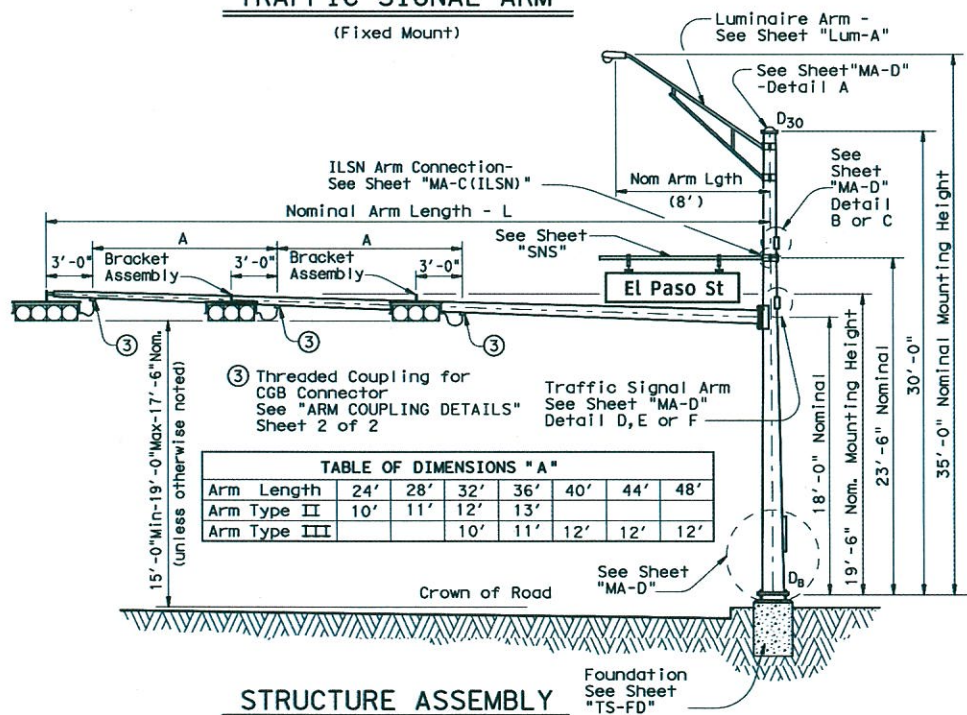


TABLE OF DIMENSIONS "A"							
Arm Length	24'	28'	32'	36'	40'	44'	48'
Arm Type II	10'	11'	12'	13'			
Arm Type III			10'	11'	12'	12'	12'

STRUCTURE ASSEMBLY

SHIPPING PARTS LIST

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed-arm connection bolts and washers and any additional hardware listed in the table.

Nominal Arm Length	30' Poles With Luminaire		24' Poles With ILSN		19' Poles With No Luminaire and No ILSN	
	Above hardware plus: One (or two if ILSN attached) small hand hole, clamp-on simplex		Above hardware plus one small hand hole		See note above	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20L-80		20S-80		20-80	
24	24L-80		24S-80		24-80	
28	28L-80	1	28S-80		28-80	
32	32L-80		32S-80		32-80	
36	36L-80		36S-80		36-80	
40	40L-80		40S-80		40-80	
44	44L-80		44S-80		44-80	
48	48L-80		48S-80		48-80	

Traffic Signal Arms (1 per Pole) Ship each arm with the listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal)		Type II Arm (2 Signals)		Type III Arm (3 Signals)	
	1 CGB connector		1 Bracket Assembly and 2 CGB Connectors		2 Bracket Assemblies and 3 CGB Connectors	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-80					
24	24I-80		24II-80			
28	28I-80	1	28II-80			
32			32II-80		32III-80	
36			36II-80		36III-80	
40					40III-80	
44					44III-80	
48					48III-80	

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	1

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
1 1/2"	3'-4"	1
1 3/4"	3'-10"	

Each anchor bolt assembly consists of the following: Top and bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, and 4 nut anchor devices (Type 2) per Standard Drawing "TS-FD".

Templates may be removed for shipment.

SHEET 1 OF 2

Texas Department of Transportation
Traffic Operations Division
**TRAFFIC SIGNAL
SUPPORT STRUCTURES**
SINGLE MAST ARM ASSEMBLY
(80 MPH WIND ZONE)
SMA-80(1)-12

©TxDOT August 1995	DN: MS	CK: JSY	DN: MAF	CK: JSY
REVISIONS	CONT	SECT	JOB	HIGHWAY
5-96 11-99 1-12	DIST	COUNTY	SHEET NO.	

122A

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

SINGLE MAST ARM ASSEMBLY
SMA-80(1)-12

PROJECT MANAGER:

DRAWN BY: TW

PROJECT NUMBER: CWF17-444-11

DATE: DEC 2018

SCALE: AS SHOWN

FIELD BOOK:

ACAD: XX

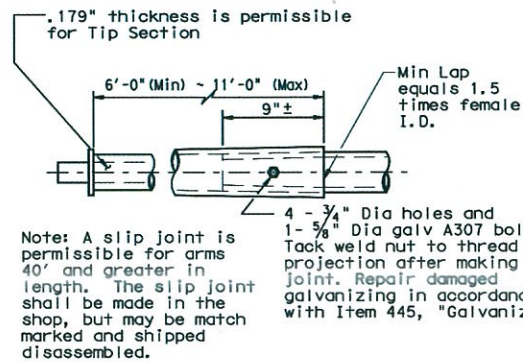
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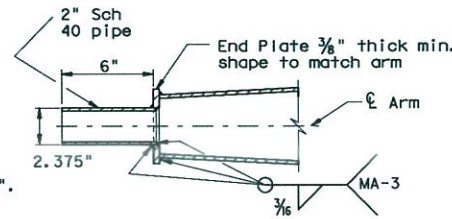
SHEET 120 OF 150

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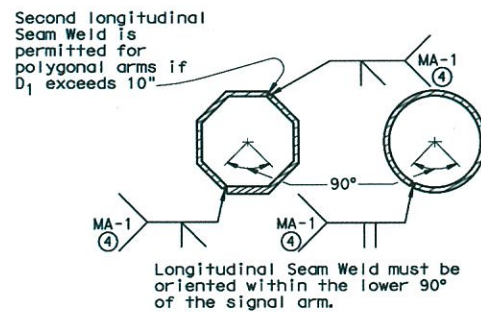
SLIP JOINT DETAIL



TENON DETAIL

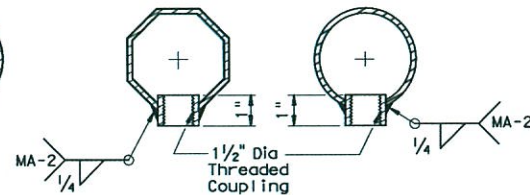
Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 1/2" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

④ 60% Min. penetration
100% penetration within 6" of circumferential base welds.



ARM COUPLING DETAILS

VIBRATION WARNING

Mast Arms of SMA and DMA structures and clamp-on Arms of LMA structures of approximately 40 ft or longer are subject to harmonic vertical vibrations in light wind conditions due to the aeroelastic characteristics of a few of the myriads of possible combinations of the following: signal numbers, weights and positions; existence/solidity of backplates; presence of additional attachments to the arm, such as signs and cameras; arm-wind orientation; and arm-pole stiffness.

Such vibrations may cause fatigue damage to the structure and may lead to galloping in moderate wind conditions which may further damage the structure and alarm the public. Tests have indicated that when wind is blowing toward the back side of signal heads having un-vented backplates attached the probability of unacceptable harmonic vibration and/or galloping is rather high.

If backplates are not required for improved visibility they should not be applied to the signal heads or, if they must be applied, they should be vented as a first and inexpensive measure to mitigate vibrations.

The traffic signal mast arms shall be visually inspected in 5 to 20 mph wind conditions after installation of signal heads and any attachments, including any required backplates. If vertical movements with a total excursion (maximum upward excursion to maximum downward excursion) of more than approximately 8" are observed at the arm tip, a damping plate shall be fitted to the arm. See "Damping Plate Mounting Details" on standard sheet, MA-DPD-10.

This visual inspection shall be repeated after each modification of the structure that could affect its aeroelastic response. Excessive vibrations shall not be allowed to continue for more than two days.

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor.

Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.6 sq ft. The specified internally lighted street name sign load applied 4.5 ft from the centerline of the pole equals 85 lbs vertical dead load plus horizontal wind load on an effective projected area of 11.5 sq ft. The specified signal load applied at the end of the traffic signal arm equals 180 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft (actual area times drag coefficient).

See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "MA-C (ILSN)" for internally lighted street name sign arm connection details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details. See "MA-C" for material specifications.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing", after fabrication.

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

SHEET 2 OF 2

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL
SUPPORT STRUCTURES
SINGLE MAST ARM ASSEMBLY

(80 MPH WIND ZONE)

SMA-80(2)-12

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REVISIONS		CONT	SECT	JOB	HIGHWAY
5-96	1-72				
		DIST	COUNTY		SHEET NO.

122B

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

SINGLE MAST ARM ASSEMBLY - 2
SMA-80(2) - 12

PROJECT MANAGER: TW

DRAWN BY: TW

PROJECT NUMBER: CWF17-444-11

DATE: DEC 2018

SCALE: AS SHOWN

FIELD BOOK:

ACAD: XX

LAYOUT: SMA-80(2)-12



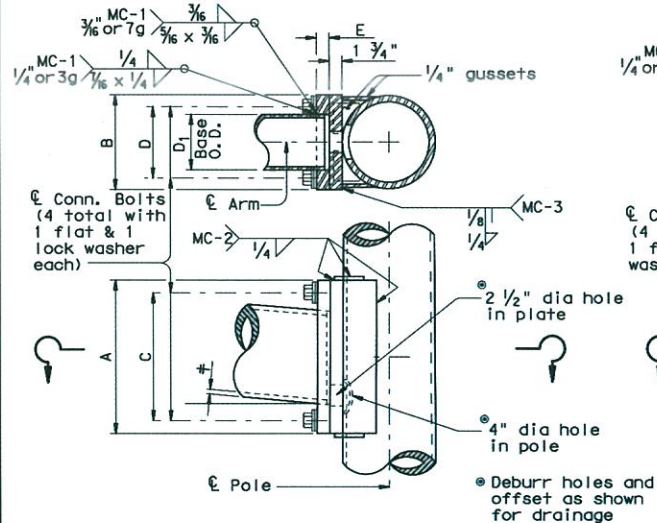
SHEET 121 OF 150

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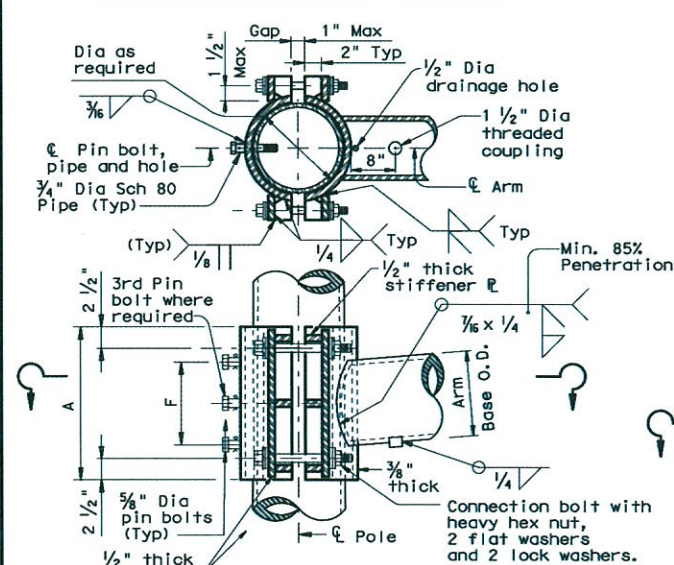
DATE: FILE:

ARM SIZE		A	B	C	D	E	CONN BOLT DIA
D ₁	#	in.	in.	in.	in.	in.	in.
6.5	.179	12	9	9	6	1 3/4	1
7.5	.179	13	9	10	6	1 3/4	1
8.0	.179	14	10	11	7	2	1 1/4
9.0	.179	16	11	13	8	2	1 1/4
9.5	.179	17	12	14	9	2	1 1/4
9.5	.239	18	12	15	9	2	1 1/4
10.0	.239	18	12	15	9	2	1 1/4
10.5	.239	18	13	15	10	3	1 1/2
11.0	.239	18	13	15	10	3	1 1/2



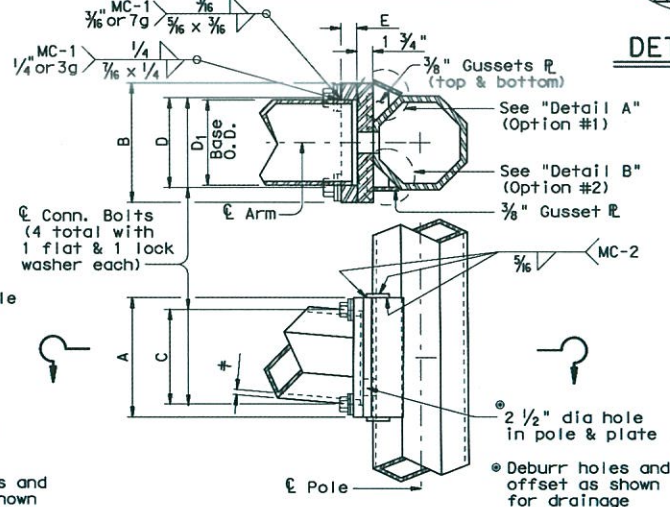
FIXED MOUNT DETAIL 1

ARM SIZE		A	F	CONN. BOLTS	PIN BOLTS
D ₁	#	in.	in.	No. ea.	No. Dia
6.5	.179	12	6	4	1 2 3/8
7.5	.179	14	8	4	1 2 3/8
8.0	.179	14	8	4	1 2 3/8
9.0	.179	16	10	4	1 2 3/8
9.5	.179	18	12	4	1 1/4 3 3/8
9.5	.239	18	12	4	1 1/4 3 3/8
10.0	.239	18	12	4	1 1/4 3 3/8



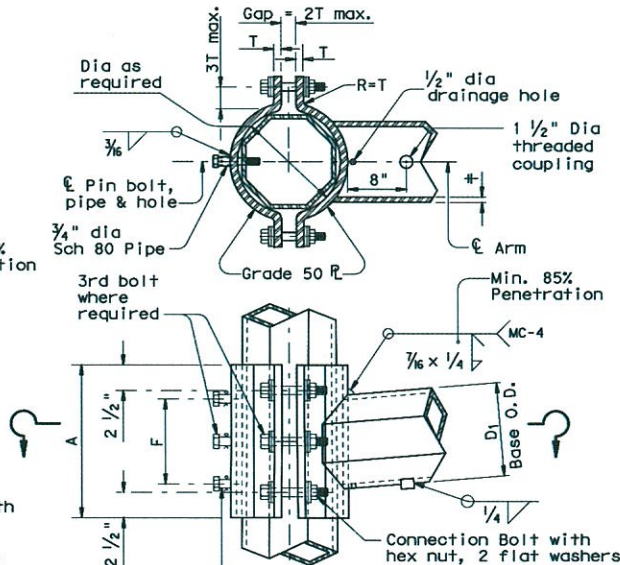
CLAMP-ON DETAIL 1

ARM SIZE		A	B	C	D	E	CONN BOLT DIA
D ₁	#	in.	in.	in.	in.	in.	in.
7.0	.179	11	11	8	8	1 3/4	1 1/4
7.5	.179	11	11	8	8	1 3/4	1 1/4
8.0	.179	11	11	8	8	2	1 1/4
9.0	.179	13	13	10	10	2	1 1/4
10.0	.179	13	13	10	10	2	1 1/4
9.5	.239	13	13	10	10	2	1 1/4
10.0	.239	14	14	11	11	2	1 1/2
11.0	.239	14	14	11	11	3	1 1/2
11.5	.239	14	14	11	11	3	1 1/2

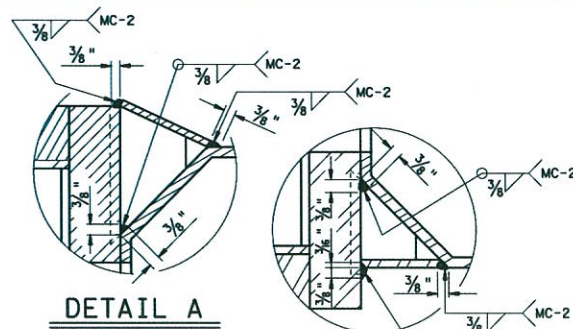


FIXED MOUNT DETAIL 2

ARM SIZE		A	F	T	CONN. BOLTS	PIN BOLTS
D ₁	#	in.	in.	in.	No. ea.	No. Dia
7.0	.179	12	6	3/4	4	3/4 2 3/8
7.5	.179	14	8	3/4	4	3/4 2 3/8
8.0	.179	14	8	3/4	4	3/4 2 3/8
9.0	.179	16	10	3/4	4	1 2 3/8
10.0	.179	18	12	3/4	4	1 2 3/8
9.5	.239	18	10	1	6	1 3 3/8
10.0	.239	18	10	1	6	1 3 3/8

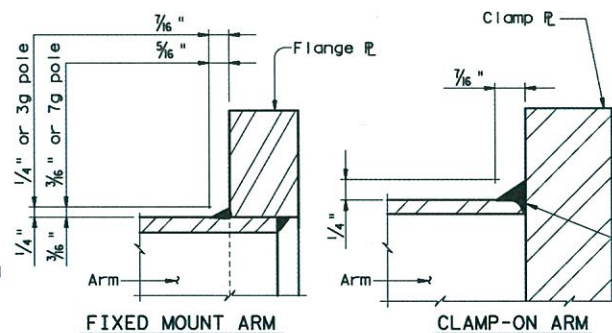


CLAMP-ON DETAIL 2



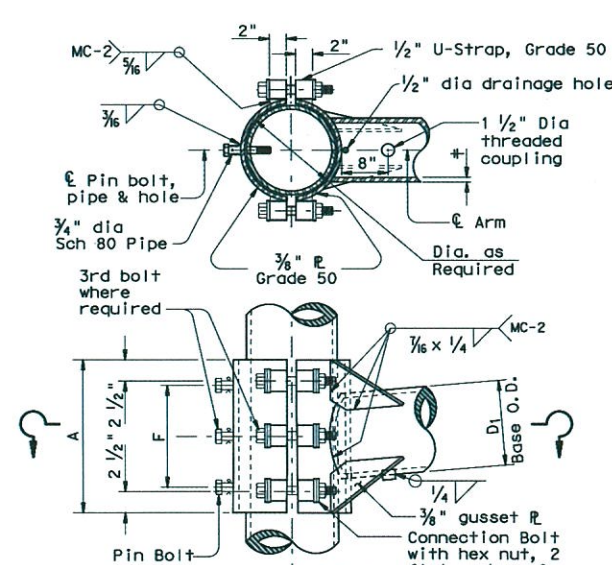
DETAIL A

DETAIL B



ARM BASE WELD DETAILS

ARM SIZE		A	F	CONN. BOLTS	PIN BOLTS
D ₁	#	in.	in.	No. ea.	No. Dia
6.5	.179	12	6	4	1 2 3/8
7.5	.179	14	8	4	1 2 3/8
8.0	.179	14	8	4	1 2 3/8
9.0	.179	16	10	4	1 2 3/8
9.5	.179	18	12	6	1 3 3/8
9.5	.239	18	12	6	1 3 3/8
10.0	.239	18	12	6	1 3 3/8



CLAMP-ON DETAIL 3

MATERIALS

Round Shafts or Polygonal Shafts ^①	ASTM A595 Gr. A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 ^②
Plates ^①	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325 or A449, except where noted
Pin Bolts	ASTM A325
Pipe ^①	ASTM A53 Gr. B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

① ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

② ASTM A1011 SS Gr.50 material shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

Min. 85% Penetration except "Clamp-on Detail 3"

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1 1/2" wide vertical slotted hole shall be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1"

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

NOTE:

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and 3/4" dia pipe shall have 3/8" dia holes for a 1/8" dia galvanized cotter pin. Back clamp plate shall be furnished with a 3/4" dia hole for each pin bolt. An 1/8" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM CONNECTIONS MA-C-12

©TxDOT August 1995	DN: MS	CK: JST	DN: MMF	CK: JST
5-96 5-99 1-12	REV	CONT	SECT	JOB
				HIGHWAY
				SHEET NO.

126A

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

MAST ARM CONNECTIONS
MA-C-12

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: MA-C-12

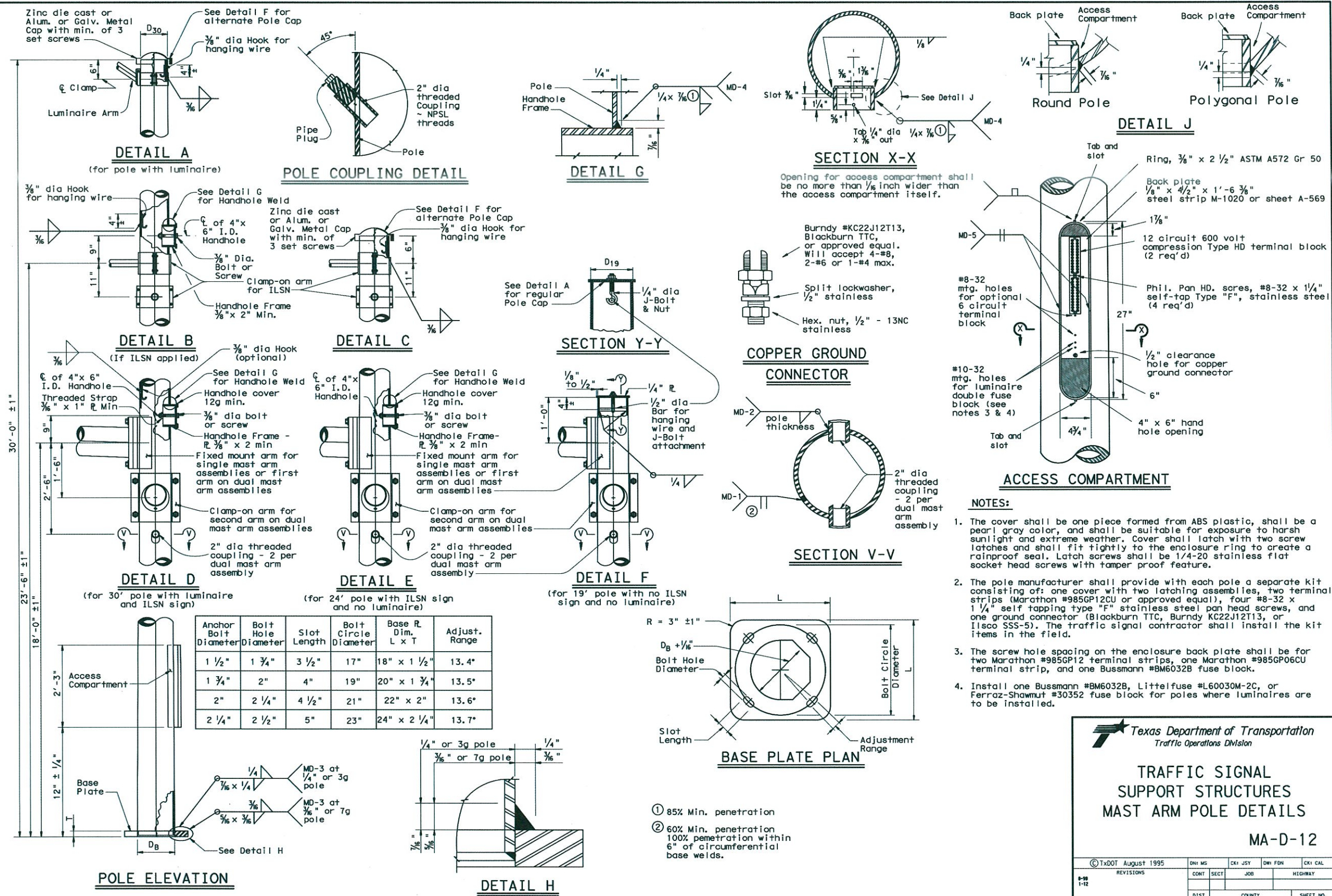


SHEET 122 OF 150

\\Antares2\Share\Eng\Drawings\Traffic Signal\MA-D-12.dwg, MA-D-12, 11/30/2018 10:58:59 AM

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DATE: FILE:



Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL
SUPPORT STRUCTURES
MAST ARM POLE DETAILS

MA-D-12

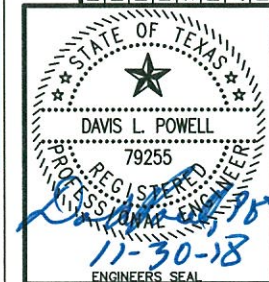
© TxDOT August 1995		DNI: MS		CK1: JSY	DNI: FDN	CK1: CAL
0-99 1-12	REVISONS	CONT	SECT	JOB		HIGHWAY
		DIST	COUNTY			SHEET NO.

127

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

MAST ARM POLE DETAILS
MA-D-12

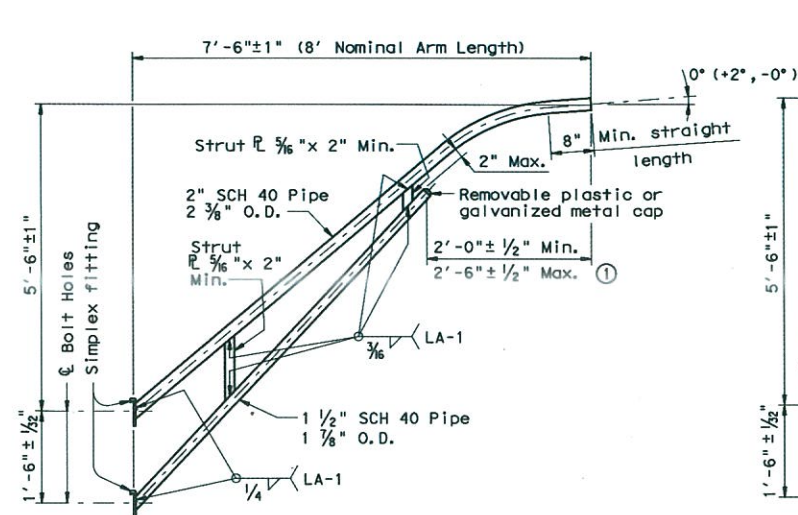
PROJECT MANAGER: TW
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: MA-D-12



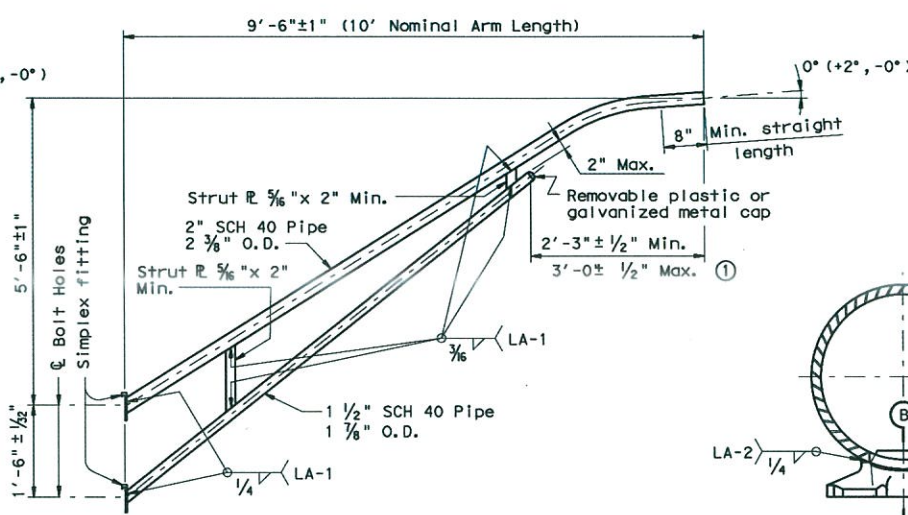
SHEET 123 OF 150

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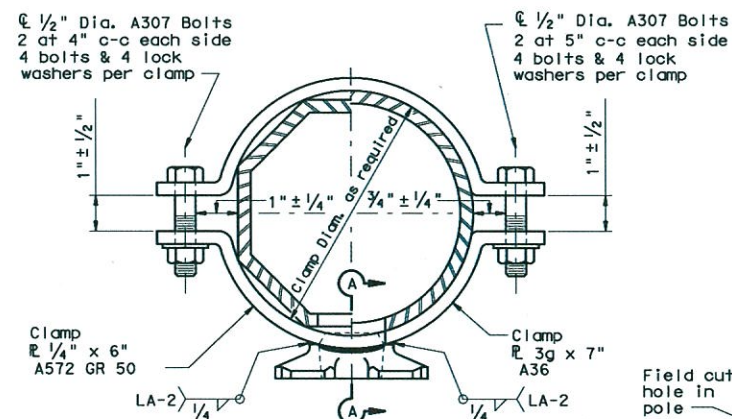


8-FOOT LUMINAIRE ARM

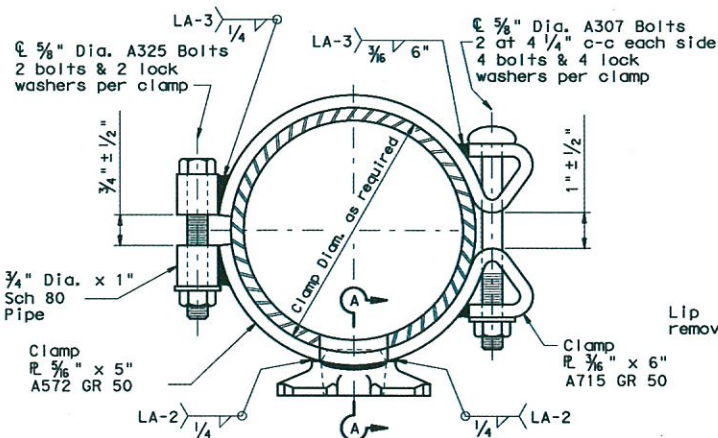


10-FOOT LUMINAIRE ARM

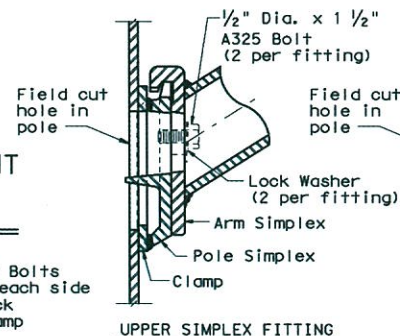
DIRECT ATTACHMENT
DETAIL



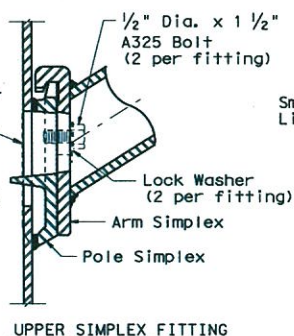
CLAMP ATTACHMENT
DETAIL NO. 1
(HALF SECTION)



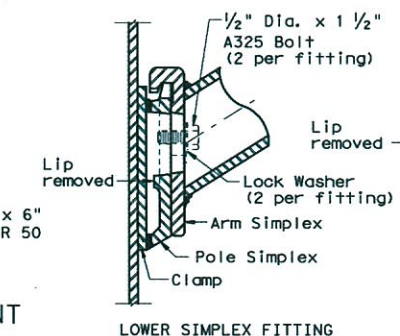
CLAMP ATTACHMENT
DETAIL NO. 3
(HALF SECTION)



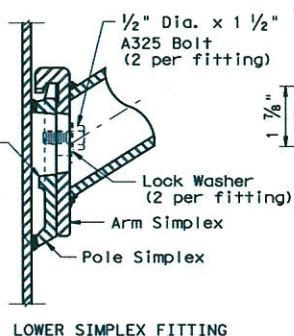
UPPER SIMPLEX FITTING



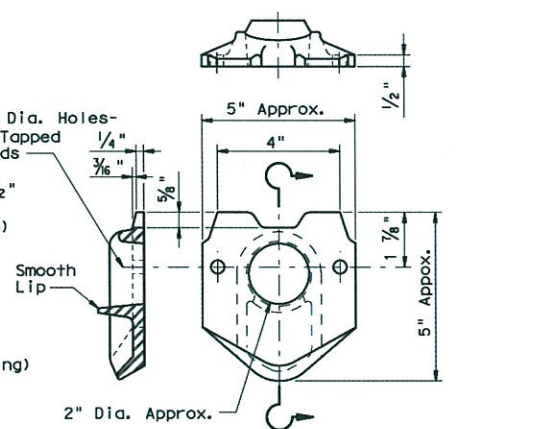
UPPER SIMPLEX FITTING



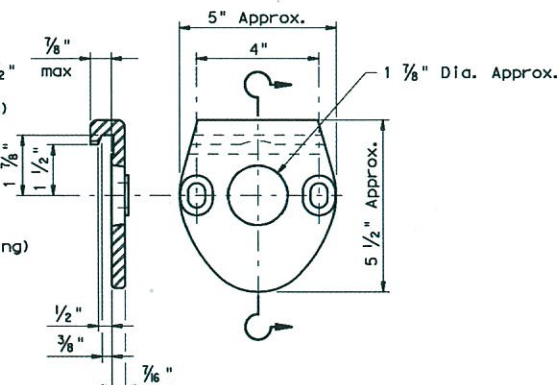
LOWER SIMPLEX FITTING



LOWER SIMPLEX FITTING



POLE SIMPLEX DETAIL



ARM SIMPLEX DETAIL

MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr. 65-35 or A148 Gr. 80-50, A576 Gr. 1021 ③, or A36 (Arm only)
Arm Pipes	ASTM A53 Gr. B, A501, A1008 HSLAS-F Gr. 50 ④, or A1011 HSLAS-F Gr. 50 ④
Arm Strut Plates ②	ASTM A36, A572 Gr. 50 ④, or A588
Misc.	ASTM designations as noted

- ① Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.
- ② Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.
- ③ A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.
- ④ ASTM A572, A1008 HSLAS-F, and A1011 HSLAS-F may have higher yield strengths but shall not have less elongation than the grade indicated.

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Revisions thereto. Design Wind Speed equals 90 mph plus a 1.3 gust factor. Arms are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq. ft.

Materials and fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absence of specified Fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.

Unless otherwise noted, all parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing".

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

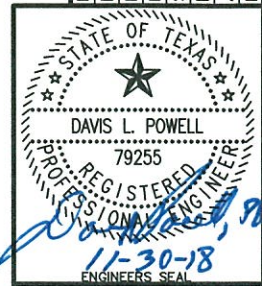
Each pole simplex fitting shall be supplied with 2 ASTM A325 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans. When clamp attachment is specified, the Fabricator shall ship the clamp assembly securely attached to the pole at the location shown on the plans.

If clamp assemblies are ordered without poles, the Fabricator shall ship one upper and one lower clamp assembly together in a single package, including all nuts and washers required for the clamps and simplex fittings.

Texas Department of Transportation
Traffic Operations Division
**STANDARD ASSEMBLY
DRAWINGS FOR LUMINAIRE
SUPPORT STRUCTURES**
ARM DETAILS
LUM-A-12

© TxDOT August 1995	DN: LEH	CK: JSY	DN: LTT	CK: TEB
5-96	REVISED	CONT	SECT	JOB
1-98		DIST	COUNTY	SHEET NO.
1-12				

129



HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

LUMINAIRE SUPPORT STRUCTURES
LUM-A-12

PROJECT MANAGER: TW
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK: XX
ACAD: XX
LAYOUT: LUM-A-12

REVISIONS
NO. DATE DESCRIPTION BY



DATE: FILE:



 **Texas Department of Transportation**
Traffic Operations Division

CFA-12

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REVISIONS 11-88 1-12		CONT	SECT	JOB		HIGHWAY
		DIST	COUNTY			SHEET NO.

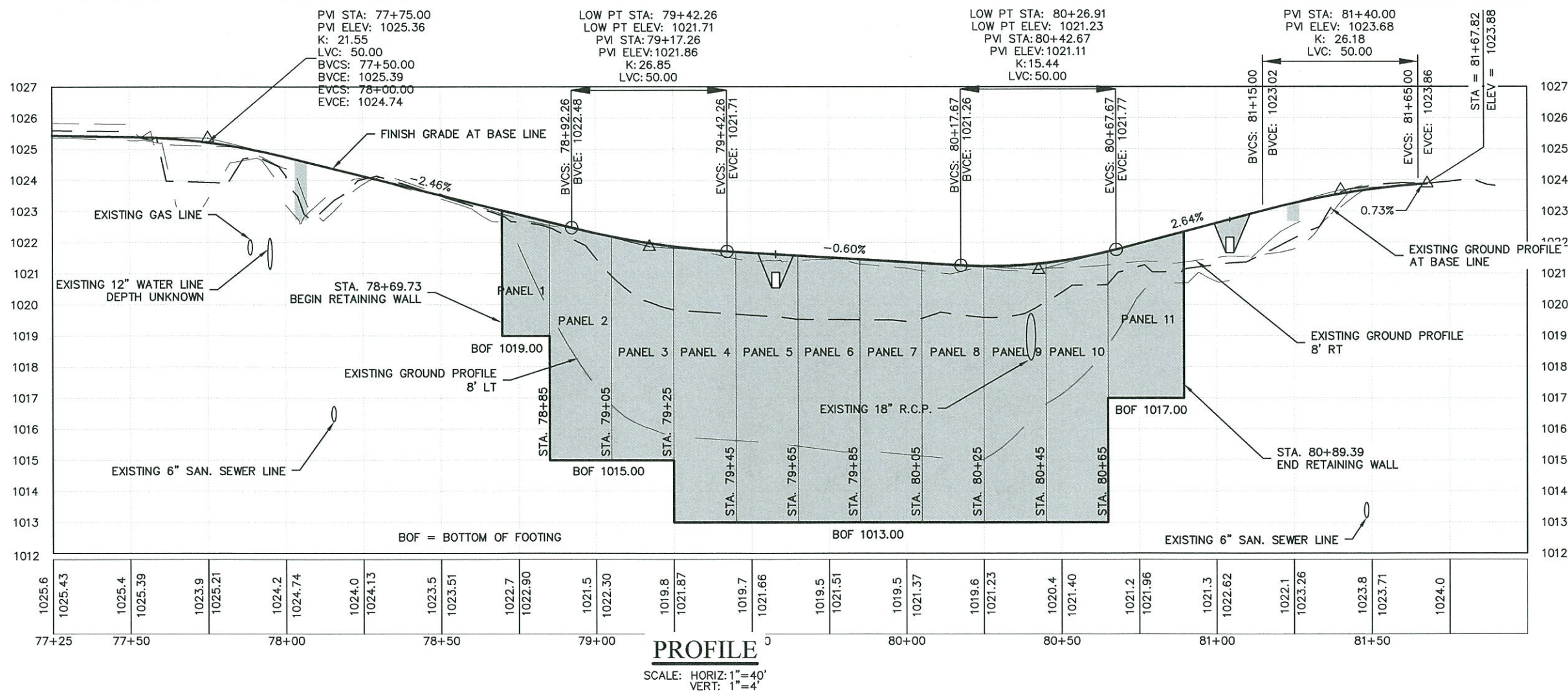
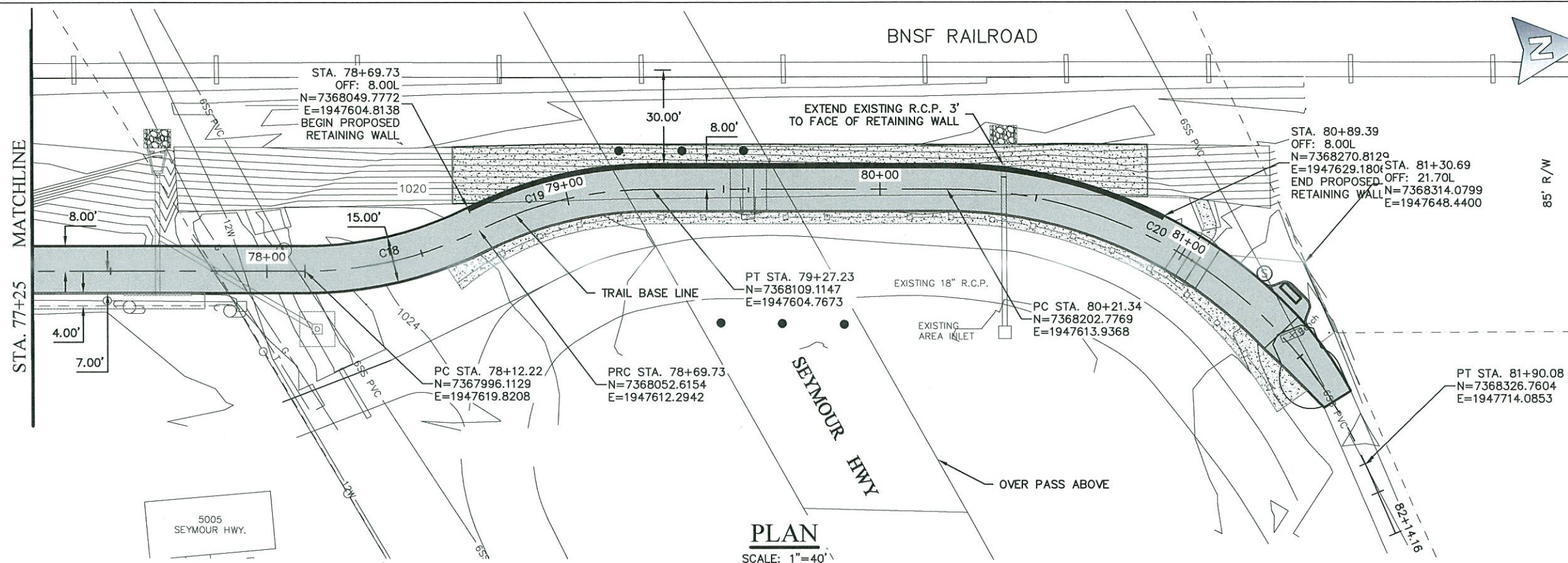


SHEET 125 OF 150

FITTING ASSEMBLY FOR LUMINAIRE CFA - 12

NO.	DATE	DESCRIPTION	BY
R E V I S I O N S			

\\Antares2\Share\Eng\Drawings\Projects\Land Projects\2017\Trail by the Railroad\DWG\Trail.dwg, Ret Wall, 11/30/2018 11:03:09 AM





QUANTITY
FOR ONE
32' PANEL

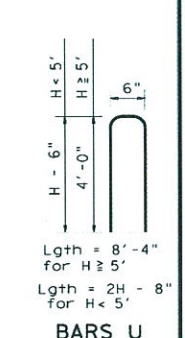
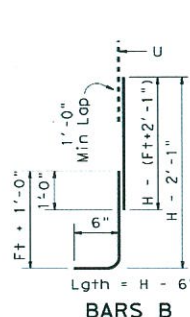
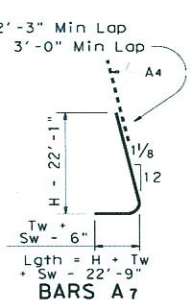
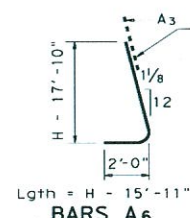
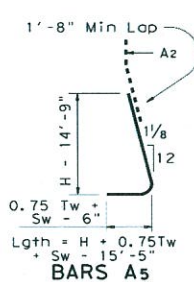
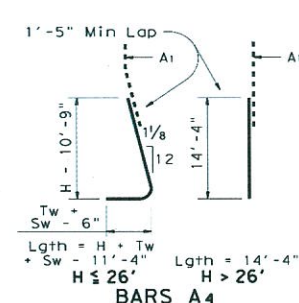
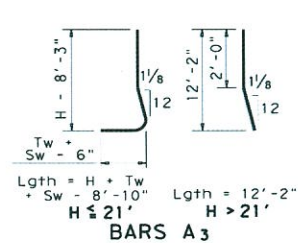
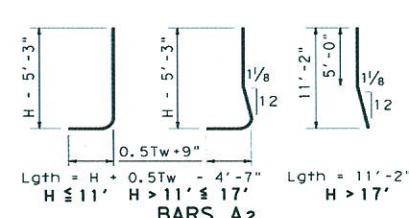
Diagram illustrating three types of lap joints for reinforcement bars:

- (a) Standard lap joint: $L_{gth} = H + T_w + S_w - 2' - 6"$, $H \leq 11'$, $H > 11' < 13'$, $H \geq 13'$.
- (b) Lap joint with 1/8 inch diameter bars: $L_{gth} = 10' - 3"$, $H \geq 13'$.
- (c) Lap joint with 1/8 inch diameter bars and 1/2 inch diameter bars: $L_{gth} = 10' - 3"$, $H \geq 13'$.

Common dimensions and labels across diagrams:

- 1'-0" Min Lap
- U (Unreinforced zone)
- H (Height of concrete column)
- T_w + S_w - 6" (Width of reinforcement zone)
- 8'-4" (Length of reinforcement zone)
- 1/8 (Bar diameter)
- 1/2 (Bar diameter)

-



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

 <p>Texas Department of Transportation</p>	<p>Bridge Division Standard</p>
--	--

RETAINING WALLS

RW 1(H)C

FILE	rnsdte10.dgn	DN:	TxDOT	CK:	TxDOT	DW:	GHO	CK:	MPH
C:\TxDOT	March 2010	CONT	SECT	JOB	HIGHWAY				
REVISIONS									
		DIST	EQUITY				SHEET NO.		

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

RETAINING WALL
RW 1(H)C

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: RW 1(H)C

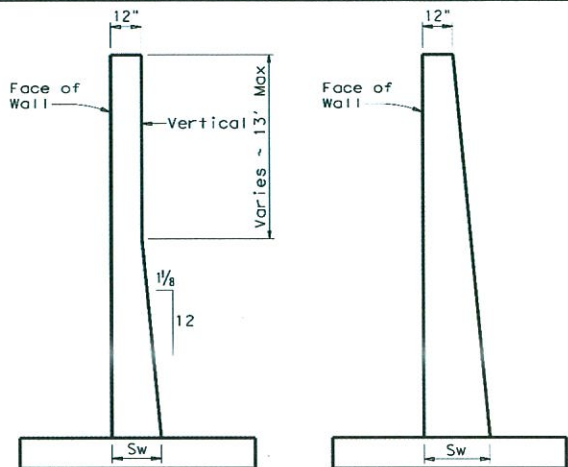
STATE OF TEXAS
DAVIS L. POWELL
79255
PROFESSIONAL ENGINEER
11-30-58
ENGINEER'S SEAL

SHEET 128 OF 150

\\Antares\Share_Eng\Drawings\Terry Walters\Land Projects\2017\Trail by the Railroad\DWG\Railroad, RW 2, 11/30/2018 11:04:54 AM

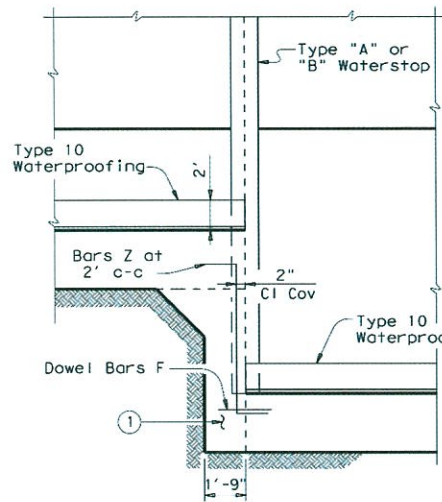
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LEVELS DISPLAYED	PATH:
1	

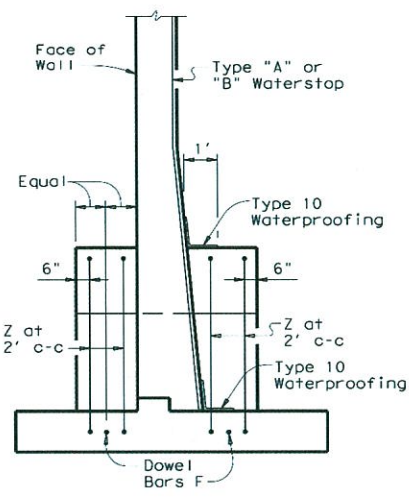


ALTERNATE STEM SLOPE DETAILS

Walls with slopes other than those shown may be used after approval by the Engineer. Sw shall not be less than shown in Table on Sheet 1. No payment will be made for excess concrete due to changing of slope of wall stem.



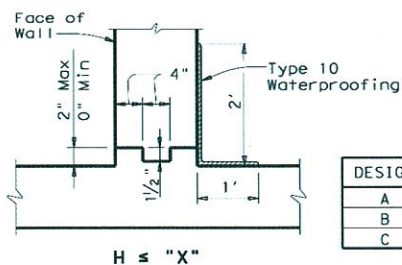
PARTIAL ELEVATION



PARTIAL SECTION

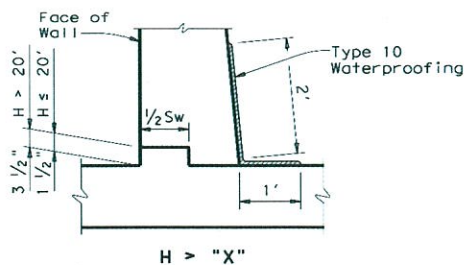
SHOWING WATERSTOP AT FOOTING JOINT

- ① Unreinforced Class "C" Concrete when difference in top of footing elevations is less than 6'. Omit when Dowel Bars F can be placed between adjacent footings with 4" cover top and bottom.



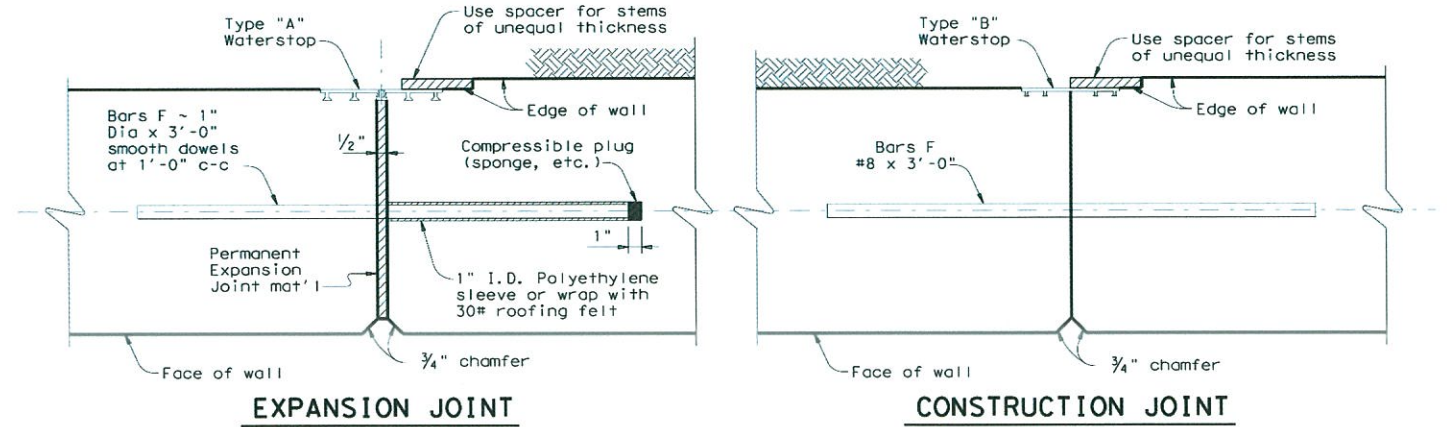
H <= "X"

DESIGN	"X"
A	14'
B	12'
C	11'



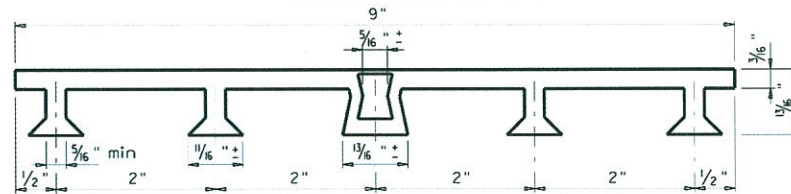
H > "X"

JOINT AND WATERSTOP DETAILS



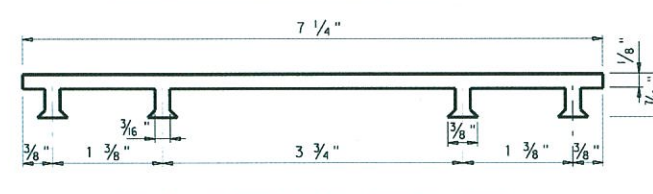
EXPANSION JOINT

CONSTRUCTION JOINT

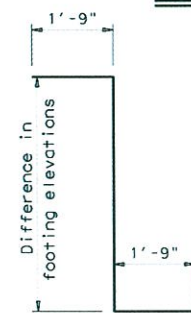


PVC WATERSTOP TYPE "A"

Note: Dimensions and shapes may vary slightly depending on manufacturer.

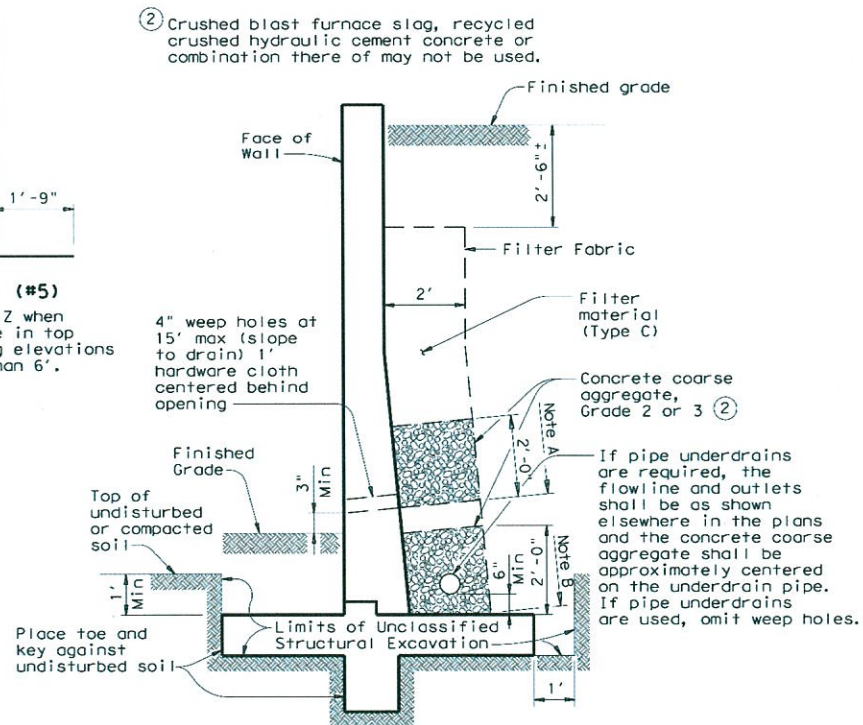


PVC WATERSTOP TYPE "B"



BARS Z (#5)

Omit Bars Z when difference in top of footing elevations is less than 6'.



DRAINAGE DETAILS AND EXCAVATION DIAGRAM

- Note A: Stop coarse aggregate at this level when weep holes are used.
Note B: Use coarse aggregate to here with filter material above when underdrains are used.

GENERAL NOTES:

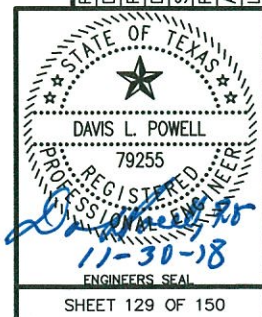
Walls are designed assuming unit weight of soil = 120 pcf, and coefficient of horizontal earth pressure = 0.33.
Walls are designed to provide a minimum factor of safety against sliding of 1.5. The undisturbed or compacted soil depth in front of walls, from bottom of Key up, shall not be less than $K_w + F_t + 1'$.
Retaining walls are detailed to be placed on grades up thru 10% with footing level, with no changes in reinforcing steel. Steeper grades can be accommodated by shortening Bars A1 and B and increasing length of legs of Bars U by the same amount. No change in Quantities will be involved.
Retaining walls may be placed on Horizontal Curves by adjusting lengths of footing Bars T and H. Minor revisions of Concrete Quantities may be required.
Designed in accordance with current AASHTO Standard and Interim Specifications.
All concrete to be Class "C".
All reinforcing steel to be Grade 60.

Texas Department of Transportation
Bridge Division

RETAINING WALL MISCELLANEOUS DETAILS

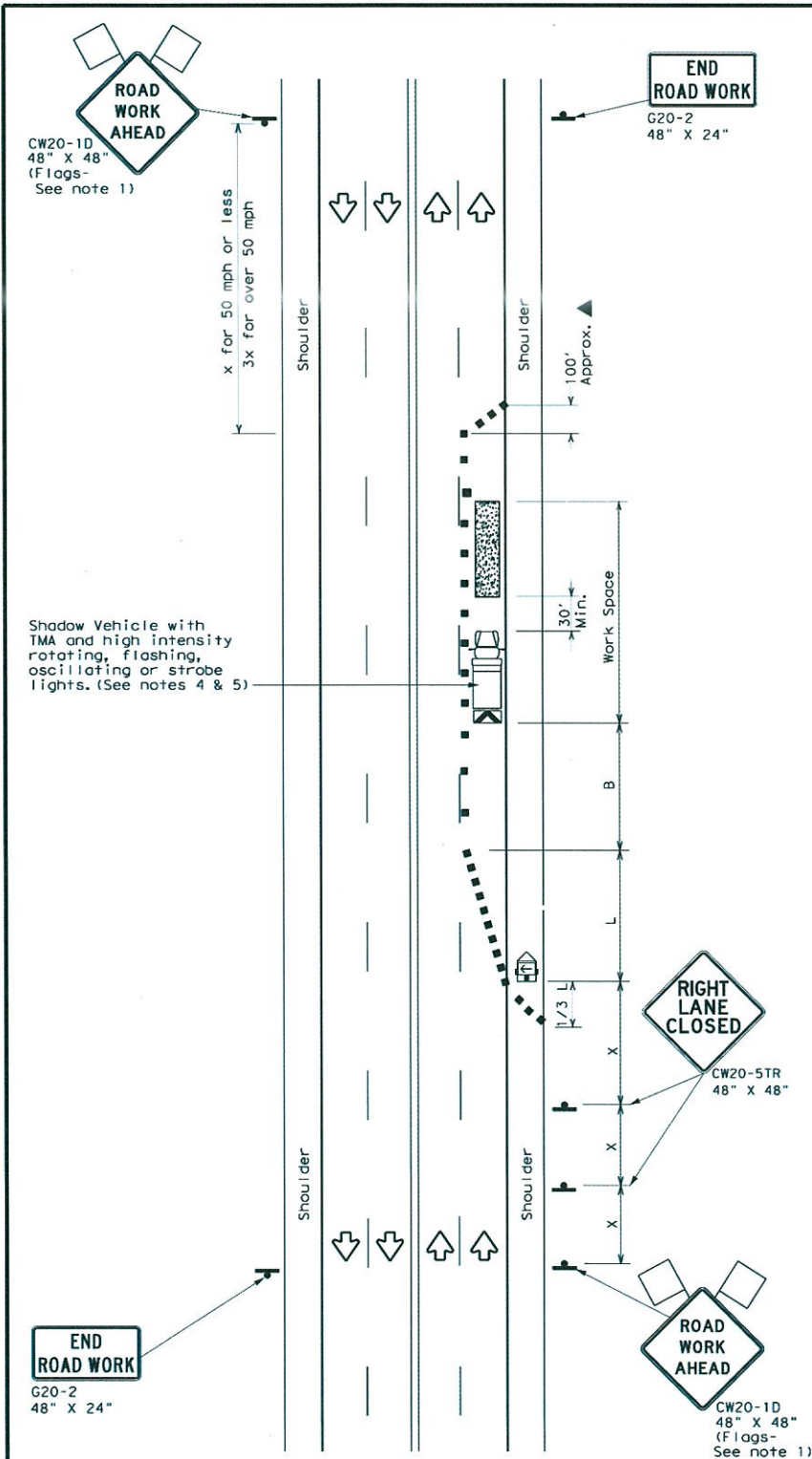
RW 2

FILE: rwsdcel1.dgn	DATE: 11/30/2018	BY: JGD	CHK: MJG
© 11/30/2018	DISTRICT: FEDERAL AID PROJECT	SHEET	
REV: 01: 11/30/2018	COUNTY: CONTROL	SECTION: JOB	HIGHWAY



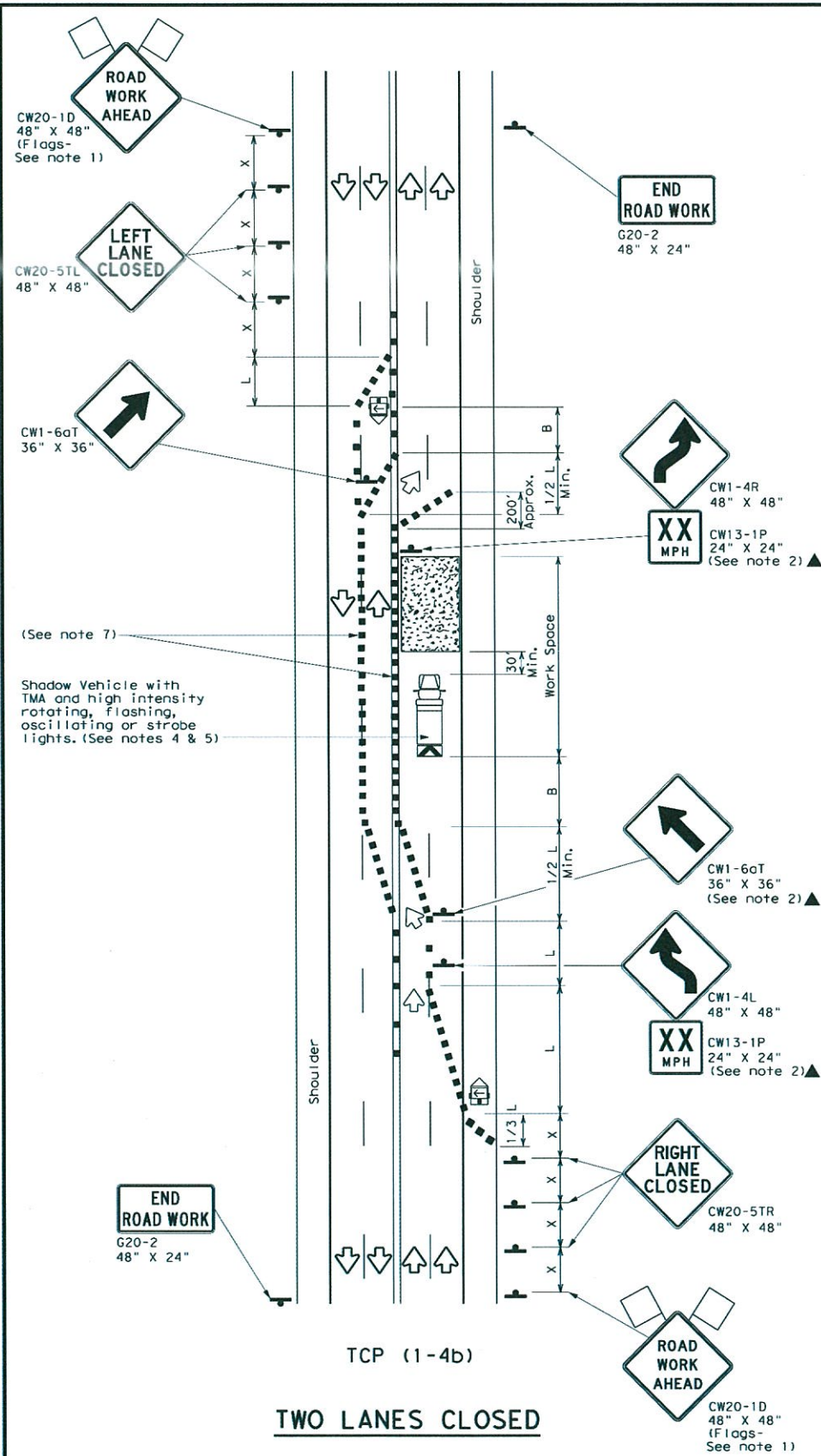
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DATE: FILE:



TCP (1-4a)

ONE LANE CLOSED



TCP (1-4b)

TWO LANES CLOSED

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

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

* 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

- Flags attached to signs where shown are REQUIRED.
- All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
- The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
- A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
- Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-4a)

- If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline where needed to protect the work space from opposing traffic with the arrow panel placed in the closed lane near the end of the merging taper.

TCP (1-4b)

- Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN

LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP (1-4) - 18

FILE:	tcp1-4-18.dgn	DN:	CK:	DR:	CR:
©	TXDOT	December 1989	CON:	SEC:	JOB:
REVISED					
2-94	4-98				
8-95	2-12				
1-97	2-18				
152					

Wichita Falls TEXAS

Blue Stiles Garden Apartments

HIKE AND BIKE TRAIL

FROM BARNETT ROAD TO SEYMOUR HWY

CWF17-444-11

TRAFFIC CONTROL PLAN - 1

TPC (1-4) - 18

PROJECT MANAGER: TW

DRAWN BY: TW

PROJECT NUMBER: CWF17-444-11

DATE: DEC 2018

SCALE: AS SHOWN

FIELD BOOK:

ACAD: XX

LAYOUT: TPC(1-4)-18

STATE OF TEXAS

DAVIS L. POWELL

79255

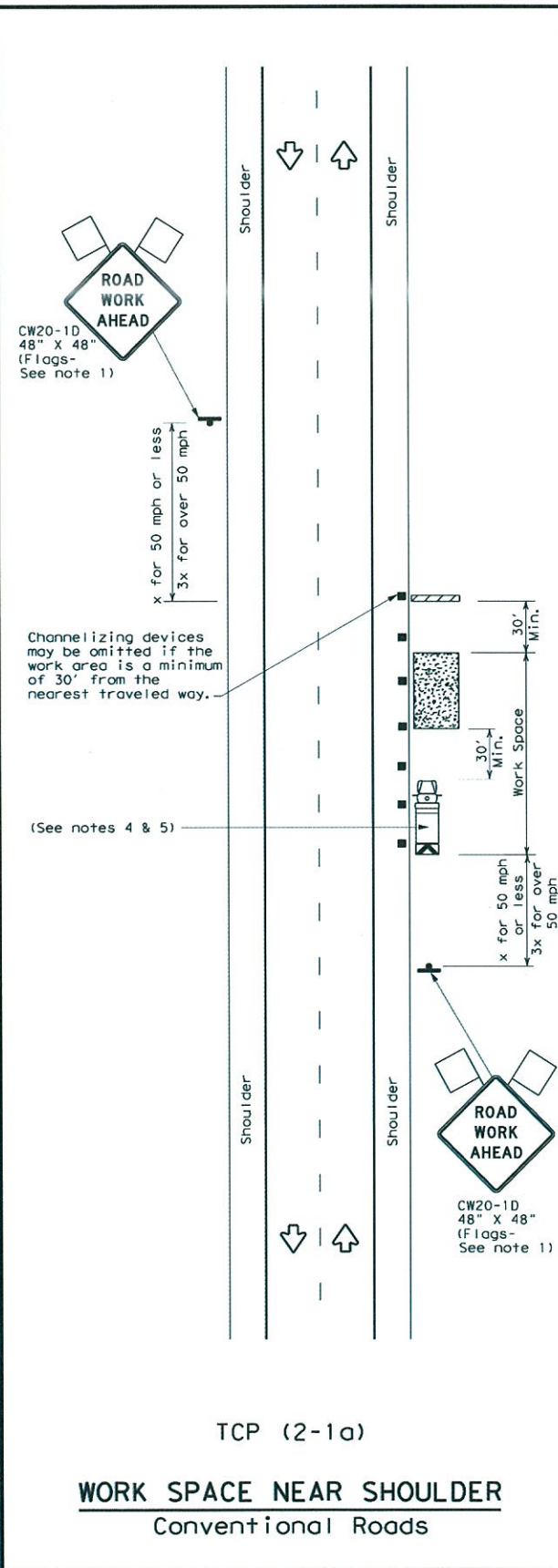
REGISTERED PROFESSIONAL ENGINEER

11-30-18

ENGINEERS SEAL

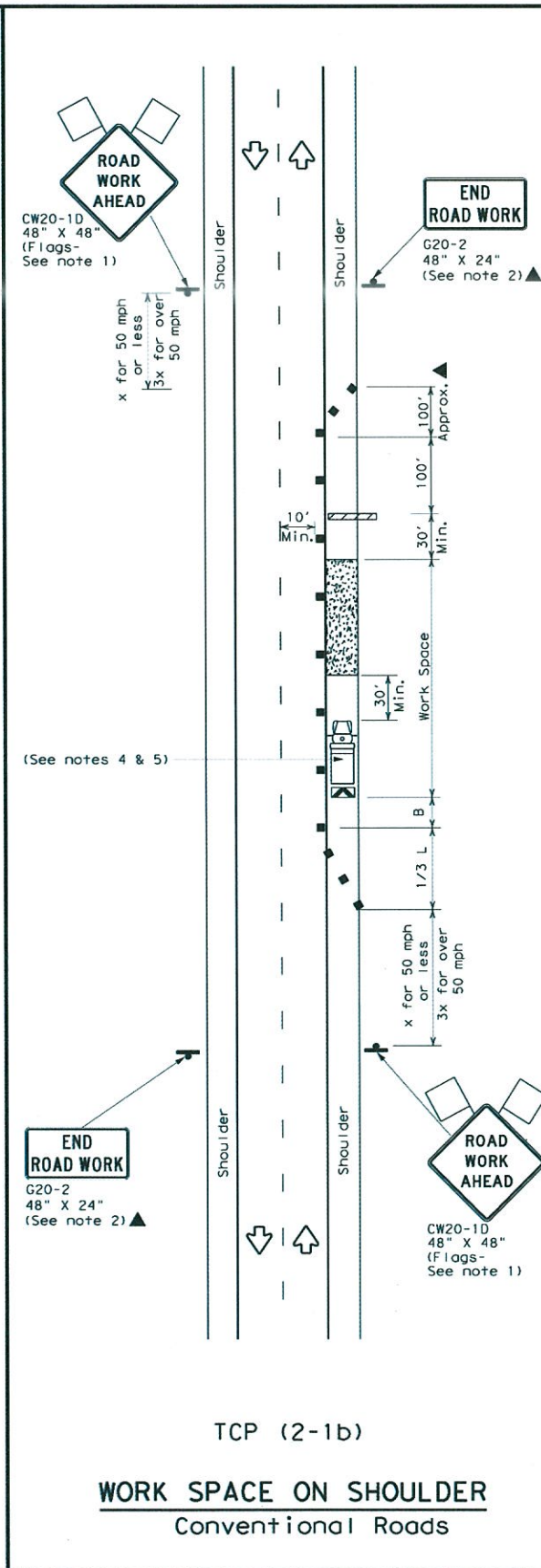
SHEET 130 OF 150

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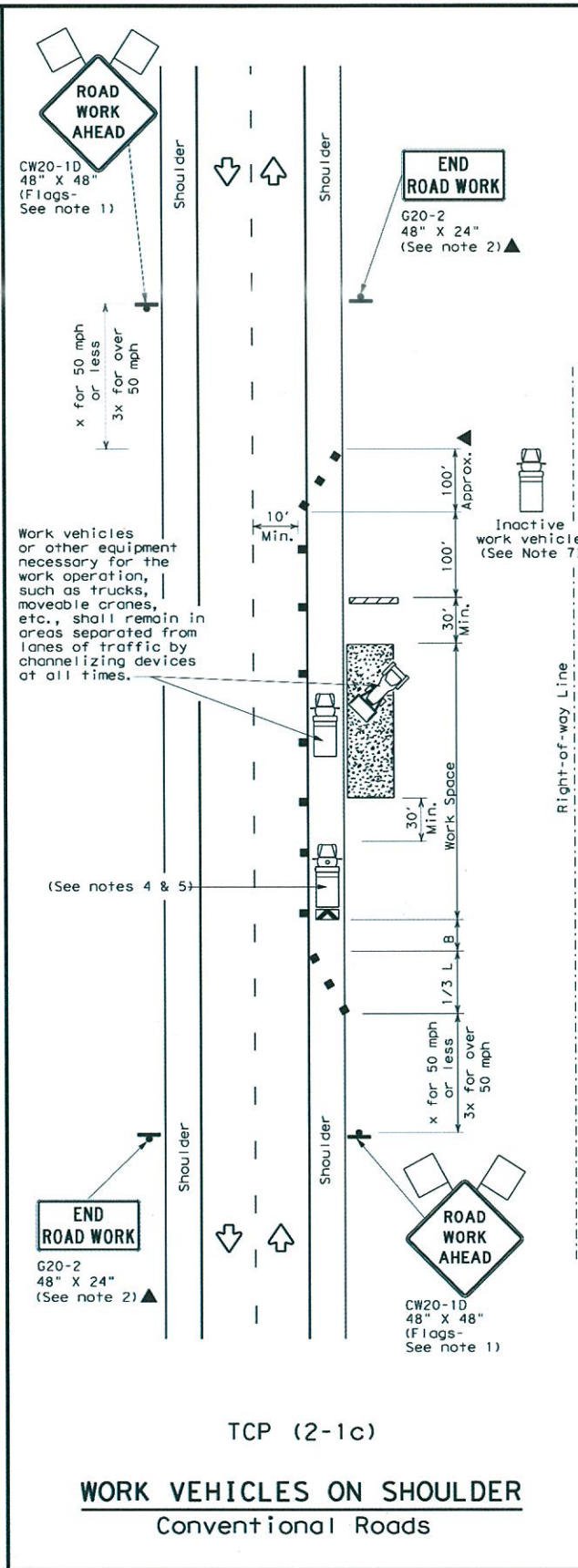
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads













TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

✖✖ Taper lengths have been rounded off.

L=Length of Taper (FT) W=Width of Offset (FT) S=Posted Speed (MPH)

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW21-10 "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.



Texas Department of Transportation

**Traffic
Operations
Division
Standard**

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP (2-1) - 18

FILE#	tcp-1-18, dg-	DN:	CR:	DR:	CR:
Ⓢ-xDT	December 1985	CONT	SECT	JOB	-12-MAY
REVIEWS					
2-94	4-98				
8-95	2-12	DIS	COUNTY		SHEET AC
1-97	2-18				

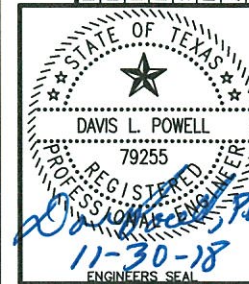
16

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

TRAFFIC CONTROL PLAN - 2
TPC (2-1) - 18

[illegible]

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX



SHEET 131 OF 150

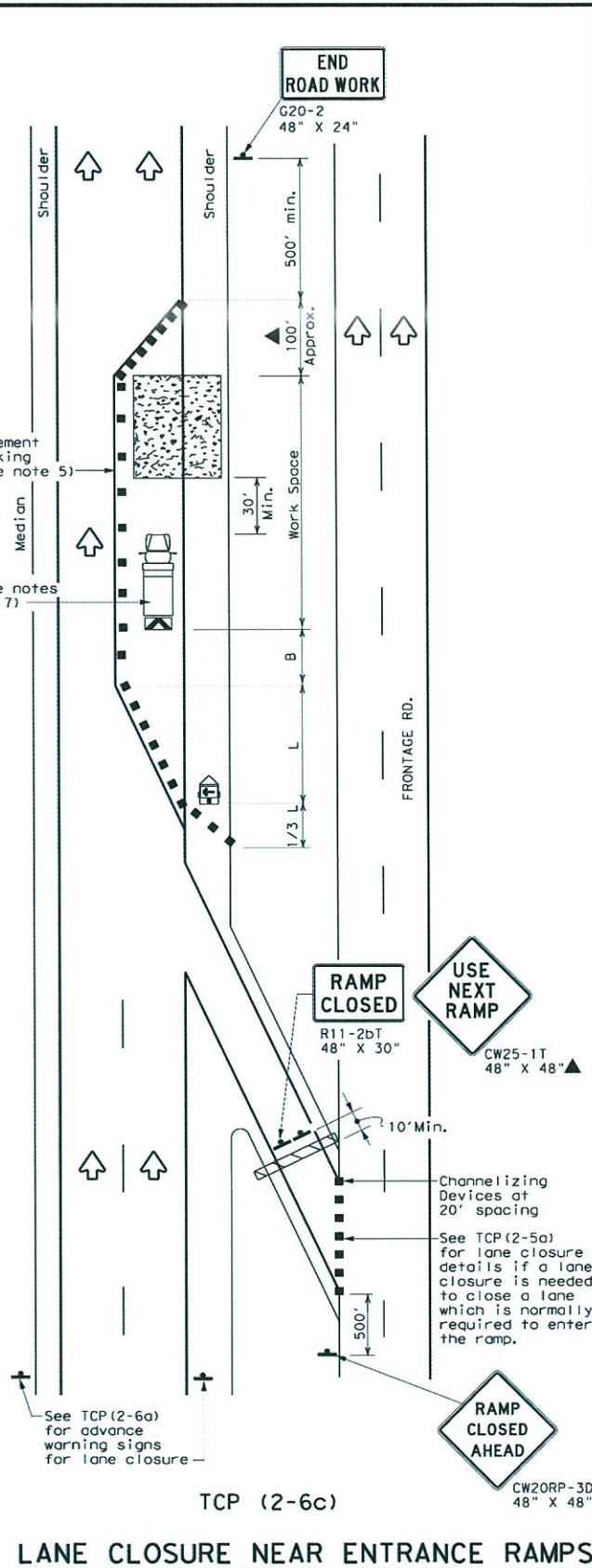
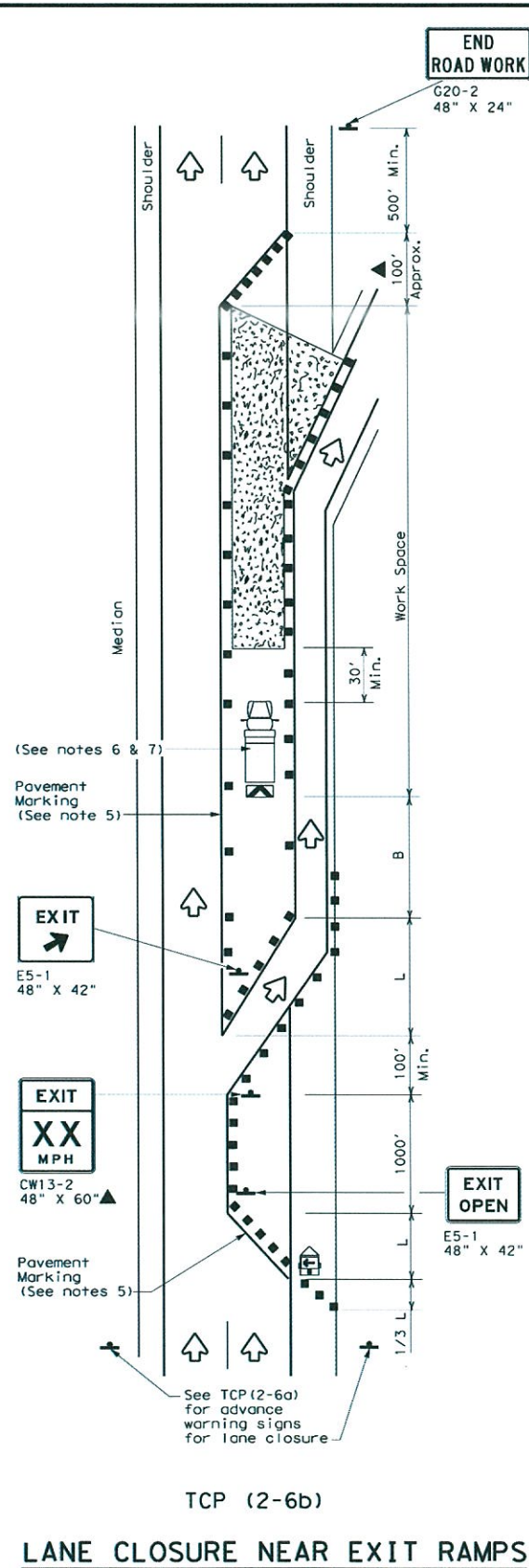
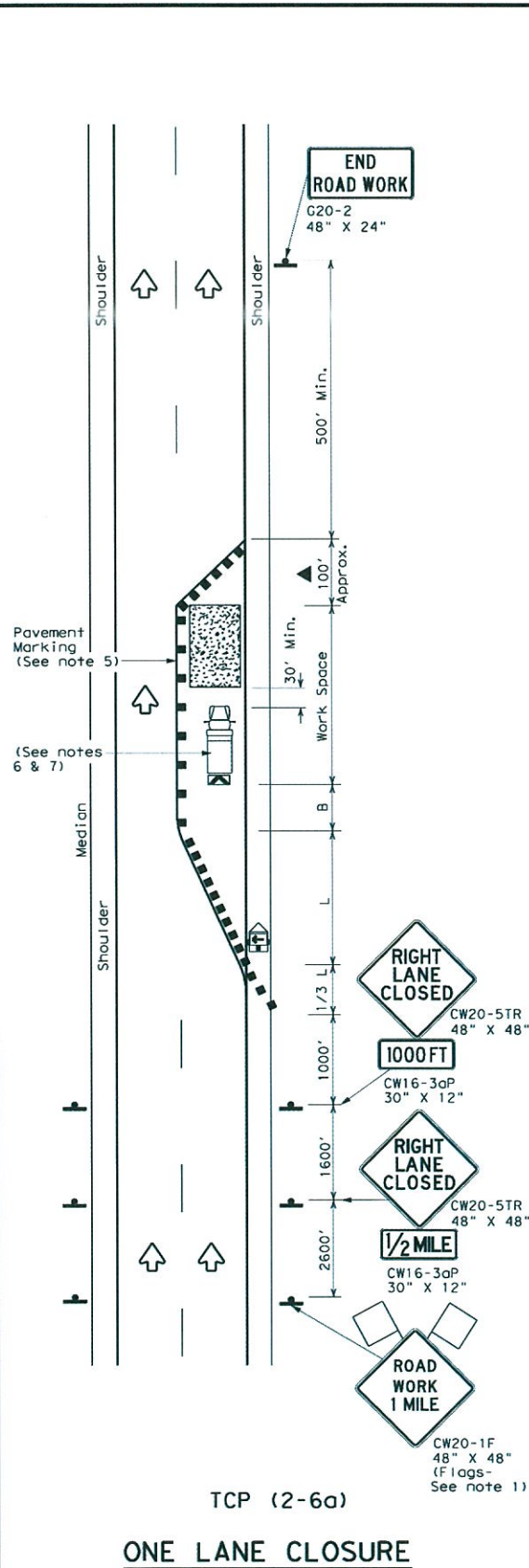
DATE:
FILE:

TCP (2-4a)

TCP (2-4b)

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DATE:
FILE:



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

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

* 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**
- Flags attached to signs where shown, are REQUIRED.
 - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
 - Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
 - Channelizing devices used along the work space or along tangent sections may be supplemented with vertical panels (VP) placed on every other channelizing device. If night time conditions make it difficult to see at least two VPs, the VPs may be placed on each channelizing device.
 - The placement of pavement markings may be omitted on intermediate-term stationary work zones with the approval of the Engineer.
 - Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
 - Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.



TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

TCP (2-6) - 18

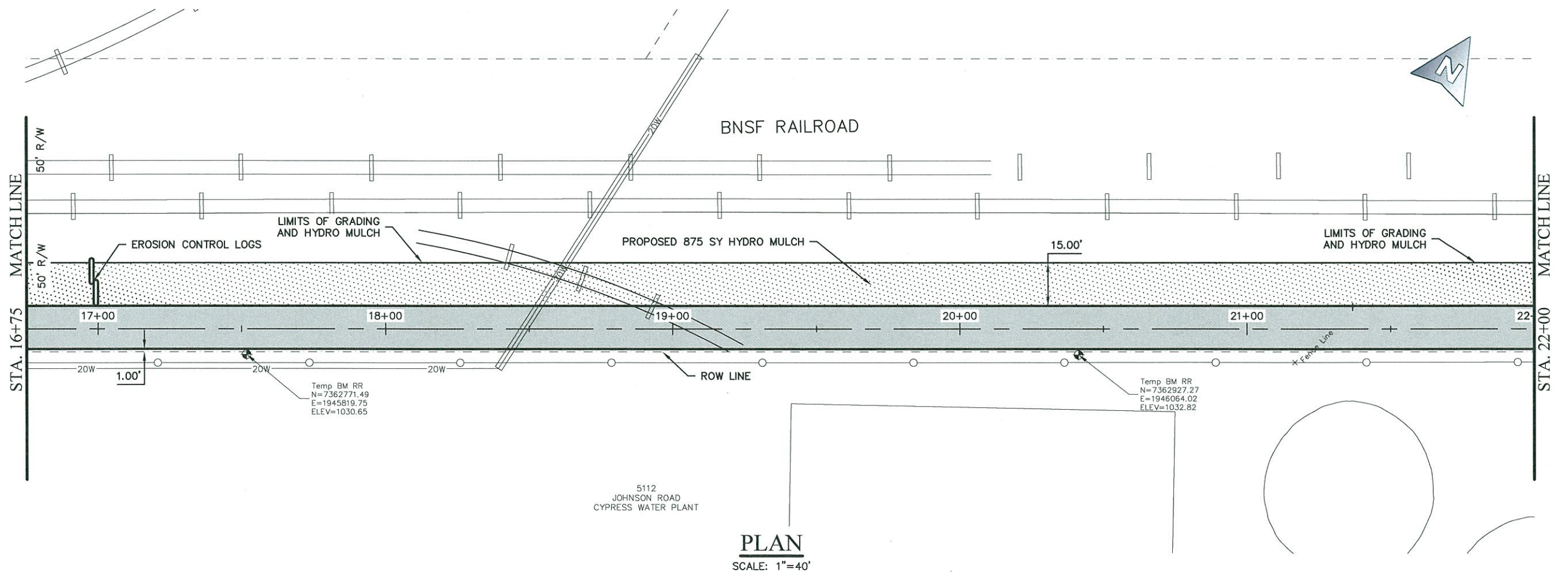
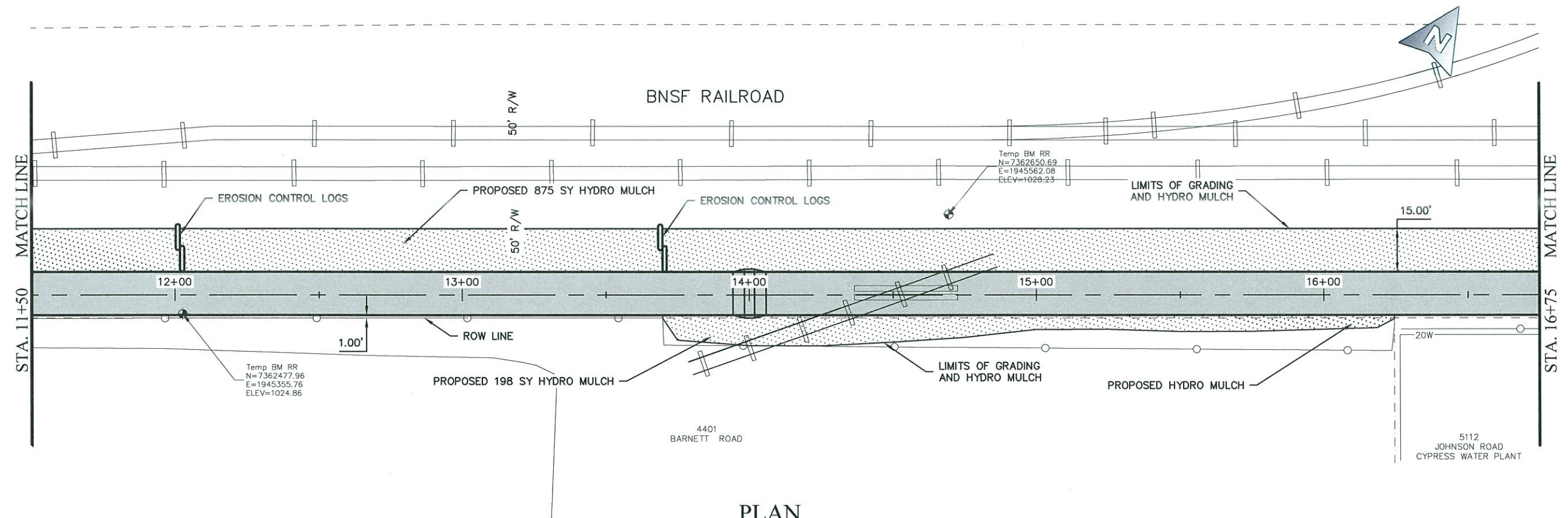
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8-95 2-12	
1-97 2-18	

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: TPC(2-6)-18

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11
TRAFFIC CONTROL PLAN - 4
TPC (2-6) - 18

STATE OF TEXAS
DAVIS L. POWELL
79255
REGISTERED PROFESSIONAL ENGINEER
11-30-18
ENGINEERS SEAL

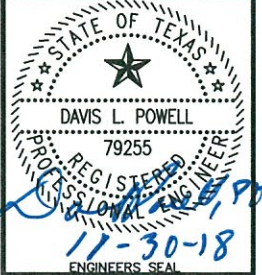
SHEET 133 OF 150

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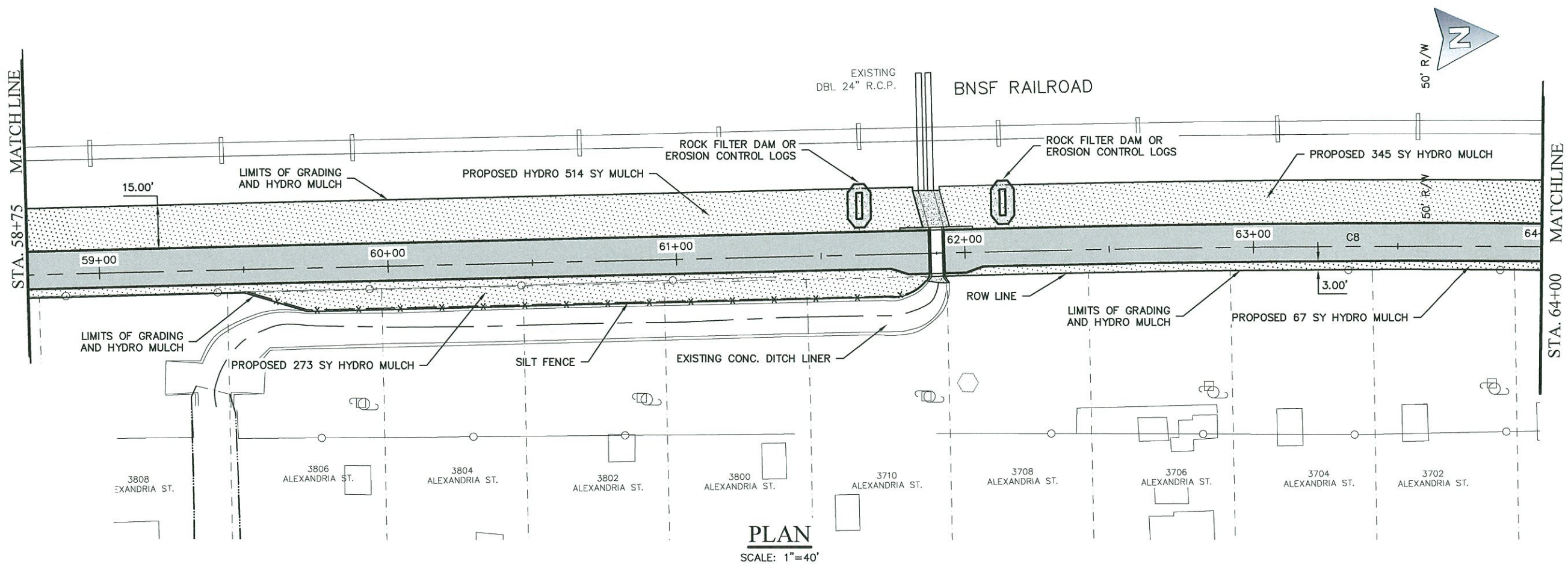
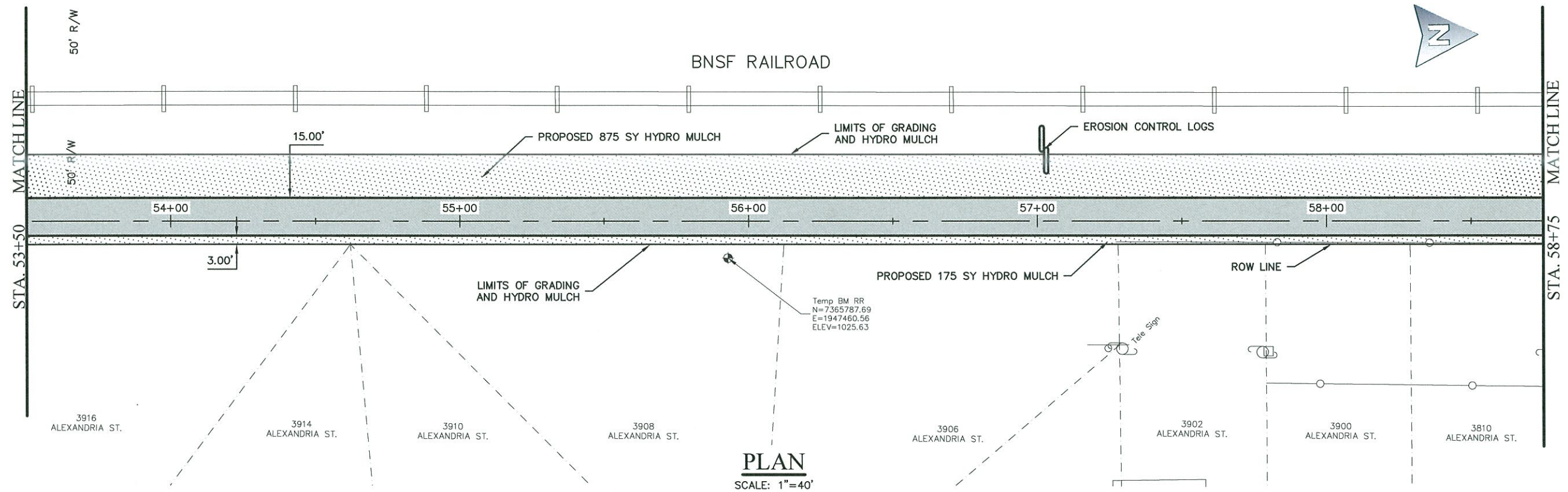
HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

EROSION CONTROL PLAN - 2
STA. 011+50 TO STA. 22+00

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: EROSION-2



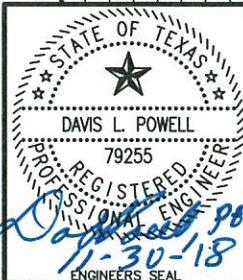
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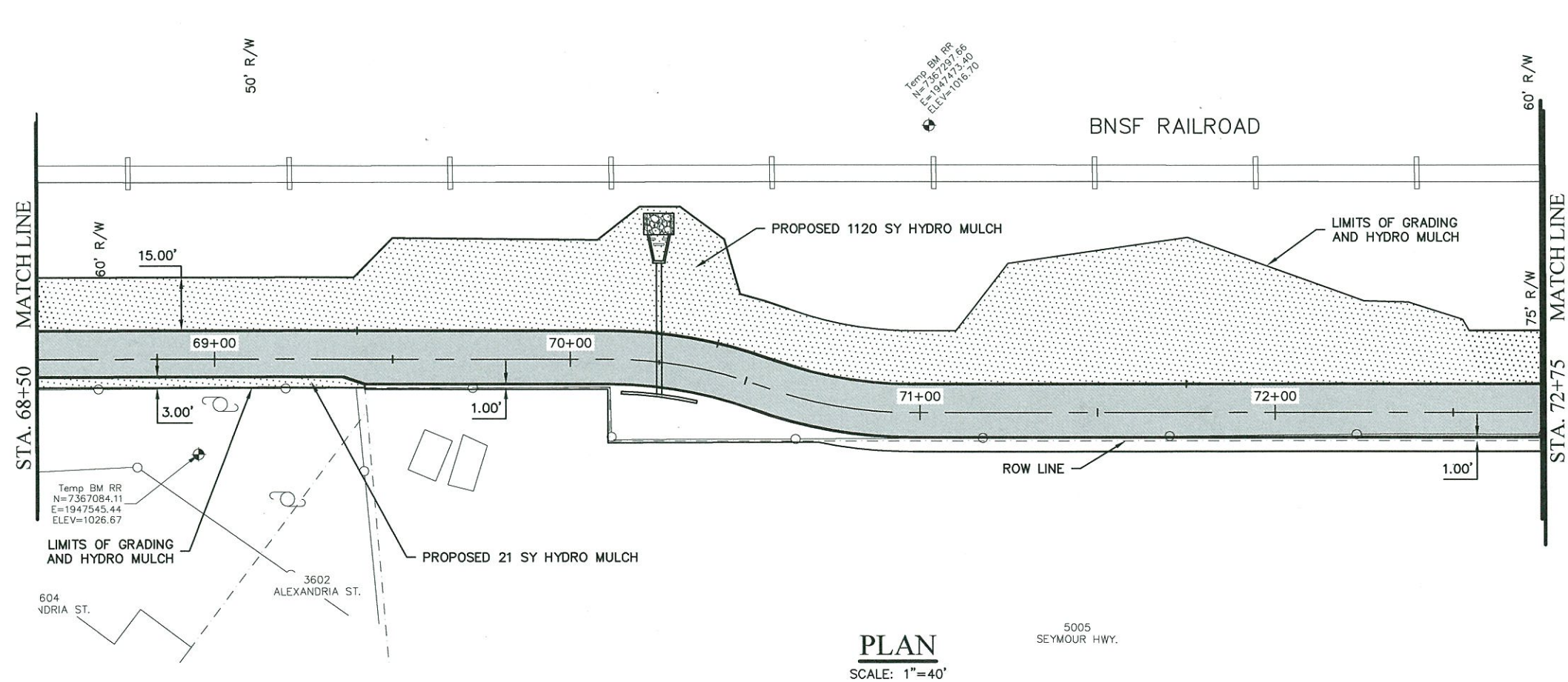
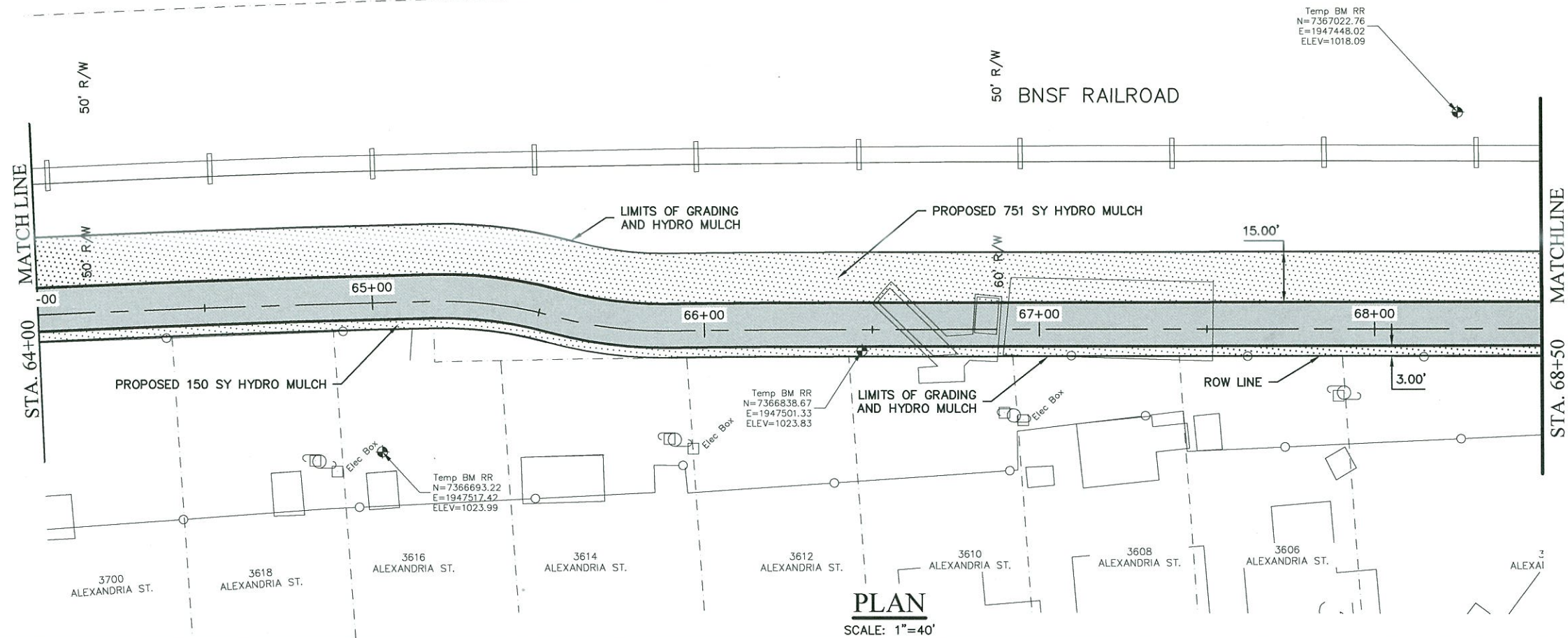
HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

EROSION CONTROL PLAN - 6
STA. 53+50 TO STA. 64+00

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: EROSION-6



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HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

EROSION CONTROL PLAN - 7
STA. 64+00 TO STA. 72+75

PROJECT MANAGER: TW
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK: XX
ACAD: XX
LAYOUT: EROSION-7



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DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1. CITY OF WICHITA FALLS

2. TEXAS DEPARTMENT OF TRANSPORTATION

☒ No Action Required ☐ Required Action

Action No.

- Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
- Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
- Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
- When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

- ☒ No Permit Required
- ☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
- ☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
- ☐ Individual 404 Permit Required
- ☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

- NONE
-
-
-

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion

- ☐ Temporary Vegetation
- ☒ Blankets/Matting
- ☒ Mulch
- ☐ Sodding
- ☐ Interceptor Swale
- ☐ Diversion Dike
- ☐ Erosion Control Compost
- ☐ Mulch Filter Berm and Socks
- ☐ Compost Filter Berm and Socks

Sedimentation

- ☒ Silt Fence
- ☒ Rock Berm
- ☐ Triangular Filter Dike
- ☐ Sand Bag Berm
- ☐ Straw Bale Dike
- ☐ Brush Berms
- ☐ Erosion Control Compost
- ☐ Mulch Filter Berm and Socks
- ☐ Compost Filter Berm and Socks
- ☐ Stone Outlet Sediment Traps
- ☐ Sediment Basins

Post-Construction TSS

- ☐ Vegetative Filter Strips
- ☐ Retention/Irrigation Systems
- ☐ Extended Detention Basin
- ☐ Constructed Wetlands
- ☐ Wet Basin
- ☐ Erosion Control Compost
- ☐ Mulch Filter Berm and Socks
- ☐ Compost Filter Berm and Socks
- ☒ Vegetation Lined Ditches
- ☐ Sand Filter Systems
- ☒ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

Action No.

-
-
-
-

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical. Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☐ No Action Required ☒ Required Action

Action No.

- IMPACTS TO VEGETATION SHOULD BE KEPT TO THE MINIMUM NECESSARY.
- TREES SHALL BE TRIMMED RATHER THAN REMOVED WHEN FEASIBLE.
- DISTURBED AREAS WOULD BE RE-VEGETATED ACCORDING TO TxDOT'S STANDARD PRACTICES FOR URBAN AREAS, WHICH TO THE EXTENT PRACTICABLE, IS IN COMPLIANCE WITH EXECUTIVE MEMORANDUM ON BENEFICIAL LANDSCAPING, IF APPLICABLE.
-

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☐ No Action Required ☒ Required Action

Action No.

- MIGRATORY BIRD TREATY ACT:** MIGRATORY BIRDS MAY ARRIVE IN THE PROJECT AREA TO BREED DURING CONSTRUCTION OF THE PROPOSED PROJECT. MEASURES WOULD BE TAKEN TO AVOID THE TAKE OF MIGRATORY BIRDS, THEIR OCCUPIED NESTS, EGGS, OR YOUNG, IN ACCORDANCE WITH THE MIGRATORY BIRD TREATY ACT, THROUGH PHASING OF WORK OR PREVENTATIVE MEASURES. BETWEEN OCTOBER 1 AND FEBRUARY 15, THE CONTRACTOR WOULD REMOVE ALL OLD MIGRATORY BIRD NESTS FROM ANY STRUCTURES THAT WOULD BE AFFECTED BY THE PROPOSED PROJECT, AND COMPLETE ANY BRIDGE WORK/DEMOLITION AND/OR VEGETATION CLEARING. IN ADDITION THE CONTRACTOR WOULD BE PREPARED TO PREVENT BIRDS MIGRATORY FROM BUILDING NESTS BY UTILIZING NEST PREVENTION METHODS, SUCH AS BIRD-DETERRENT NETTING AND BIRD-REPELLING SPRAYS AND/OR GELS, BETWEEN FEBRUARY 15 AND OCTOBER 1. IN THE EVENT THAT MIGRATORY BIRDS ARE ENCOUNTERED ON-SITE DURING PROJECT CONSTRUCTION, ADVERSE IMPACTS ON PROTECTED BIRDS, ACTIVE NESTS, EGGS, AND/OR YOUNG WOULD BE AVOIDED.
- WESTERN BURROWING OWL:** DO NOT DISTURB, DESTROY, OR REMOVE ACTIVE NESTS, INCLUDING GROUND NESTING BIRDS, DURING THE NESTING SEASON; AVOID THE REMOVAL OF UNOCCUPIED, INACTIVE NESTS, AS PRACTICABLE; PREVENT THE ESTABLISHMENT OF ACTIVE NESTS DURING THE NESTING SEASON ON TxDOT OWNED AND OPERATED FACILITIES AND STRUCTURES PROPOSED FOR THE REPLACEMENT OR REPAIR; DO NOT COLLECT, CAPTURE, RELOCATE, OR TRANSPORT BIRDS, EGGS, YOUNG, OR ACTIVE NESTS WITHOUT A PERMIT.

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used. Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act. Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

- Dead or distressed vegetation (not identified as normal)
- Trash piles, drums, canister, barrels, etc.
- Undesirable smells or odors
- Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☒ No

If "No", then no further action is required.

If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☐ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

Action No.

-
-
-


VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☐ No Action Required ☒ Required Action

Action No.

- KEEP NOISE TO A MINIMUM. REDUCE IDLING OF VEHICLES AND EQUIPMENT.
- MAINTAIN PROJECT SITE. MINIMIZE DUST AND AIRBORNE PARTICLES TO THE MAXIMUM EXTENT PRACTICAL.
- COLLECT SANITARY WASTE IN ACCORDANCE WITH LOCAL REGULATIONS BY SANITARY WASTE COLLECTOR. PORTABLE UNITS SHALL NOT BE PLACED IN OR NEAR A WATERWAY OR DRAINAGE AREA.

		Design Division Standard	
ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS			
EPIC			
FILE: epic.dgn	DN: TxDOT	CK: RG	DN: VP
©TxDOT: February 2015	CONT	SECT	JOB
REVISIONS			
12-12-2011 (DS)			
05-07-14 ADDED NOTE SECTION IV.			
01-23-2015 SECTION I - CHANGED ITEM 1122			
TO ITEM 506, ADDED GRASSY SWALES.			
DIST	COUNTY	SHEET NO.	

HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

ENVIRONMENTAL PERMITS,
ISSUES AND COMMENTS
EPIC

PROJECT MANAGER:

DRAWN BY: TW

PROJECT NUMBER: CWF17-444-11

DATE: DEC 2018

SCALE: AS SHOWN

FIELD BOOK:

ACAD: XX

LAYOUT: EPIC



\\Antares2\Share\Eng\Drawings\Terry Walters\Land Projects\2017\Trail by the Railroad\DWG\Trail.dwg, StormPolInfo, 11/30/2018 11:28:23 AM

SITE DESCRIPTION

PROJECT LIMITS:

HIKE AND BIKE TRAIL FROM BARNETT ROAD TO SEYMOUR HIGHWAY

PROJECT DESCRIPTION:

HIKE AND BIKE TRAIL FROM BARNETT ROAD TO SEYMOUR HIGHWAY

THE CONSTRUCTION OF A NEW CONCRETE HIKE AND BIKE TRAIL AND ASSOCIATED WORK

MAJOR SOIL DISTURBING ACTIVITIES:

EXCAVATION AND EMBANKMENT

EFFECTS ON ENDANGERED SPECIES:

NONE

EFFECTS ON NATIONAL REGISTER LISTED PROPERTIES:

NONE

TOTAL PROJECT AREA:

6.70 ACRES

TOTAL AREA TO BE DISTURBED:

6.70 ACRES

WEIGHTED RUNOFF COEFFICIENT

(BEFORE CONSTRUCTION): N/A

(AFTER CONSTRUCTION): N/A

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

EXISTING GRASS AREA AND BARE SPOTS THAT WILL BE COVERED WITH A 10' TO 14' WIDE CONCRETE SIDEWALK

NAME OF RECEIVING WATERS:

LOCAL DITCHES AND STORM SEWER DRAINS INTO THE WICHITA RIVER OR HOLLIDAY CREEK AND THEN INTO THE WICHITA RIVER.

THE WICHITA RIVER IS A TRIBUTARY OF THE RED RIVER AT STREAM SEGMENT 0204.

STORM WATER MANAGEMENT:

STORM WATER WILL CONTINUE TO FLOW IN EXISTING WATERWAYS.

PROPOSED DEVICES ARE INTENDED ONLY TO MINIMIZE EROSION AND CONTAMINANT CONTENT.

SOIL STABILIZATION PRACTICES:

TEMPORARY SEEDING

☒ PERMANENT PLANTING, SODDING, OR SEEDING

☒ MULCHING

☒ SOIL RETENTION BLANKET

☒ BUFFER ZONES

☒ PRESERVATION OF NATURAL RESOURCES

OTHER:

DISTURBED AREAS ON WHICH CONSTRUCTION ACTIVITY HAS CEASED (TEMPORARILY OR PERMANENTLY) SHALL BE STABILIZED WITHIN 14 DAYS UNLESS ACTIVITIES ARE SCHEDULED TO RESUME AND DO WITHIN 21 DAYS.

STRUCTURAL PRACTICES:

☒ SILT FENCES

☒ HAY BALES

☒ ROCK BERMS

☒ DIVERSION, INTERCEPTOR, OR PERIMETER DIKES

☒ DIVERSION DIKE AND SWALE COMBINATIONS

☒ PIPE SLOPE DRAINS

☒ PAVED FLUMES

☒ ROCK BEDDING AT CONSTRUCTION EXIT

☒ TIMBER MATTING AT CONSTRUCTION EXIT

☒ CHANNEL LINERS

☒ SEDIMENT TRAPS

☒ SEDIMENT BASINS

☒ STORM INLET SEDIMENT TRAP

☒ STONE OUTLET STRUCTURES

☒ CURBS AND GUTTERS

☒ STORM SEWERS

☒ VELOCITY CONTROL DEVICES

OTHER:

POST-CONSTRUCTION TSS CONTROL:

☒ RETENTION/IRRIGATION

☒ EXTENDED DETENTION BASIN

☒ VEGETATIVE FILTER STRIPS

☒ CONSTRUCTED WETLANDS

☒ WET BASINS

☒ COMPOST FILTER BERMS

NARRATIVE – SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

THE ORDER OF ACTIVITIES WILL BE AS FOLLOWS:

1. ALL TOPSOIL IN AREAS TO BE EXCAVATED WILL BE BLADED BACK OR STOCKPILED FOR FUTURE USE.

2. AREAS DISTURBED DURING EARTHWORK CONSTRUCTION WILL BE RESEED WHEN CONSTRUCTION OPERATIONS ARE COMPLETED OR AS DIRECTED BY THE ENGINEER

EROSION AND SEDIMENT CONTROLS

OTHER EROSION AND SEDIMENT CONTROLS:

MAINTENANCE:

ALL EROSION AND SEDIMENT CONTROLS WILL BE MAINTAINED IN GOOD WORKING ORDER. IF REPAIR IS NECESSARY, IT WILL BE DONE 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. THE AREAS ADJACENT TO CREEKS AND DRAINAGE WAYS SHALL HAVE PRIORITY FOLLOWED BY DEVICES PROTECTING STORM SEWER INLETS.

INSPECTION:

AN INSPECTION WILL BE PERFORMED BY A CITY INSPECTOR EVERY 7 DAYS AS WELL AS AFTER EVERY HALF INCH OR MORE OF A RAIN AS RECORDED ON A RAIN GAUGE TO BE LOCATED AT THE PROJECT SITE. AN INSPECTION AND MAINTENANCE REPORT WILL BE MADE PER EACH INSPECTION. BASED ON THE INSPECTION RESULTS, THE CONTROLS SHALL BE REVISED PER THE INSPECTION REPORT.

WASTE MATERIALS:

ALL TRASH AND WASTE MATERIALS WILL BE COLLECTED AND STORED IN A LEAKPROOF, SECURELY LIDDED METAL CONTAINER CONFORMING TO STATE AND LOCAL SOLID WASTE MANAGEMENT REGULATIONS. THE CONTAINER(S) WILL BE EMPTIED AS NECESSARY OR REQUIRED AND THE CONTENTS DELIVERED TO A LOCAL DUMP. NO CONSTRUCTION WASTE WILL BE BURIED WITHIN THE RIGHT OF WAY. NO PAYMENT WILL BE MADE FOR DISPOSAL OF TRASH AND WASTE MATERIALS AS DESCRIBED. THIS ACTIVITY WILL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING):

IN GENERAL, PRODUCTS IN THE FOLLOWING CATEGORIES ARE CONSIDERED TO BE HAZARDOUS: PAINTS, ACIDS, SOLVENTS, CONCRETE CURING COMPOUND, ASPHALT PRODUCTS AND PETROLEUM PRODUCTS. IN THE EVENT OF A SPILL WHICH MAY BE HAZARDOUS, THE SPILL COORDINATOR SHOULD BE CONTACTED IMMEDIATELY.

SANITARY WASTE:

SANITARY WASTE WILL BE COLLECTED FROM PORTABLE UNITS AS NECESSARY OR REQUIRED BY A LICENSED SANITARY WASTE MANAGEMENT CONTRACTOR. IN AS MUCH AS THIS IS ALREADY STANDARD INDUSTRY PRACTICE, NO ADDITIONAL PAYMENT FOR COMPLIANCE WILL BE MADE.

OFFSITE VEHICLE TRACKING:

☒ HAUL ROADS DAMPENED FOR DUST CONTROL

☒ LOADED HAUL TRUCKS TO BE COVERED WITH TARPULIN

☒ EXCESS DIRT ON ROAD REMOVED DAILY

☒ STABILIZED CONSTRUCTION ENTRANCE

OTHER:

REMARKS:

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

ALL WATERWAYS SHALL BE CLEARED AS SOON AS PRACTICABLE OF TEMPORARY EMBANKMENTS, FALSEWORK, PILING, DEBRIS, TEMPORARY BRIDGES, MATTING, PILING, DEBRIS OR OTHER OBSTRUCTIONS PLACED DURING CONSTRUCTION OPERATIONS THAT ARE NOT A PART OF THE FINISHED WORK.

STORMWATER POLLUTION PREVENTION INFORMATION

PROJECT MANAGER:

DRAWN BY: TW

PROJECT NUMBER: CWF17-444-11

DATE: DEC 2018

SCALE: AS SHOWN

FIELD BOOK:

ACAD: XX

LAYOUT: STORMPOLINFO

HIKE AND BIKE TRAIL FROM BARNETT ROAD TO SEYMOUR HWY CWF17-444-11

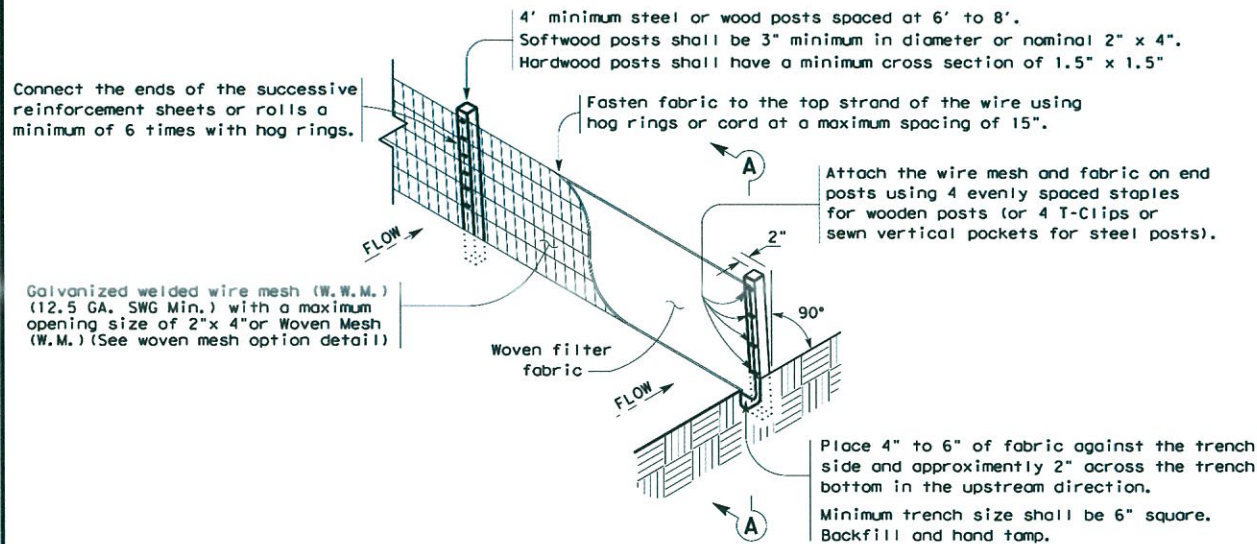
STORMWATER POLLUTION PREVENTION INFORMATION

STATE OF TEXAS
DAVIS L. POWELL
79255
REGISTERED PROFESSIONAL ENGINEER
11-30-18
ENGINEER'S SEAL

SHEET 144 OF 150

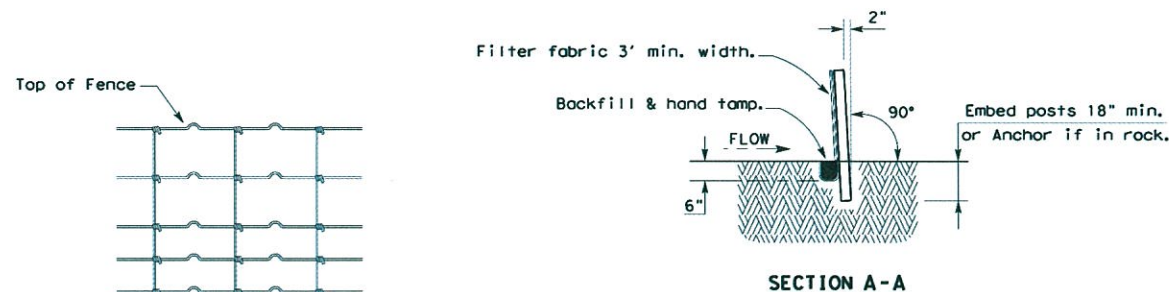
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DATE
FILE



TEMPORARY SEDIMENT CONTROL FENCE

SCF



HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA. SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

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 maximum flow through rate of 100 GPM/FT². Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

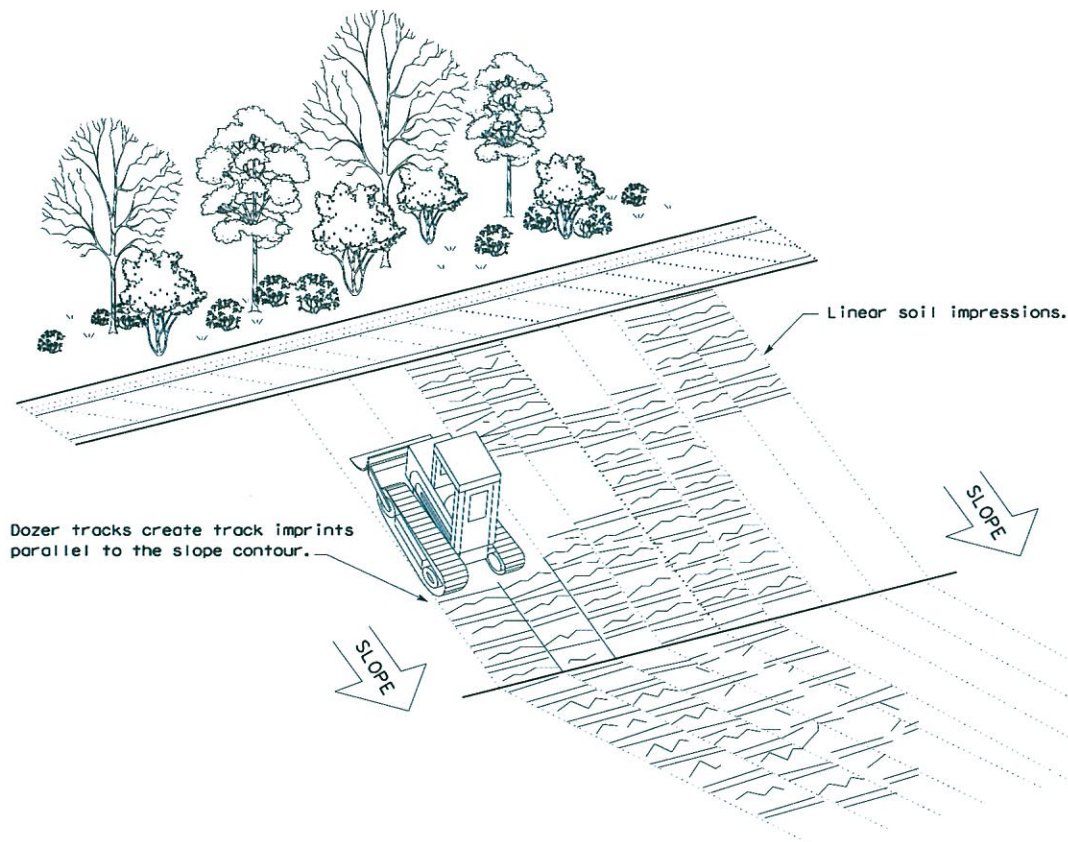
LEGEND

Sediment Control Fence

SCF

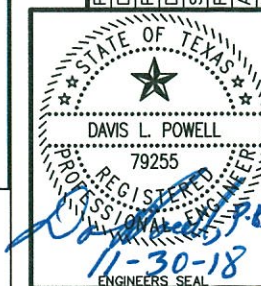
GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continuous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



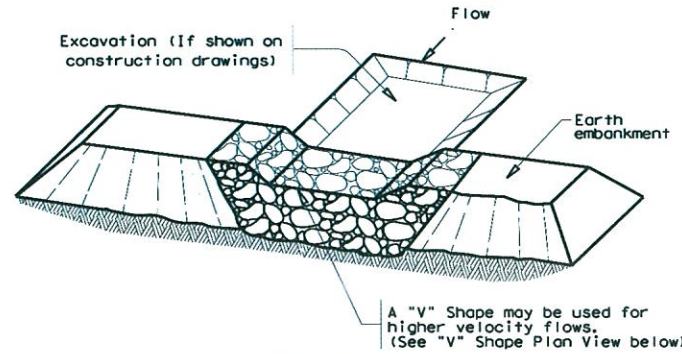
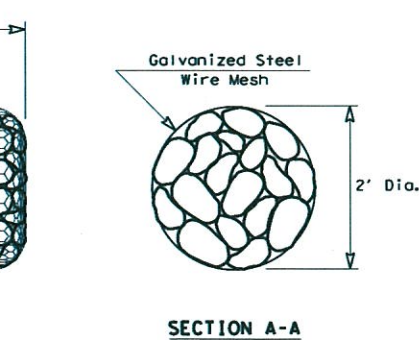
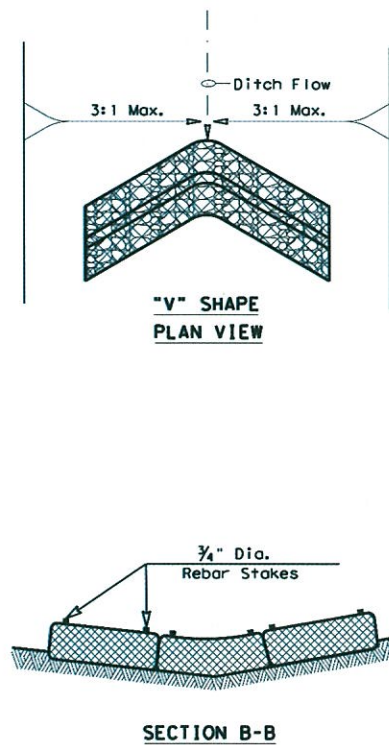
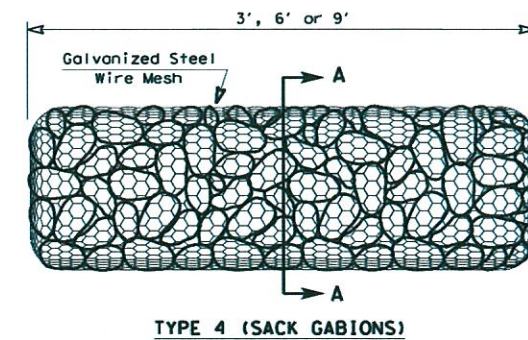
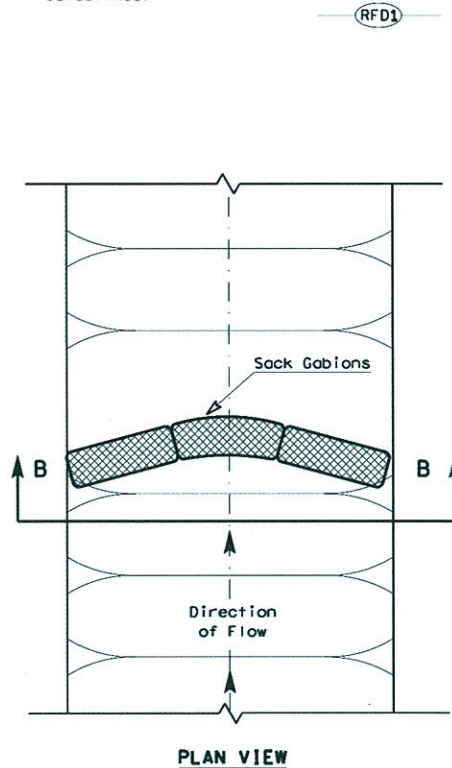
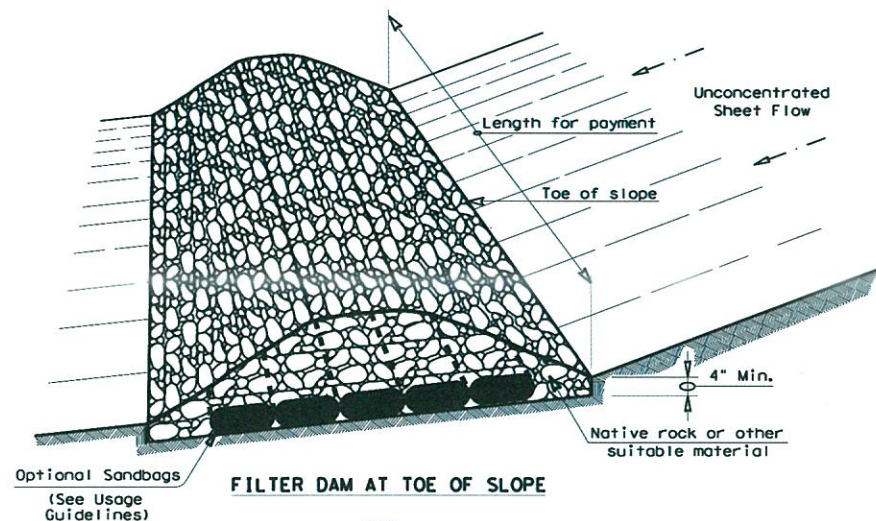
VERTICAL TRACKING

Texas Department of Transportation		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES			
FENCE & VERTICAL TRACKING			
EC(1)-16			
FILE: ec116	DW: TxDOT	CK: KM	DW: VP
© TxDOT: JULY 2016	CONF: SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY	SHEET NO.

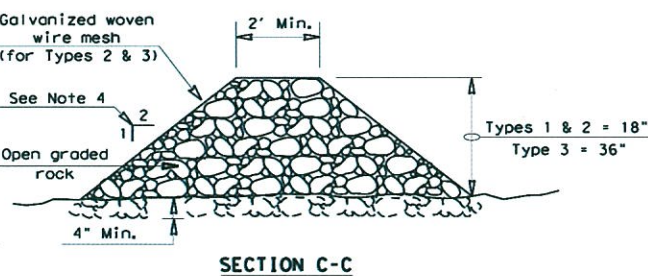
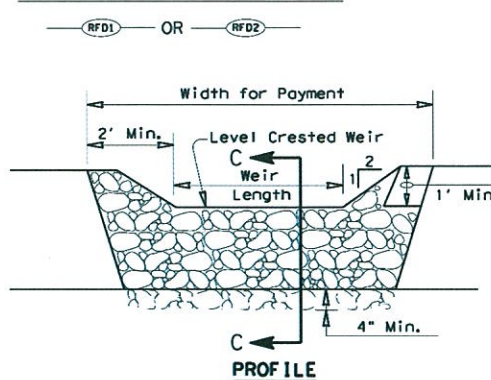


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DATE: FILE:



FILTER DAM AT SEDIMENT TRAP



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/FT² of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

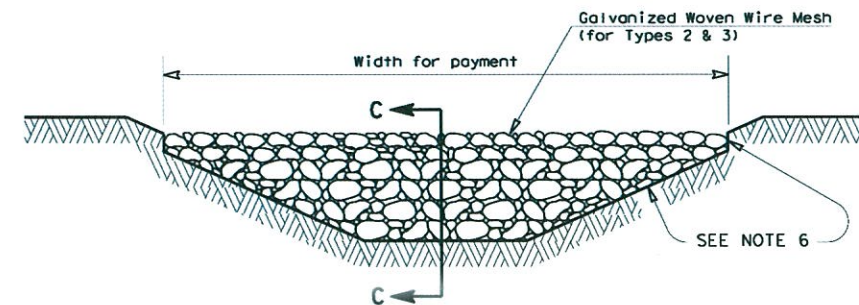
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximately 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) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

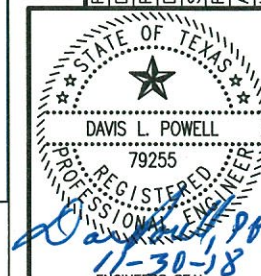
GENERAL NOTES

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. For 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 3/4" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 1/2" x 3 1/4".
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.

PLAN SHEET LEGEND

- Type 1 Rock Filter Dam — RFD1 —
Type 2 Rock Filter Dam — RFD2 —
Type 3 Rock Filter Dam — RFD3 —
Type 4 Rock Filter Dam — RFD4 —

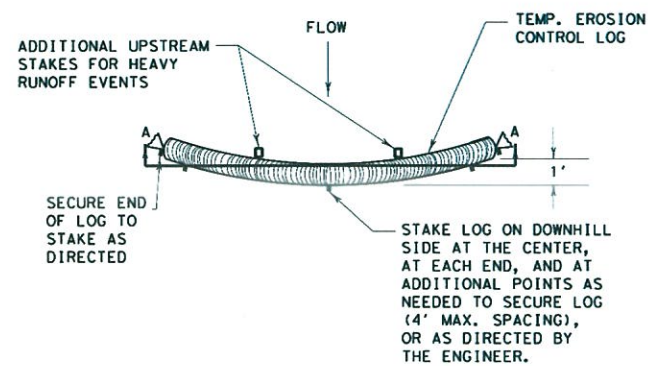
Texas Department of Transportation		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES			
ROCK FILTER DAMS			
EC(2)-16			
FILE: ec216	DATE: JULY 2016	CON: TxDOT	SECT: KM
© TxDOT: JULY 2016	REVISIONS	JOB	HIGHWAY
DIST		COUNTY	SHEET NO.



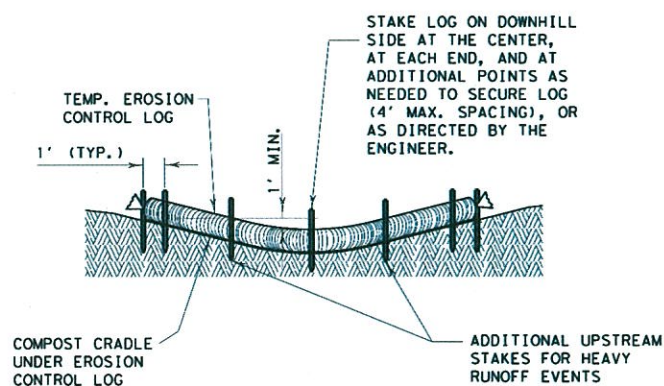
DATE: \$DATE\$
FILE: \$FILES\$

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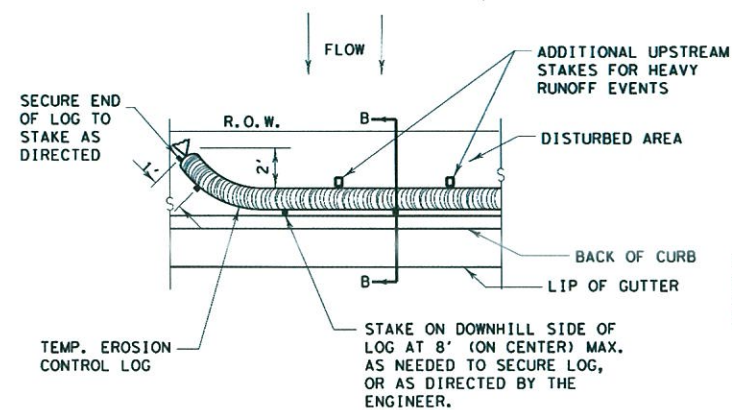
PLAN VIEW



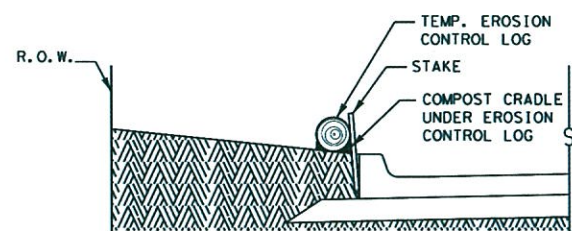
SECTION A-A
EROSION CONTROL LOG DAM

LEGEND

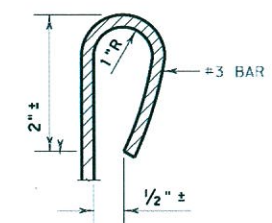
- CL-D EROSION CONTROL LOG DAM
- CL-BOC EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI EROSION CONTROL LOG AT DROP INLET
- CL-CI EROSION CONTROL LOG AT CURB INLET
- CL-GI EROSION CONTROL LOG AT CURB & GRATE INLET



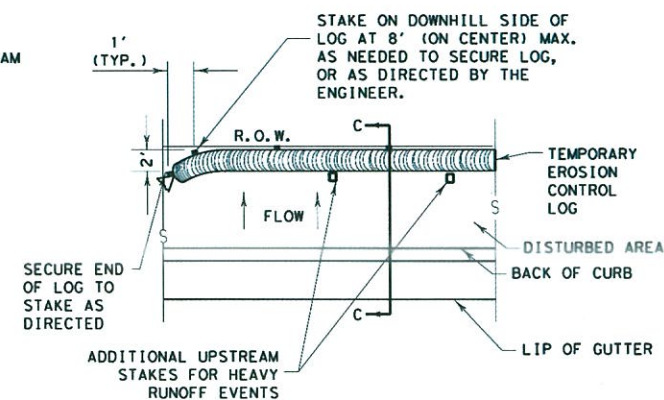
PLAN VIEW



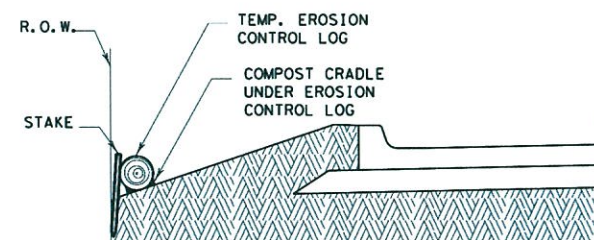
SECTION B-B
EROSION CONTROL LOG AT BACK OF CURB



REBAR STAKE DETAIL

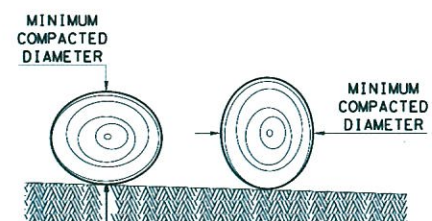


PLAN VIEW



SECTION C-C
EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

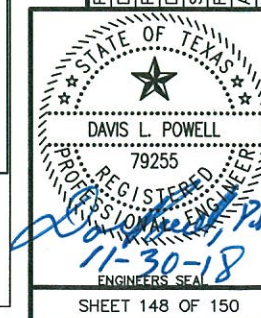
1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

SHEET 1 OF 3

Texas Department of Transportation		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES EROSION CONTROL LOG EC(9)-16			
FILE: ec916	DW: TxDOT	CK: KM	DW: LS/PT
© TxDOT: JULY 2016	CONT	SECT	JOB
REVISIONS	DIST	COUNTY	SHEET NO.



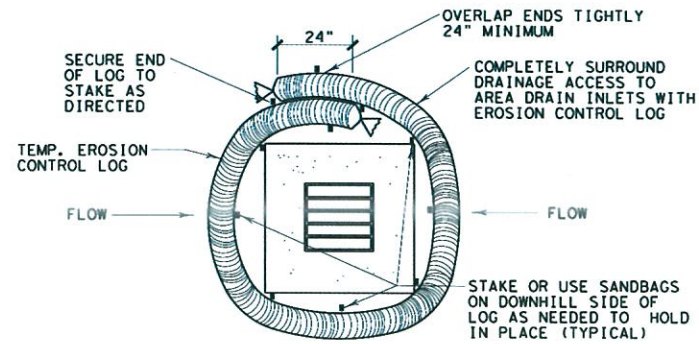
DATE:
FILE:

SHEET 149 OF 150

\\Antares\Share\Eng\Drawings\Terry Walters\Land Projects\2017\Trail by the Railroad\DWG\trail.dwg, EC(9)-16-3, 11/30/2018 11:34:53 AM

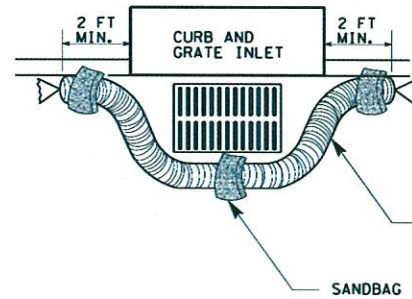
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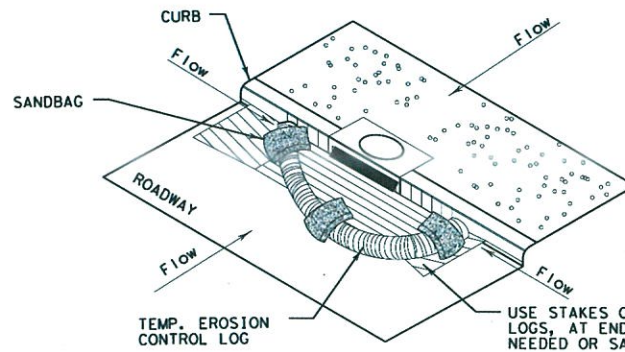
EROSION CONTROL LOG AT DROP INLET

CL-DI



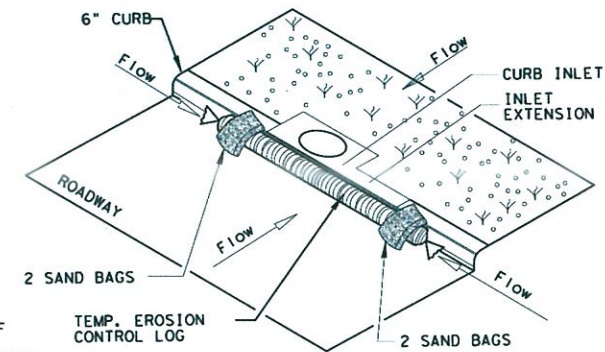
EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



EROSION CONTROL LOG AT CURB INLET

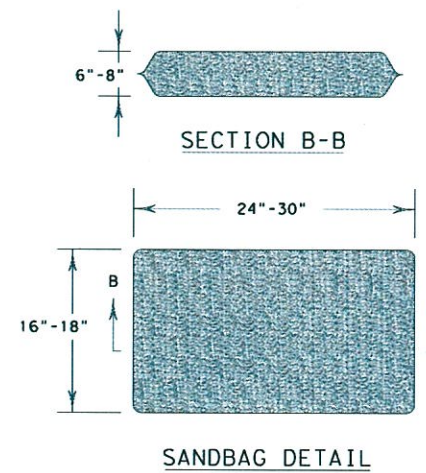
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

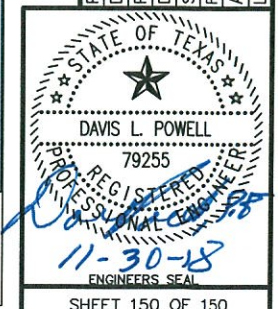
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



SANDBAG DETAIL

SHEET 3 OF 3

		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES			
EROSION CONTROL LOG			
EC (9) - 16			
FILE: ec916	DW: TxDOT	CK: RM	DW: LS/PT
© TxDOT: JULY 2016	CONT: SEC1	JOB: HIGHWAY	CK: LS
REVISIONS		DIST	COUNTY
		SHEET NO.	



HIKE AND BIKE TRAIL
FROM BARNETT ROAD TO SEYMOUR HWY
CWF17-444-11

EROSION CONTROL LOG - 3
EC (9) - 16

PROJECT MANAGER:
DRAWN BY: TW
PROJECT NUMBER: CWF17-444-11
DATE: DEC 2018
SCALE: AS SHOWN
FIELD BOOK:
ACAD: XX
LAYOUT: EC(9)-16-3

NO.	DATE	DESCRIPTION	BY

