



August 7, 2023
AVO 37449

Ms. Ramie Hammonds
Development Services
City of Sanger
PO Box 1729
Sanger, Texas 76226

Re: Dollar General Final Plat and Construction Plans
First Review

Dear Ms. Hammonds:

The City of Sanger requested Halff Associates, Inc. review the Dollar General Final Plat and Construction Plans prepared by Triangle Engineering LLC. dated June 21, 2023. We have completed our review and have the following comments:

Final Plat:

1. Dedicate the necessary drainage, water, and access easements. The drainage easement should encompass the proposed storm drain and overflow paths between the west and east property lines. The water easement should be provided for the proposed water meters and fire hydrant. The access easement should include the proposed fire lane and extend to the north property line.
2. Denton County Master Throughfare Plan indicates FM 2450 classified as a Major Arterial with 140' right of way at the intersection. This requires 45' of right of way to be dedicated.

Construction Plans

Cover Sheet:

3. Include signature block for City.

Site Plan:

4. Show proposed easements on site plan.
5. Provide sidewalk FM 2450 frontage.
6. Locate fire hydrant within 100 feet of building fire department connection.
7. Denton County requires a fire department turn around for fire lanes over 150 feet long. The turnaround may be a 120' hammerhead, 60' Y, or 96' diameter cul de sac.
8. Denton County requires a minimum 30' internal and 50' external radius on all fire lanes.
9. Provide plans for TxDOT driveway and utility permit application.

Grading Plan:

10. The building code requires (IBC 2018 1804.4 Site Grading) The ground immediately adjacent to the foundation shall be sloped away from the building at a slope of not less than one unit vertical in 20 units horizontal (5%) for a minimum distance of 10' measured perpendicular to the face of the wall. If this is not physically possible, a 5% slope shall be provided to an approved alternate method of draining. Swales used for this purpose shall be sloped not less than 2% when located within 10' of the building foundation. Confirm grading on north side of building.
11. Parkway and driveway shall have a 2% slope to the road. Grading in TxDOT right of way must be approved with driveway permit.
12. Grading plan discharges surface drainage over the wall on the south side of the site. Consider regrading the area to drain east, add an inlet, or demonstrate no adverse impact for discharge.
13. Confirm south retaining wall original grade elevation.

Erosion Control:

14. Provide erosion control on east discharge point and west incommoding point adequate for designed discharge. Silt fence is not adequate for areas greater than 2 acres.

Paving Plan:

15. Provide paving compressive strength requirements and subgrade treatment.

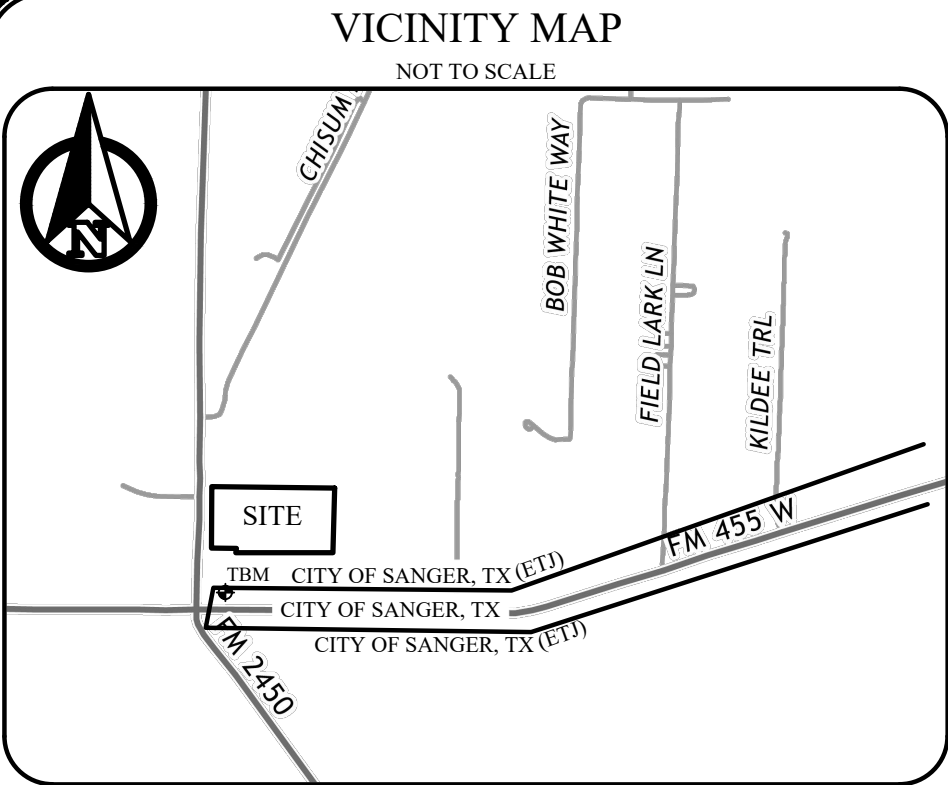
Paving Details:

16. Subdivision Regulations 10.106(B) requires minimum commercial road paving thickness with either 4000 PSI or 4500 PSI compressive strength for machine or hand placed concrete respectfully.
17. Provide geotechnical report to document pavement thicknesses and subgrade treatments below City recommended minimums.
18. Verify variable height block wall excavation and backfill will not encroach onto adjacent property.

The Engineer shall revise the construction plans in accordance with the above comments and/or provide a written response that addresses each comment. If you have any questions or need additional information, please do not hesitate to call me at (817) 764-7472.

Sincerely,
HALFF

Dennis W. Haar, P.E.
Attachments: Markups



Denton County MTP indicates FM 2450 is to be a Major Arterial with 140' ROW at the intersection. Dedicate 45' additional ROW

F.M. HIGHWAY 2450
TXDOT R.O.W. MAP DAL23502AC
CITY OF SANGER, TX (ETJ)
CALLED VARIABLE WIDTH R.O.W.

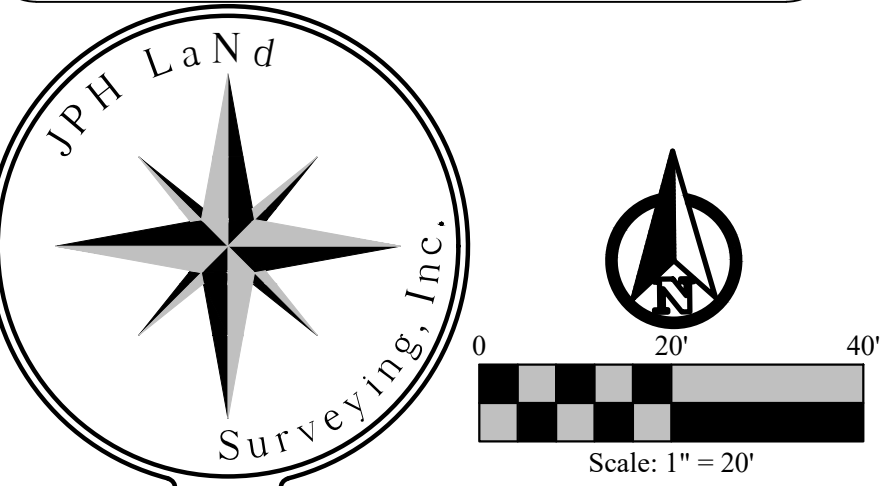
MONUMENTS / DATUMS / BEARING BASIS
Monuments are found if not marked MNS or CRS.

CRS ○ 1/2" rebar stamped "JPH Land Surveying" set
MNS ○ Mag nail & washer stamped "JPH Land Surveying" set
TBM ♦ Site benchmark (see vicinity map for general location)
"4" ○ "4" cut in concrete
○ Vertex or common point (not a monument)
Coordinate values, if shown, are U.S. S.F. / TxC.S./83, NCZ
Elevations, if shown, are NAVD'88 (Geoid 18)
Bearings are based on the TxC.S./83, NCZ
Distances & areas shown are represented in surface values

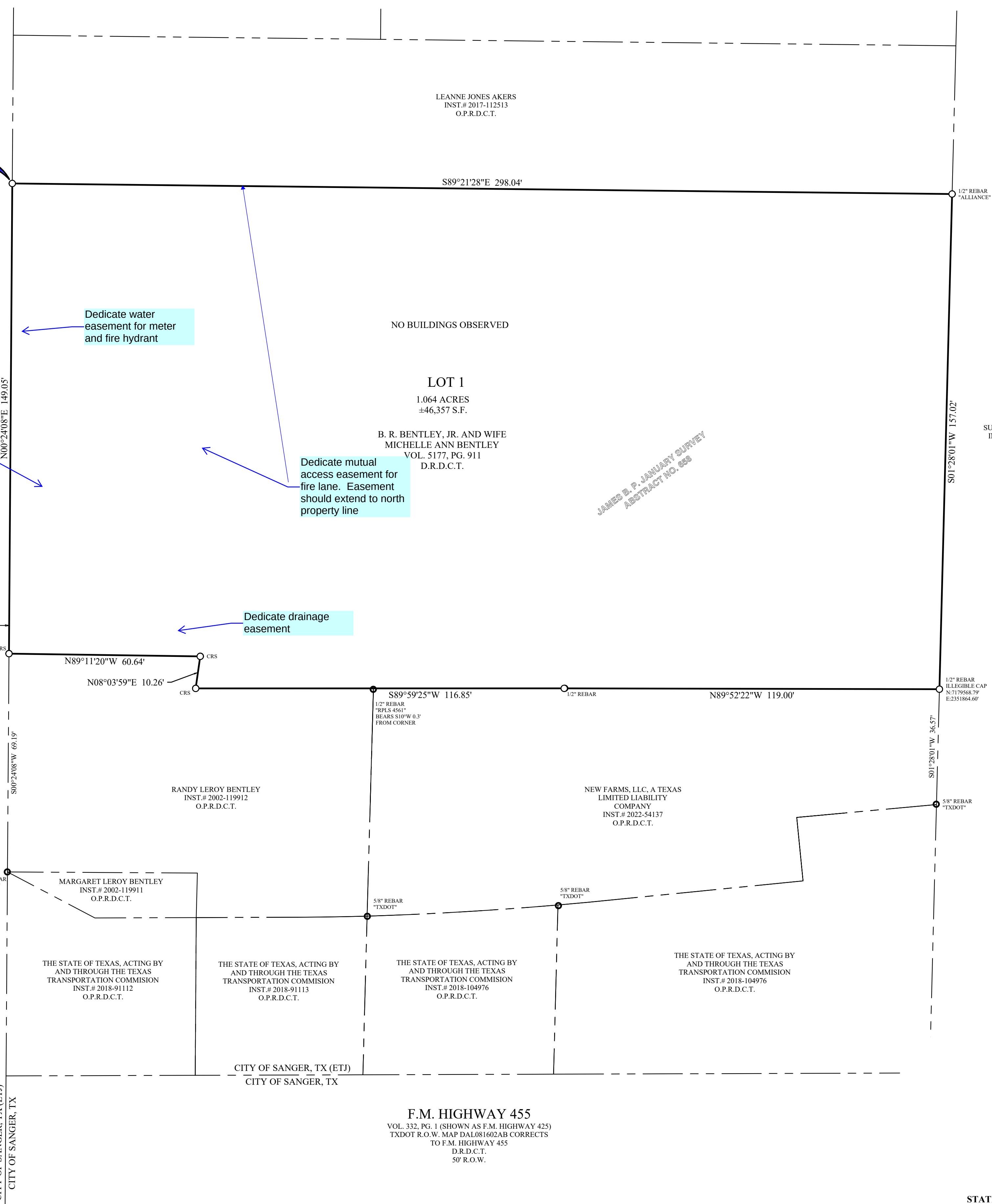
TYPE I ○ TxDOT Right of Way tapered concrete monument.
TYPE II ○ TxDOT Right of Way bronze cap in concrete.
TYPE III ○ TxDOT Right of Way aluminum cap.

LEGEND OF ABBREVIATIONS

US S.F. United States Survey Feet
TxC.S./83, NCZ Texas Coordinate System of 1983, North Central Zone
NAVD'88 North American Vertical Datum of 1988
P.R.D.C.T. Plat Records of Denton County, Texas
O.P.R.D.C.T. Official Public Records of Denton County, Texas
D.R.D.C.T. Deed Records of Denton County, Texas
VOL/Pg/INST# Volume/Page/Instrument Number
ESMT/BL Easement/Building Line
POB/POC Point of Beginning/Point of Commencing
A.K.A. Also Known As
S.F./R.O.W. Square Feet/Right of Way



JPH Job/Drawing No. (see below)
2023.022.001 FM 2450 Sanger, Denton Co., Tx - Plat.dwg
© 2023 JPH Land Surveying, Inc. - All Rights Reserved
785 Lonesome Dove Trail, Hurst, Texas 76054
Telephone (817) 431-4971 www.jphlandsurveying.com
TBPELS Firm #10019500
DFW | Central Texas | West Texas | Houston



STATE OF TEXAS §
COUNTY OF DENTON §

I (we), the undersigned, owner(s) of the land shown on this plat within the area described by metes and bounds as follows:

WHEREAS, B. R. Bentley, Jr. and wife, Michelle Ann Bentley are the owners of that certain tract situated in the James B. P. January Survey, Abstract No. 658, City of Sanger ETJ, Denton County, Texas, said tract being the same tract described in the deed to B. R. Bentley, JR., and wife Michelle Ann Bentley, recorded in Volume 5177, Page 911, Deed Records, Denton County, Texas (D.R.D.C.T.); the subject tract is more particularly described as follows (bearings are based on the Texas Coordinate System of 1983, North Central Zone):

BEGINNING at a 1/2 inch capped rebar stamped "Alliance" found on the monumented east line of FM Highway 2450 (no dedicating document found) at the northwest corner of said Bentley tract;

- THENCE with the perimeter and to the corners of the Bentley tract, the following calls:
- SOUTH 89°21'28" EAST, a distance of 298.04 feet to a found 1/2 inch capped rebar stamped "Alliance";
 - SOUTH 01°2'28'01" WEST, a distance of 157.02 feet to a found 1/2 inch capped rebar stamped with an illegible cap, from which a found 5/8 inch capped rebar stamped "Texas Department of Transportation" bears SOUTH 01°2'28'01" WEST a distance of 36.57 feet;
 - NORTH 89°52'22" WEST, a distance of 119.00 feet to a found 1/2 inch capped rebar;
 - SOUTH 89°59'25" WEST, a distance of 116.85 feet to a set 1/2 inch capped rebar stamped "JPH Land Surveying";
 - NORTH 08°03'59" EAST, a distance of 10.26 feet to a set 1/2 inch capped rebar stamped "JPH Land Surveying";
 - NORTH 89°11'20" WEST, a distance of 60.64 feet (deed call 60.00 feet) to a set 1/2 inch capped rebar stamped "JPH Land Surveying", from which a found 5/8 inch capped rebar stamped "Texas Department of Transportation" monumenting the said east line of FM 2450 bears SOUTH 00°24'08" WEST a distance of 69.19 feet;
 - NORTH 00°24'08" EAST, a distance of 149.05 feet (deed call 149.95 feet) returning to the **POINT OF BEGINNING** and enclosing 1.064 acres (± 46,357 square feet).

GENERAL PLAT NOTES:

- All lots comply with the minimum size requirements of the zoning district.
- This property may be subject to charges related to impact fees and the applicant should contact the City regarding any applicable fees due.
- All common areas, drainage easements, and detention facilities will be owned and maintained by the HOA/POA or property owner. Any common area within the City's right-of-way will require a facilities agreement, to be reviewed and approved by the City.
- Notice – selling a portion of this addition by metes and bounds is a violation of City ordinance and State Law and is subject to fines and withholding of utilities and building permits.
- This plat does not alter or remove existing deed restrictions, if any, on this property.
- Minimum finished floor elevations are at least 2 feet above the 100 year flood plain.
- The subject property does not lie within a 100 – year floodplain according to Community Panel No. 48121C0205G, dated 2011/04/18, of the National Flood Insurance Rate Maps for Denton County, Texas.
- The purpose of this plat is to plat a previously un-platted tract of land.
- Bearings are based on the Grid North, State Plane Coordinate System, Texas North Central Zone (4202), North American Datum of 1983 (NAD '83).
- This survey was performed with the benefit of a title commitment provided by Fidelity National Title Insurance Company, GF# FT-44122-9001222202680-TW, Commitment # 9001222202680, effective August 29, 2022, and issued September 8, 2022. Therefore, easements, agreements, or other documents, either recorded, or unrecorded may exist that affect the subject property that are not shown on this survey.
- Subject property's record description's error of closure, 1.68'.

UTILITY PROVIDERS

Water Bolivar Water Supply Corp 4151 FM 455 West Sanger, TX 76266 940-458-3931	Gas Atmos Energy Corp P.O. Box 740353 Cincinnati, OH 45274-0353 1800-460-3030
Electric CoServ Electric P.O. Box 734803 Dallas, TX 75373-4803 833-890-6264	Communication Brightspeed 833-692-7773
Sanger Electric P.O. Box 1729 Sanger, TX 76266 940-458-7930	

STATE OF TEXAS §
COUNTY OF TARRANT §

I hereby certify that this plat is true and correct and was prepared from an actual survey of the property made on the ground under my supervision.

PRELIMINARY, THIS DOCUMENT SHALL NOT BE RECORDED FOR ANY PURPOSE AND SHALL NOT BE USED OR VIEWED OR RELIED UPON AS A FINAL SURVEY DOCUMENT

Jewel Chadd
Registered Professional
Land Surveyor No. 5754
jewel@jphls.com
Date: TBD

NOW, THEREFORE, KNOW ALL PERSONS BY THESE PRESENTS:

THAT B. R. Bentley, Jr. and wife, Michelle Ann Bentley do hereby adopt this plat designating the hereinabove described property as Lot 1, **Bentley Addition**, an addition in the City of Sanger ETJ, Texas, and does hereby dedicate to the public use forever by fee simple title, free and clear of all liens and encumbrances, all streets, thoroughfares, alleys, fire lanes, drive aisles, parks, and watercourses, and to the public use forever easements for sidewalks, storm drainage facilities, utilities and any other property necessary to serve the plat and to implement the requirements of the subdivision regulations and other City codes and do hereby bind ourselves, our heirs, successors and assigns to warrant and to forever defend the title on the land so dedicated. Further, the undersigned covenants and agrees that he/she shall maintain all easements and facilities in a state of good repair and functional condition at all times in accordance with City codes and regulations. No buildings, fences, trees, shrubs, or other improvements or growths shall be constructed or placed upon, over, or across the easements as shown, except that landscape improvements may be installed, if approved by the City of Sanger. The City of Sanger and public utility entities shall have the right to access and maintain all respective easements without the necessity at any time of procuring permission from anyone.

WITNESS MY HAND this _____, day of _____, 20_____.

B. R. Bentley, Jr.
Owner

STATE OF _____ §
COUNTY OF _____ §

Before me, **B. R. Bentley, Jr.**, on this day personally appeared, known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purposes and considerations therein expressed and in the capacity therein stated.

Given under my hand and seal of office this _____, day of _____, 20_____.

Notary Public in and for the State of _____ Notary's Name

My Commission Expires _____.

WITNESS MY HAND this _____, day of _____, 20_____.

Michelle Ann Bentley
Owner

STATE OF _____ §
COUNTY OF _____ §

Before me, **Michelle Ann Bentley**, on this day personally appeared, known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that she executed the same for the purposes and considerations therein expressed and in the capacity therein stated.

Given under my hand and seal of office this _____, day of _____, 20_____.

Notary Public in and for the State of _____ Notary's Name

My Commission Expires _____.

**FINAL PLAT
BENTLEY ADDITION
LOT 1**

BEING A 1.064-ACRE FINAL PLAT
SITUATED IN THE JAMES B. P. JANUARY SURVEY,
ABSTRACT NO. 658,
CITY OF SANGER ETJ, DENTON COUNTY, TEXAS

TOTAL LOTS - 1
HOA/OPEN SPACE LOTS - 0
RIGHT-OF-WAY ACREAGE - 0.0 ACRES

PREPARED IN MAY 2023

SITE DEVELOPMENT PLANS
FOR
DOLLAR GENERAL
NE QUADRANT OF FM 2450 & CHAPMAN ROAD
CITY OF SANGER ETJ
DENTON COUNTY, TEXAS 76266
JAMES B.P. JANUARY SURVEY ABSTRACT NO # 658
1.064 ACRES

BENCHMARKS

SITE BENCH MARK IS A MAG NAIL WITH A WASHER STAMPED "JPH LAND BENCHMARK" SET IN A CONCRETE SLAB IN THE NORTHEAST CORNER OF THE INTERSECTION OF F.M.HIGHWAY 455 AND F.M.HIGHWAY 2450.BENCHMARK ELEVATION=677.33' . SEE SURVEY FOR GENERAL LOCATION.

PROJECT CONTACT LIST

ENGINEER
TRIANGLE ENGINEERING LLC
1782 McDERMOTT DR
ALLEN, TX. 75013
KARTAVYA PATEL
214-609-9271

OWNER/DEVELOPER
VAQUERO DG FM 2450 PARTNERS, LP
2627 TILLAR ST, STE 111
FORT WORTH, TX 76107
KELLY AGNOR
512-983-1793

SURVEYOR
JPH LAND SURVEYING,INC
785 LONESOME DOVE TRAIL,
HURST, TX 76054
JEWEL CHADD
817-431-4971

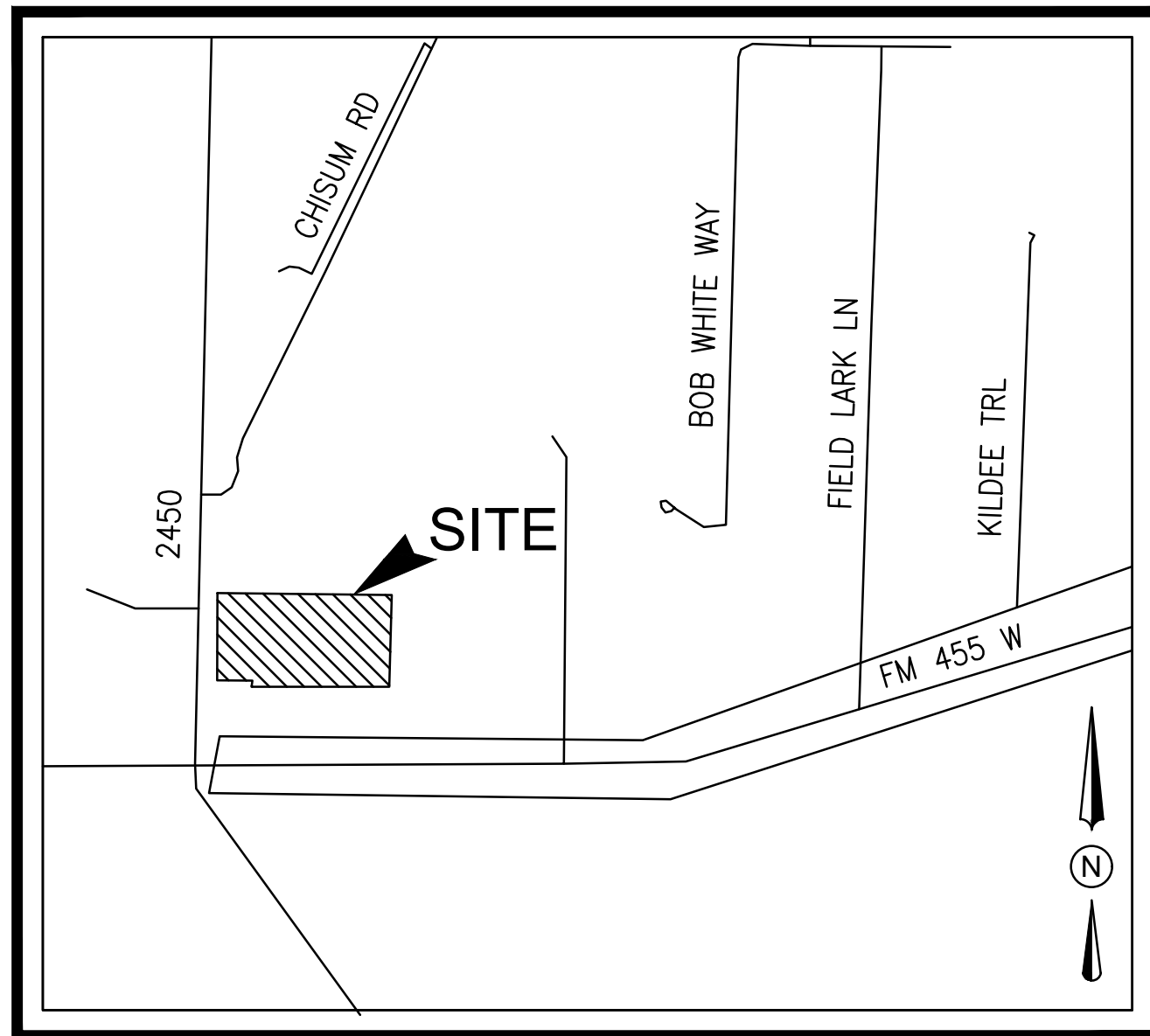
ARCHITECT
FRANZ ARCHITECTS
4055 INTERNATIONAL PLAZA, STE 100
FORT WORTH, TX 76109
AVI KAIKOV
817-632-0079

FLOOD PLAIN NOTE

THIS PROPERTY LIES WITHIN ZONE(S) X (UNSHADED) OF THE FLOOD INSURANCE RATE MAP FOR DENTON COUNTY, TEXAS AND INCORPORATED AREAS, MAP NO.48121C0205G, DATED 2011/04/18, VIA SCALED MAP LOCATION AND GRAPHIC PLOTTING AND/OR THE NATIONAL FLOOD HAZARD LAYER (NFHL) WEB MAP SERVICE (WMS) AT <http://hazards.fema.gov>.

TXDOT GENERAL NOTES

- "ALL CONSTRUCTION WITHIN THE STATE RIGHT OF WAY WILL REQUIRE COMPLIANCE TO TXDOT STANDARD SPECIFICATIONS, STANDARD PLANS, AND TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES"
- BY SEALING AND SIGNING THERE PERMIT PLANS AS A PROFESSIONAL CIVIL ENGINEER LICENSED TO PRACTICE IN THE STATE OF TEXAS , I CERTIFY THAT THE PROPOSED DRIVEWAY OR PUBLIC STREET CONNECTIONS TO THE STATE ROADWAY MEETS OR EXCEEDS THE MINIMUM STOPPING SIGHT DISTANCE REQUIRED FOR A DESIGN SPEED OR 55 MILES PER HOUR, BASED ON THE MOST RECENT ON-LINE TXDOT ROADWAY DESIGN MANUAL REQUIREMENT.
- POSTED SPEED LIMIT IS 40 MILES PER HOUR
- "SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014, AND SPECIFICATION ITEMS LISTED AS FOLLOWS SHALL GOVERN ON THIS PROJECT FOR ALL WORK WITHIN THE STATE RIGHT OF WAY"
- TRAFFIC CONTROL MUST BE MAINTAINED THROUGHOUT THE DURATION OF WORK WITHIN TXDOT ROW
- ALL DISTRIBUTED ROW MUST BE RE-VEGETATED WITH SOD AND MAINTAINED UNTIL VEGETATION IS RE-ESTABLISHED.
- ALL LANE ENCLOSURE MUST BE COORDINATED WITH BOTH TXDOT AND MUNICIPALITY INSPECTORS.
- NO CONSTRUCTION SHALL BE PERMITTED WITHIN TEXAS DEPARTMENT OF TRANSPORTATION(TXDOT) RIGHT OF WAY PRIOR TO TXDOT APPROVAL AND ISSUANCE OF PERMIT.
- ANY UTILITY RELOCATION UNDER TXDOT ROW , REQUIRED SEPERATE "UIR" PERMIT.



VICINITY MAP

N.T.S.

SHEET LIST TABLE

C-1.0	COVER SHEET
	SURVEY
C-1.1	GENERAL NOTES
C-2.0	DEMOLITION PLAN
C-3.0	SITE PLAN
C-3.1	SITE DETAILS
C-3.2	DIMENSION CONTROL PLAN
C-4.0	GRADING PLAN
	DRAINAGE AREA MAP(TXDOT AS BUILT)
	24" PIPE CULVERT DATA (TXDOT AS BUILT)
C-5.0	PRE-DRAINAGE PLAN
C-6.0	POST-DRAINAGE PLAN
C-7.0	EROSION CONTROL PLAN
C-7.1	EROSION CONTROL DETAILS
C-8.0	PAVING PLAN
C-8.1	PAVING DETAILS
C-9.0	UTILITY PLAN
C-9.1	UTILITY DETAILS
	TXDOT DETAILS
L.1	LANDSCAPE PLAN
L.2	LANDSCAPE DETAILS
L.3	IRRIGATION PLAN
L.4	IRRIGATION DETAILS

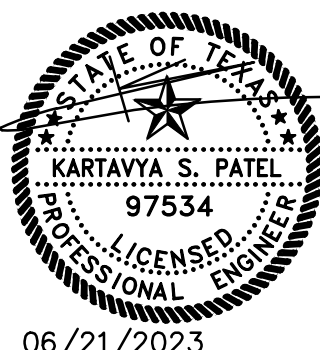
Provide Plat

Provide City signature block



Know what's below.
Call before you dig.

NO.	DATE	DESCRIPTION	BY
1	06-08-23	1st CITY SUBMITTAL	AP
2	06-21-23	REVISED PER CLIENT COMMENT	AP
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COVER SHEET

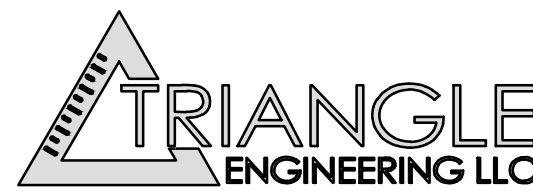
DOLLAR GENERAL

NE QUADRANT OF FM 2450 & CHAPMAN ROAD

CITY OF SANGER ETJ

DENTON COUNTY, TEXAS 76266

JAMES B.P. JANUARY SURVEY ABSTRACT NO # 658



Planning | Civil Engineering | Construction Management

P.E.	DES.	DATE	SCALE	PROJECT NO.	SHEET NO.
KP	AP	06-02-23	SCALE BAR	050-23	C-1.0
TX. P.E. FIRM #11525					

Field:AT
Drafter:ML-DFW6203
Revision:
Revision:

TEXAS811 MARKED UTILITY LEGEND

ELECTRIC	
ELECTRIC-GAS-OIL-STEAM	
COMMUNICATION-CATV	
WATER	
SEWER	

NOTE REGARDING UTILITIES:

Utility locations are per observed evidence and sources listed below:
TEXAS811 - ticket number(s) 2351205691.
<https://portal.texas811.org/#/ticket/2351205691>
UTILITY MAPS - Provided by Katy Hall, Customer Service Representative (Katy@bolivarwaterse.com)

SURVEYED DESCRIPTION: Written because the recorded deed did not close by 1.7 feet.

FIELD NOTES to that certain tract situated in the James B. P. January Survey, Abstract No. 658, City of Sanger ETJ, Denton County, Texas, said tract being the same tract described in the deed to B. R. Bentley, and wife Michelle Ann Bentley, recorded in Volume 5177, Page 911, Deed Records, Denton County, Texas (D.R.D.C.T.); the subject tract, surveyed by JPH Land Surveying, Inc., is more particularly described as follows (bearings are based on the Texas Coordinate System of 1983, North Central Zone):

BEGINNING at a 1/2 inch capped rebar stamped "Alliance" found on the monumented east line of FM Highway 2450 (no dedicating document found) at the northwest corner of said Bentley tract;

THENCE with the perimeter and to the corners of the Bentley tract, the following calls:

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UTILITY WARNING

Regarding Table A items 11(a) & 11(b), unless otherwise stated, the client or client's representative did not provide JPH with plans and/or reports, and JPH did not coordinate a private utility locate request. If these Table A items are listed in the certification, the client, being aware of the factors listed above, has agreed for these Table A item(s) to be addressed from a combination of online GIS maps, markings from locate request(s) to municipalities and 811 and observed evidence of utilities. The client is aware locate requests to 811 and the like, may be ignored or result in an incomplete response, in which case utilities may not have been marked, or not completely marked, at the time the fieldwork was performed. Therefore, utilities may exist which are not shown on this survey. Lacking excavation and/or a private utility locate request, the exact location of underground features cannot be accurately, completely, and reliably depicted.

FLOOD ZONE CLASSIFICATION

This property lies within ZONE(S) X (UNSHADED) of the Flood Insurance Rate Map for Denton County, Texas and Incorporated Areas, map no. 48121C0205G, dated 2011/04/18, via scaled map location and graphic plotting and/or the National Flood Hazard Layer (NFHL) Web Map Service (WMS) at <http://hazards.fema.gov>.

MONUMENTS / DATUMS / BEARING BASIS

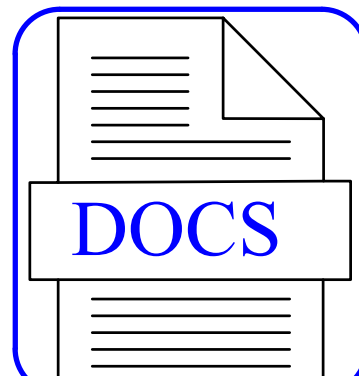
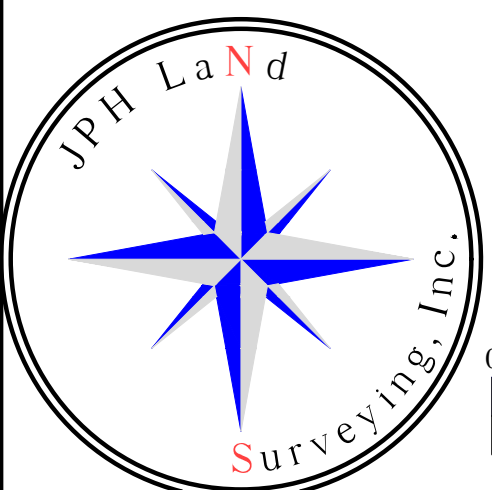
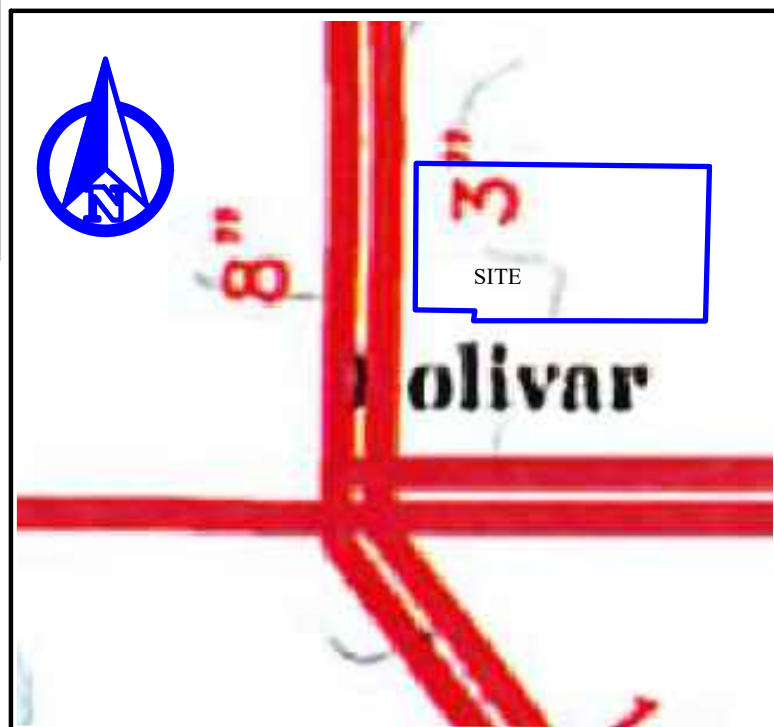
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- TYPE I ○ TxDOT Right of Way tapered concrete monument.
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LEGEND OF ABBREVIATIONS

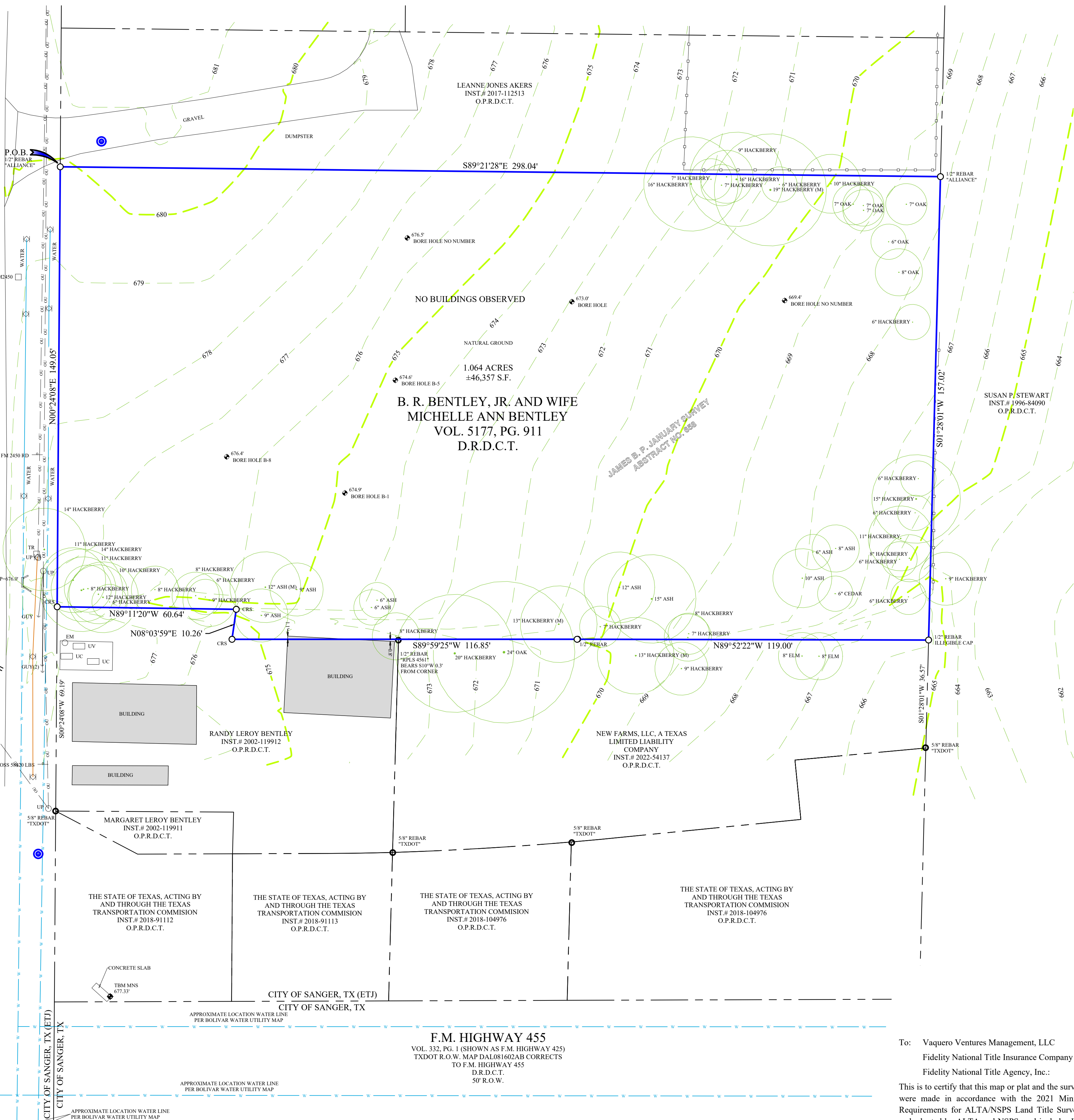
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O.P.R.D.C.T. Official Public Records of Denton County, Texas
D.R.D.C.T. Deed Records of Denton County, Texas
VOL/Pg/INST# Volume/Page/Instrument Number
POB/POC Point of Beginning/Point of Commencing
ESMT/BL Easement/Building Line
PVC/RCP Polyvinyl Chloride Pipe/Reinforced Concrete Pipe

UTILITY MAP

NOT TO SCALE



JPH Job/Drawing No. (see below)
2023.022.001 FM 2450 Sanger, Denton Co., Tx - ALTA.dwg
© 2023 JPH Land Surveying, Inc. - All Rights Reserved
785 Lonesome Dove Trail, Hurst, Texas 76054
Telephone (817) 431-4971 www.jphlandsurveying.com
TBPELS Firm #10019500
DFW | Central Texas | West Texas | Houston

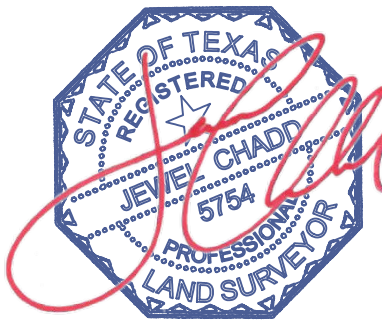


F.M. HIGHWAY 455
VOL. 332, PG. 1 (SHOWN AS F.M. HIGHWAY 425)
TXDOT R.O.W. MAP DAL081602AB CORRECTS
TO F.M. HIGHWAY 455
D.R.D.C.T.
50' R.O.W.

To: Vaquero Ventures Management, LLC
Fidelity National Title Insurance Company
Fidelity National Title Agency, Inc.

This is to certify that this map or plat and the survey on which it is based were made in accordance with the 2021 Minimum Standard Detail Requirements for ALTA/NSPS Land Title Surveys, jointly established and adopted by ALTA and NSPS, and includes Items 1, 2, 3, 4, 5, 6(a), 7(a,b), 8, 9, 11(a,b), 13, 14, 16 & 17 of Table A thereof. The fieldwork was completed on February 10, 2023.

Jewel Chadd
Registered Professional
Land Surveyor No. 5754
jewel@jphls.com
February 20, 2023



TITLE COMMITMENT NOTES:

This survey was performed with the benefit of a title commitment provided by Fidelity National Title Insurance Company, GF# FT-44122-9001222202680-TW, Commitment # 9001222202680, effective August 29, 2022, and issued September 8, 2022. Complete copies of the record description of the property, any record easements benefiting the property, the record easements or servitudes and covenants affecting the property ("Record Documents"), documents of record referred to in the Record Documents, and any other documents containing desired appropriate information affecting the property being surveyed and to which the survey shall make reference were not provided to this surveyor for notation on the survey **except for those items listed within Schedule B of said commitment**. Therefore, easements, agreements, or other documents, either recorded, or unrecorded may exist that affect the subject property that are not shown on this survey.

The following Schedule B items were addressed according to the Minimum Standard Detail Requirements for ALTA/NSPS Land Title Surveys Section 6(c)(ii) and identified by the tract designator listed in the title commitment.

Schedule B Exception #		If more than one tract is being addressed, the chart below will use the tract designators used in the title commitment.									
Recording Information (may include grantee and exception type)		1. Subj. G/L. correct (see edge of sheet for grid values)	2. Inaccurate is shown	3. Lies within crosses, or touches the indicated tract	4. It is not on does not touch and/or does not directly affect the indicated tract	5. - based on its land description -	6. It is a blanket	7. It is a blanket	8. It is a blanket	9. It is a blanket	10. It is a blanket
10.f	Oil, Gas and Mineral Lease Vol. 355, Pg. 201, D.R.D.C.T.			X				X			
10.g*	Right-of-way Easement for Oil & Gas Transmission Vol. 386, Pg. 39, D.R.D.C.T.							X	X	X	
10.h	Oil, Gas and Mineral Lease Vol. 595, Pg. 484, D.R.D.C.T.			X				X			
10.i*	Right-of-way Easement for a Water Line Vol. 639, Pg. 558, D.R.D.C.T.			X				X	X	X	

10.g*: Document does not describe a specific location of oil/gas pipeline. Texas Railroad Commission GIS (<https://gis.rtc.texas.gov/GISviewer/>) does not show a pipeline near subject property.

10.i*: Document does not describe a specific location of water line. Boliva Water utility map and water lines marked per Texas 811 ticket indicate 2 lines within the right-of-way of F. M. Highway 2450.

SURVEYOR'S NOTES:

- Parent tract's record description's error of closure, 1.68'.
- Zoning District: No Zoning according to the Property Requirements Report provided by Zoning-Info, Inc., Zoning-info.com (817) 886-85964. Dated: February 8, 2023.
- Site benchmark is a mag nail with a washer stamped "JPH BENCHMARK" set in a concrete slab in the northeast corner of the intersection of F. M. Highway 455 and F. M. Highway 2450. Benchmark Elevation = 677.33'. See vicinity map for general location.
- No evidence of ongoing earth moving work, building construction, or building addition on site were observed in the process of conducting the fieldwork.
- There are no visible marked parking spaces or fire lane striping within the limits of the surveyed property.
- There are no visible evidence of physical access (e.g. curb cuts, driveways) to any abutting streets, highways, or other public or private ways.
- The site lies on the east side of F. M. Highway 2450, approximately 200' north of the intersection of F. M. Highway 2450 and F. M. Highway 455.
- No evidence of existing building(s) were observed in the process of conducting the fieldwork.
- Texas Department of Transportation's Project Tracker lists F. M. Highway 2450 as "Construct begins within 4 years". Project id 235302026, with a description of Reconstruct Existing Roadway. No evidence of ongoing street or sidewalk construction or repairs were observed in the process of conducting the fieldwork.

ZONING REQUIREMENTS

NO ZONING

Zoning

Denton - Texas

NZR

Denton County only has zoning restrictions in place in the land areas immediately surrounding Lake Ray Roberts. All other areas of the ETJ are considered "No Zoning" and follow any local HOA bylaws and/or deed restrictions.

Allowed Uses/Parking

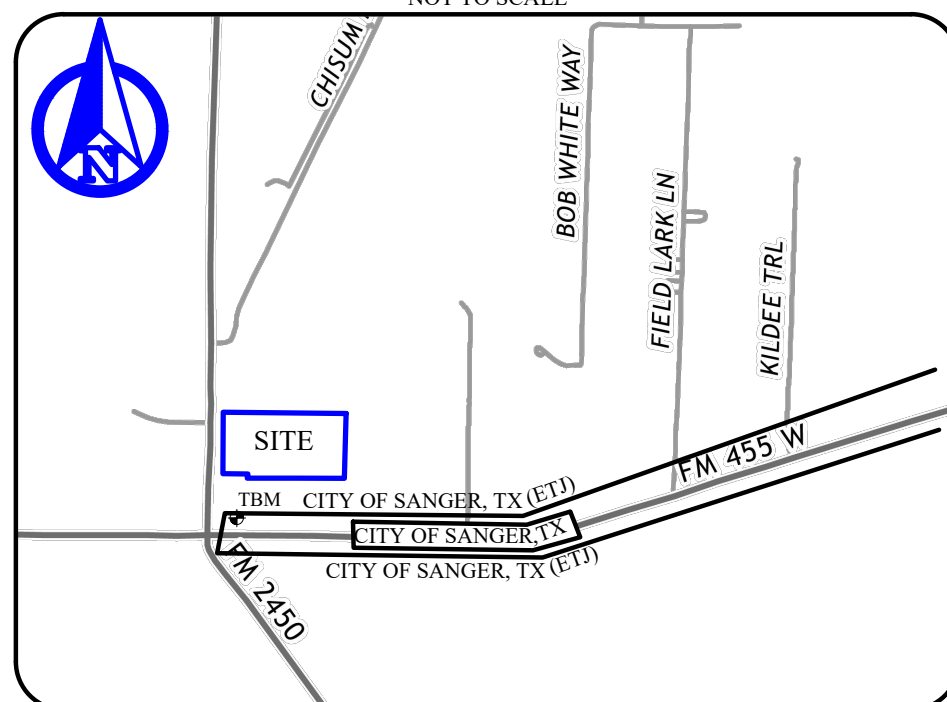
Bulk Requirements

Table 1: NZR Bulk Requirements Table

Requirement	Minimum	Maximum
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VICINITY MAP

NOT TO SCALE



ALTA / NSPS LAND TITLE SURVEY
1.064 ACRES

SITUATED IN THE
JAMES B. P. JANUARY SURVEY
ABSTRACT NO. 658

CITY OF SANGER ETJ, TEXAS
DENTON COUNTY, TEXAS

ADDRESS: NO ADDRESS ASSIGNED (CENTRAL APPRAISAL DISTRICT)

DEMOLITION GENERAL NOTES

1. ANY DEMOLITION IS TO BE PERFORMED IN STRICT CONFORMANCE WITH ALL APPLICABLE CITY, COUNTY AND STATE, AND/OR GOVERNING BODY'S STANDARDS.
2. EROSION AND SEDIMENT CONTROL MEASUREMENTS SHALL BE MAINTAINED AT ALL TIMES DURING DEMOLITION.
3. THE PURPOSE OF THIS DRAWING IS TO CONVEY THE OVERALL SCOPE OF WORK AND IT IS NOT INTENDED TO COVER ALL DETAILS OR SPECIFICATIONS REQUIRED TO COMPLY WITH GENERALLY ACCEPTED DEMOLITION PRACTICES. CONTRACTOR SHALL THOROUGHLY GET FAMILIARIZED WITH THE SITE, SCOPE OF WORK, AND ALL EXISTING CONDITIONS AT THE JOB SITE PRIOR TO BIDDING AND COMMENCING THE WORK. THE DEMOLITION CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR MEANS, METHODS, TECHNIQUES, OR PROCEDURES USED TO COMPLETE THE WORK IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS AND IS LIABLE FOR THE SAFETY OF THE PUBLIC OR CONTRACTOR'S EMPLOYEES DURING THE COURSE OF THE PROJECT.
4. THE DEMOLITION PLAN IS INTENDED TO SHOW REMOVAL OF KNOWN SITE FEATURES AND UTILITIES AS SHOWN ON THE SURVEY. THERE MAY BE OTHER SITE FEATURES, UTILITIES, STRUCTURES, AND MISCELLANEOUS ITEMS BOTH BURIED AND ABOVE GROUND THAT ARE WITHIN THE LIMITS OF WORK THAT MAY NEED TO BE REMOVED FOR THE PROPOSED PROJECT THAT ARE NOT SHOWN HEREON. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING THE CITY, ENGINEER AND/OR OWNER PRIOR TO REMOVING ITEMS NOT SHOWN ON THE PLANS.
5. THE CONTRACTOR SHALL CONTACT RESPECTIVE UTILITY COMPANIES PRIOR TO DEMOLITION TO COORDINATE DISCONNECTION AND REMOVAL OF EXISTING UTILITIES WITHIN THE AREA OF WORK.
6. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ANY DAMAGE TO EXISTING UTILITIES THAT ARE INTENDED TO CONTINUE TO PROVIDE SERVICE WHETHER THESE UTILITIES ARE SHOWN ON THE PLAN OR NOT.
7. UPON DISCOVERY OF ANY UNDERGROUND TANKS, CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER'S REPRESENTATIVE. NO REMOVAL OF TANKS SHALL OCCUR UNTIL AUTHORIZED BY OWNER.
8. BUILDING AND APPURTENANCES DESIGNATED FOR DEMOLITION SHALL NOT BE DISTURBED BY THE CONTRACTOR UNTIL HE HAS BEEN FURNISHED WITH NOTICE TO PROCEED BY THE OWNER. AS SOON AS SUCH NOTICE HAS BEEN GIVEN, THE CONTRACTOR SHALL PERFORM THE DEMOLITION, UNDER THE DIRECTION OF THE OWNER'S REPRESENTATIVE.
9. DEBRIS SHALL NOT BE BURIED ON THE SUBJECT SITE, ALL UNSUITABLE MATERIAL AND DEBRIS SHALL BE REMOVED FROM THE SITE AND DISPOSED OF IN ACCORDANCE WITH ALL CITY, STATE, AND FEDERAL LAWS AND ORDINANCES.
10. AS SOON AS DEMOLITION WORK HAS BEEN COMPLETED, THE FINAL GRADE OF BACKFILL IN DEMOLITION AREAS SHALL BE COMPACTED PER THE GEOTECHNICAL REPORT. CONTRACTOR TO PREVENT WATER FROM DRAINING ONTO ADJACENT PROPERTIES.
11. EXISTING TREES TO REMAIN SHOULD BE PROTECTED FROM DAMAGE DURING DEMOLITION AND CONSTRUCTION.

EROSION CONTROL GENERAL NOTES

1. EVERY SOIL DISTURBING ACTIVITY SHALL HAVE AN ACCOMPANYING EROSION CONTROL PLAN.
2. THE STORM WATER POLLUTION PREVENTION PLAN (SWP3) SHALL BE READILY AVAILABLE FOR REVIEW BY FEDERAL, STATE, OR LOCAL OFFICIALS.
3. NO SOIL DISTURBING ACTIVITIES WILL OCCUR PRIOR TO THE SWP3 AND ASSOCIATED BEST MANAGEMENT PRACTICES (BMP) BEING FULLY IMPLEMENTED AND THEN INSPECTED.
4. THE CONTRACTOR SHALL COMPLY WITH THE CITY'S STORM WATER ORDINANCE, THE TPDES GENERAL CONSTRUCTION PERMIT TXR150000 AND ANY OTHER STATE AND/OR LOCAL REGULATIONS.
5. THE SITE SHALL BE INSPECTED BY THE CONTRACTOR OR HIS REPRESENTATIVE WEEKLY, AND AFTER ANY MAJOR STORM. ADJUSTMENTS/REPAIRS TO THE EROSION CONTROL MEASURES SHOULD BE MADE AS NEEDED.
6. CONTRACTOR SHALL VEGETATE ALL DISTURBED AREAS IMMEDIATELY UPON COMPLETION OF GRADING ACTIVITIES. FINAL ACCEPTANCE OF A SITE SHALL BE CONTINGENT UPON VEGETATION BEING ESTABLISHED IN ALL DISTURBED AREAS.
7. ADEQUATE MEASURES SHALL BE TAKEN TO PREVENT EROSION. IN THE EVENT THAT SIGNIFICANT EROSION OCCURS AS A RESULT OF CONSTRUCTION THE CONTRACTOR SHALL RESTORE THE ERODED AREA TO ORIGINAL CONDITION OR BETTER.
8. TEMPORARY STONE STABILIZED CONSTRUCTION ENTRANCE SHALL HAVE THE FOLLOWING MINIMUM DIMENSIONS: 24' WIDE X 50' LONG X 6" DEEP. (3'-5" COARSE AGGREGATE). PLACE FILTER FABRIC UNDER STONE .
9. THE CONCRETE WASHOUT AREA IS TO BE USED AS A VEHICLE WASH DOWN AREA FOR DEBRIS AND SOIL REMOVAL PRIOR TO EXITING THE SITE.

ADA GENERAL NOTES

1. MAXIMUM SLOPE OF CURB RAMP SHALL BE 1:12 (8.33%). 5% RECOMMENDED.
2. MAXIMUM SLOPE OF CURB RAMP "FLARED SIDES" SHALL BE (8.33%) MAX.
3. SLOPE AND CROSS SLOPE OF A SIDEWALK LEADING INTO A CURB RAMP'S SYSTEM SHALL BE A MAXIMUM OF 1:20 (5%) AND 1:50 (2%) CROSS SLOPE.
4. MAXIMUM SLOPE OF A HANDICAPPED ACCESSIBLE ROUTE ALONG A SIDEWALK LEADING INTO A CURB RAMP, BEFORE IT MUST BE CONSIDERED A RAMP IS 1:20 (5%) AND 1:50 (2%) CROSS SLOPE.
5. ALL SLOPED SURFACES AT CURB RAMP SYSTEMS MUST HAVE A "SIGNIFICANT COLOR CONTRAST" FOR THE SEEING IMPAIRED. THEREFORE ALL SUCH SLOPES MUST HAVE "INTEGRAL COLOR IN CONCRETE" OR "STAINED" (SCOFFIELD), COMPARED TO THE ADJACENT "FLAT" SIDEWALK/PAVING SURFACE.
6. SLOPED CURB-RAMP SURFACE TO HAVE TEXTURE (IE. FORMED/SAWCUT GROVES 3/4" WIDE X 1/4" DEEP @ 2" ON-CENTER). FORMED PERPENDICULAR TO PATH OF TRAVEL FOR THE BLIND TO FEEL TEXTURE BENEATH THEIR FEET & FOR WHEELCHAIR TRACTION. ARRANGED SO WATER WILL NOT ACCUMULATE.
7. MAXIMUM SLOPE AND CROSS SLOPE OF HANDICAPPED ACCESSIBLE PARKING SPACE & ADJACENT ACCESS AISLE IS 1:50 (2%) IN ANY DIRECTION.

SITE GENERAL NOTES

1. ALL CONSTRUCTION SHALL BE IN STRICT ACCORDANCE WITH THE CITY OR LOCAL JURISDICTION STANDARDS.
2. THE LOCATION OF UNDERGROUND UTILITIES INDICATED ON THE PLANS IS TAKEN FROM AS-BUILTS, UTILITY PLANS OR SURVEY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAKE ARRANGEMENTS WITH THE OWNERS OF SUCH UNDERGROUND UTILITIES PRIOR TO WORKING IN THE AREA TO CONFIRM THEIR EXACT LOCATION AND TO DETERMINE WHETHER ANY ADDITIONAL UTILITIES OTHER THAN THOSE SHOWN ON THE PLANS MAY BE PRESENT. THE CONTRACTOR SHALL PRESERVE AND PROTECT ALL UNDERGROUND UTILITIES. IF EXISTING UNDERGROUND UTILITIES ARE DAMAGED, THE CONTRACTOR WILL BE RESPONSIBLE FOR THE COST OF REPAIRING THE UTILITY.
3. WHERE EXISTING UTILITIES OR SERVICE LINES ARE CUT, BROKEN OR DAMAGED, THE CONTRACTOR SHALL REPLACE OR REPAIR THE UTILITIES OR SERVICE LINES WITH THE SAME TYPE OF ORIGINAL MATERIAL AND CONSTRUCTION, OR BETTER, UNLESS OTHERWISE SHOWN OR NOTED ON THE PLANS, AT HIS OWN COST AND EXPENSE. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AT ONCE OF ANY CONFLICTS WITH UTILITIES.
4. ALL EXCAVATIONS, TRENCHING AND SHORING OPERATIONS SHALL COMPLY WITH THE REQUIREMENTS OF THE U. S. DEPARTMENT OF LABOR, OSHA, CONSTRUCTION SAFETY AND HEALTH REGULATIONS AND ANY AMENDMENTS THERETO.
5. THE CONTRACTOR SHALL RESTORE ALL AREAS DISTURBED BY CONSTRUCTION TO ORIGINAL CONDITION OR BETTER. RESTORED AREAS INCLUDE, BUT ARE NOT LIMITED TO TRENCH BACKFILL, SIDE SLOPES, FENCES, DRAINAGE DITCHES, DRIVEWAYS, PRIVATE YARDS AND ROADWAYS.
6. ANY CHANGES NEEDED AFTER CONSTRUCTION PLANS HAVE BEEN RELEASED, SHALL BE APPROVED BY THE CITY ENGINEER. THESE CHANGES MUST BE RECEIVED IN WRITING.
7. THE CONTRACTOR SHALL PROVIDE "RED LINED" MARKED PRINTS TO THE ENGINEER PRIOR TO FINAL INSPECTION INDICATING ALL CONSTRUCTION WHICH DEVIATED FROM THE PLANS OR WAS CONSTRUCTED IN ADDITION TO THAT INDICATED ON THE PLANS.
8. ALL CURB RADIUS TO BE 10' OR 2' UNLESS OTHERWISE NOTED ON THE SITE PLAN.

PAVING GENERAL NOTES

1. STRIP & REMOVE FROM THE CONSTRUCTION AREA ALL TOPSOIL, ORGANICS & VEGETATION TO A MINIMUM DEPTH OF 6 INCHES.
2. CONTROL JOINTS FORMED BY SAWING ARE RECOMMENDED BOTH LONGITUDINAL AND TRANSVERSE DIRECTIONS. CONTROL JOINT SHALL BE SAWED WITHIN 3 HOURS AFTER PLACING CONCRETE. JOINTS SHALL BE PROPERLY CLEANED AND SEALED AS SOON AS POSSIBLE AFTER JOINTS ARE CUT.
3. DRAINAGE SHOULD BE MAINTAINED AWAY FROM THE FOUNDATION, BOTH DURING AND AFTER CONSTRUCTION. WATER SHOULD NOT BE ALLOWED TO POND NEAR THE FOUNDATION. THE FOLLOWING ITEMS SHOULD PROVIDE FOR POSITIVE DRAINAGE OF WATER AWAY FROM THE FOUNDATION: SIDEWALKS AND OTHER CONCRETE FLAT WORK, PARKING AREAS, DRIVEWAYS AND OTHER SURFACE DRAINAGE FEATURES, AND LANDSCAPING.
4. FRENCH DRAINS ARE RECOMMENDED AROUND ANY SLABS WHERE SEEPING GROUND WATER IS ENCOUNTERED DURING CONSTRUCTION.
5. SIDEWALK AROUND THE BUILDING SHALL NOT BE STRUCTURALLY CONNECTED TO THE BUILDING FOUNDATION UNLESS IT'S NOTED ON THE STRUCTURAL PLANS.
6. ALL EXPANSION JOINTS AND CRACK CONTROL JOINTS SHOULD BE SEALED TO PREVENT THE INFILTRATION OF WATER INTO THE SUBSURFACE. THIS IS PARTICULARLY IMPORTANT AROUND IRRIGATED LANDSCAPING AND ALONG THE DRAINAGE PATH OF ROOF DOWNSPOUTS.
7. LANDSCAPE ISLANDS SHOULD BE BACKFILLED WITH LOW PLASTICITY CLAYS TO REDUCE WATER INTRUSION INTO THE SUBSURFACE PAVEMENT STRUCTURES. CURBS SHOULD BE PROVIDED WITH WEEP HOLES IN LANDSCAPE AREAS TO REDUCE THE BUILD UP OF HYDROSTATIC PRESSURE AND TO REDUCE THE INTRUSION OF WATER INTO THE SUBSURFACE MATERIAL.
8. CURB AND GUTTER SHALL CONSIST OF STEEL REINFORCED CONCRETE AND SHALL BE SIX (6") INCHES HIGH, UNLESS OTHERWISE NOTED ON THE SITE/GRADING PLANS.
9. THE CONTRACTOR SHALL PROCEED WITH PAVING NO MORE THAN SEVENTY-TWO (72) HOURS AFTER DENSITY/MOISTURE TESTS HAVE BEEN TAKEN AND PASSED BY A REGULAR TESTING FIRM.
10. MANHOLE RIM ELEVATIONS, CLEAN-OUTS, VALVE BOXES, ETC. SHALL BE ADJUSTED TO FINISHED GRADE BY THE PAVING CONTRACTOR AT THE TIME OF PAVING.
11. SEE IRRIGATION PLAN FOR IRRIGATION SLEEVE PLACEMENT PRIOR TO PAVING CONSTRUCTION.

DIMENSION CONTROL GENERAL NOTES

1. ALL DIMENSIONS ARE MEASURED TO FACE OF CURB AS SHOWN. CONTACT ENGINEER/ARCHITECT IF THERE IS ANY DISCREPANCIES IN THE DIMENSIONS.
2. REFER TO ARCHITECTURAL FLOOR PLAN FOR EXACT BUILDING DIMENSIONS.
3. LIGHTED MONUMENT SIGN SHALL BE BY SEPARATE PERMIT.
4. BARRIER-FREE RAMPS ARE REQUIRED ON ALL STREET FRONTAGES. RAMPS WITH DETECTABLE WARNING SURFACES ARE REQUIRED AT ALL INTERSECTIONS.

GRADING GENERAL NOTES

1. ALL SURPLUS EXCAVATION AND WASTE MATERIAL SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND IT SHALL BE HIS SOLE RESPONSIBILITY TO REMOVE SUCH SURPLUS EXCAVATION AND WASTE MATERIAL FROM THE SITE TO A PUBLIC DUMP SITE APPROVED FOR THE DISPOSAL OF SUCH MATERIALS. IF SURPLUS EXCAVATION IS REMOVED FROM THIS SITE TO ANOTHER PROPERTY, IT SHALL BE PLACED ON SUCH PROPERTY WITH THE WRITTEN CONSENT OF THE OWNER(S) OF SUCH PROPERTY. A COPY OF SUCH WRITTEN CONSENT SHALL BE PROVIDED TO THE OWNER. IF THE CONTRACTOR WISHES TO DISPOSE OF SURPLUS EXCAVATION ON-SITE, IT SHALL BE ONLY WITH THE PRIOR APPROVAL OF THE OWNERS PROJECT REPRESENTATIVE AND CARE SHOULD BE TAKEN TO AVOID BLOCKING NATURAL DRAINAGE AND INCREASING STEEP SLOPES. IF ANY OF THE HAULED EXCAVATION MATERIAL IS TAKEN TO ANOTHER LOCATION WITHIN THE CITY LIMITS, THE OWNER OF THE PROPERTY IS REQUIRED TO OBTAIN A LOT GRADING PERMIT BEFORE MATERIAL IS DELIVERED.
2. THE CONTRACTOR IS REQUIRED TO PROVIDE HIS OWN STAKING AND TO VERIFY PROJECT ELEVATIONS. "MATCH EXISTING" SHALL BE UNDERSTOOD TO APPLY TO BOTH VERTICAL ELEVATION AND HORIZONTAL ALIGNMENT.
3. THE CONTRACTOR SHALL PREPARE ALL LANDSCAPE AREAS INCLUDING STREET RIGHT-OF-WAY AREAS TO AN ACCEPTABLE SUBGRADE CONDITION IN ACCORDANCE WITH THE LANDSCAPE PLANS. IF THE CONTRACTOR IS NOT EMPLOYED TO PROVIDE AND INSTALL LANDSCAPING, HE SHALL PREPARE A FINISHED AND COMPACTED SUB-GRADE IN THE LANDSCAPING AREAS.
4. NO SLOPES TO EXCEED 3H:1V WITHOUT SLOPE STABILIZATION.

UTILITY GENERAL NOTES

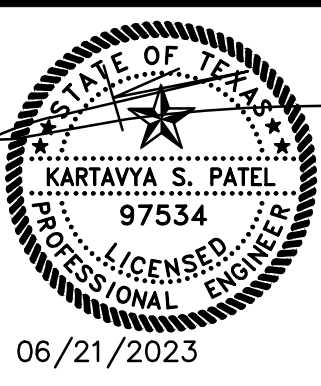
1. ALL CONSTRUCTION SHALL BE IN STRICT ACCORDANCE WITH THE CITY/UTILITY COMPANY STANDARDS.
2. FIELD VERIFY LOCATION OF EXISTING WATER MAIN, SEWER MAIN, GAS, TELEPHONE AND ELECTRICAL LINE. POT HOLE RECOMMENDED PRIOR TO CONSTRUCTION BEGIN. CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE WITH UTILITY SERVICE PROVIDERS.
3. THE LOCATION OF UNDERGROUND UTILITIES INDICATED ON THE PLANS IS TAKEN FROM AS-BUILTS, UTILITY PLANS OR SURVEY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAKE ARRANGEMENTS WITH THE OWNERS OF SUCH UNDERGROUND UTILITIES PRIOR TO WORKING IN THE AREA TO CONFIRM THEIR EXACT LOCATION AND TO DETERMINE WHETHER ANY ADDITIONAL UTILITIES OTHER THAN THOSE SHOWN ON THE PLANS MAY BE PRESENT. THE CONTRACTOR SHALL PRESERVE AND PROTECT ALL UNDERGROUND UTILITIES. IF EXISTING UNDERGROUND UTILITIES ARE DAMAGED, THE CONTRACTOR WILL BE RESPONSIBLE FOR THE COST OF REPAIRING THE UTILITY.
4. WHERE EXISTING UTILITIES OR SERVICE LINES ARE CUT, BROKEN OR DAMAGED, THE CONTRACTOR SHALL REPLACE OR REPAIR THE UTILITIES OR SERVICE LINES WITH THE SAME TYPE OF ORIGINAL MATERIAL AND CONSTRUCTION, OR BETTER, UNLESS OTHERWISE SHOWN OR NOTED ON THE PLANS, AT HIS OWN COST AND EXPENSE. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AT ONCE OF ANY CONFLICTS WITH UTILITIES.
5. ALL EXCAVATIONS, TRENCHING AND SHORING OPERATIONS SHALL COMPLY WITH THE REQUIREMENTS OF THE U. S. DEPARTMENT OF LABOR, OSHA, CONSTRUCTION SAFETY AND HEALTH REGULATIONS AND ANY AMENDMENTS THERETO.
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STORM SEWER GENERAL NOTES

1. ALL STORM DRAIN CONSTRUCTION, TESTING, AND MATERIALS SHALL BE IN ACCORDANCE WITH THE CITY'S CURRENT STANDARDS, DETAILS, AND SPECIFICATIONS UNLESS OTHERWISE NOTED.
2. CONTRACTOR SHALL VERIFY EXISTING LOCATIONS, SIZES AND FLOW LINES FOR ALL STORM SEWER SYSTEMS AND DRAINAGE STRUCTURES SHOWN ON THE PLANS PRIOR TO CONNECTING PROPOSED STORM SEWER PIPES.
3. TWO WEEKS PRIOR TO CONNECTING TO EXISTING STORM DRAIN LINES, THE CONTRACTOR SHOULD INSPECT THE EXISTING LINE AND CONTACT THE STORM WATER INSPECTOR SHOULD THE LINE NEED TO BE CLEANED.
4. CONTRACTOR SHOULD INSPECT ALL STORM DRAIN OUTFALLS NO EARLIER THAN TWO WEEKS PRIOR TO FINAL INSPECTION AND REMOVE ALL SILT AND DEBRIS.



NO.	DATE	DESCRIPTION	BY
1	06-08-23	1st CITY SUBMITTAL	AP
2	06-21-23	REVISED PER CLIENT COMMENT	AP
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GENERAL NOTES

DOLLAR GENERAL

NE QUADRANT OF FM 2450 & CHAPMAN ROAD

CITY OF SANGER ETJ

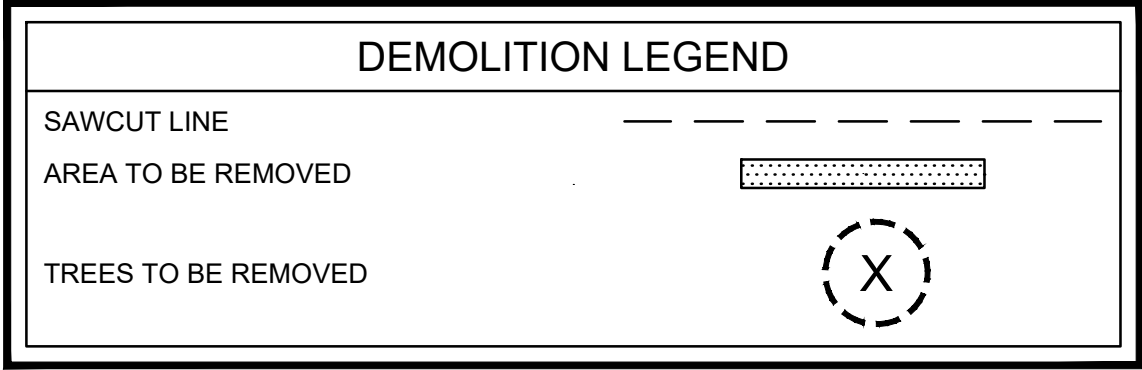
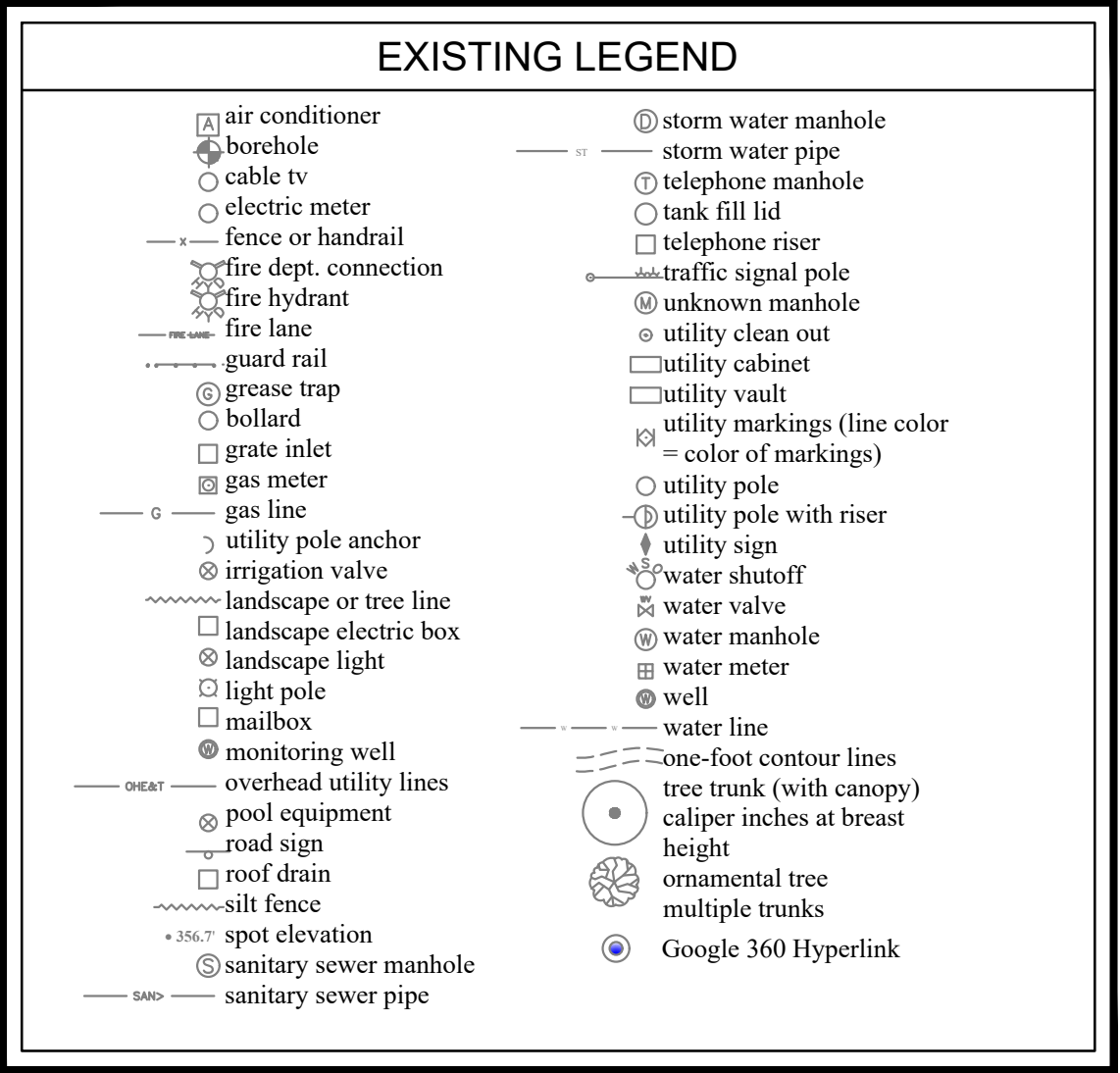
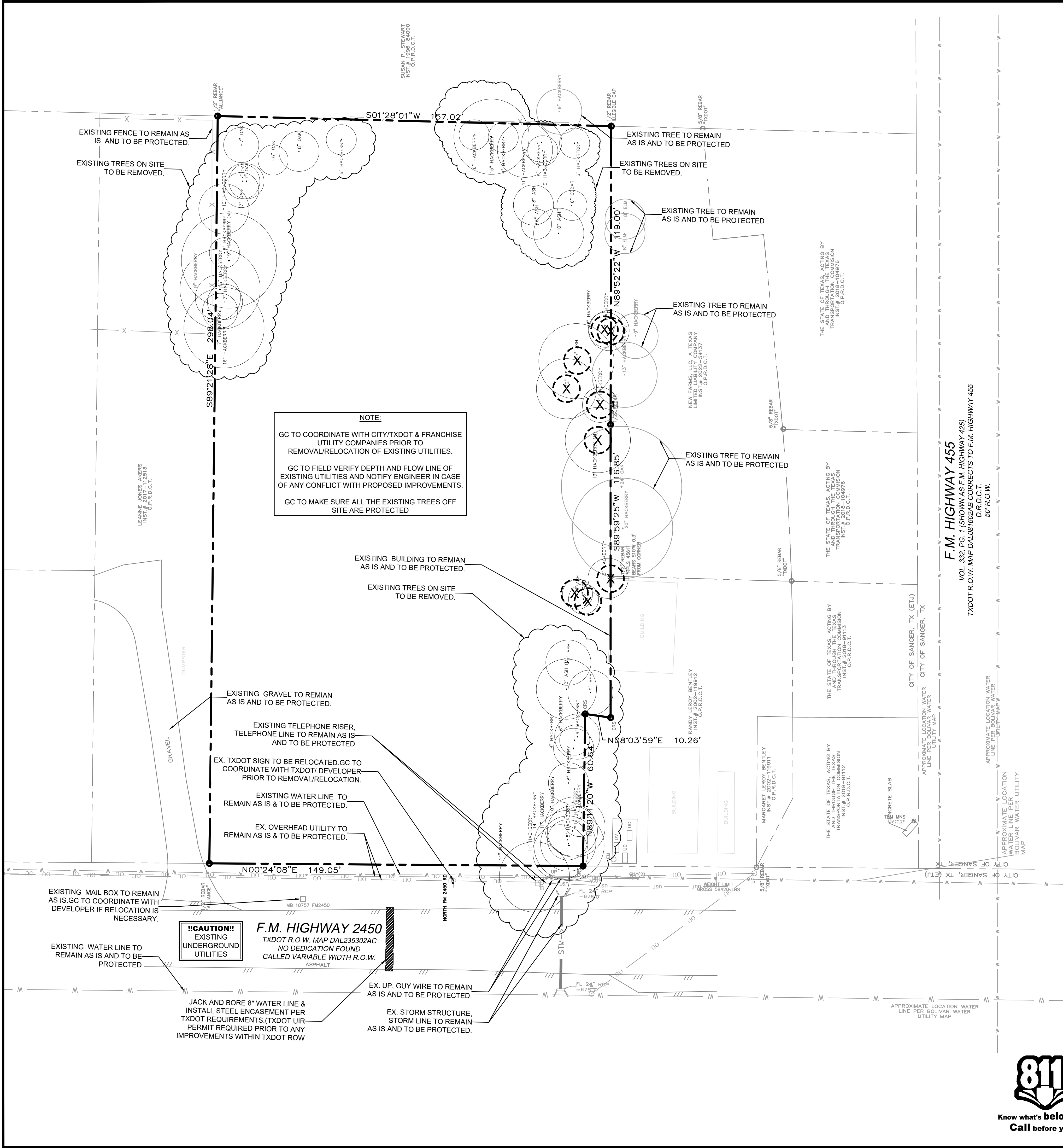
DENTON COUNTY, TEXAS 76266

JAMES B.P. JANUARY SURVEY ABSTRACT NO # 658

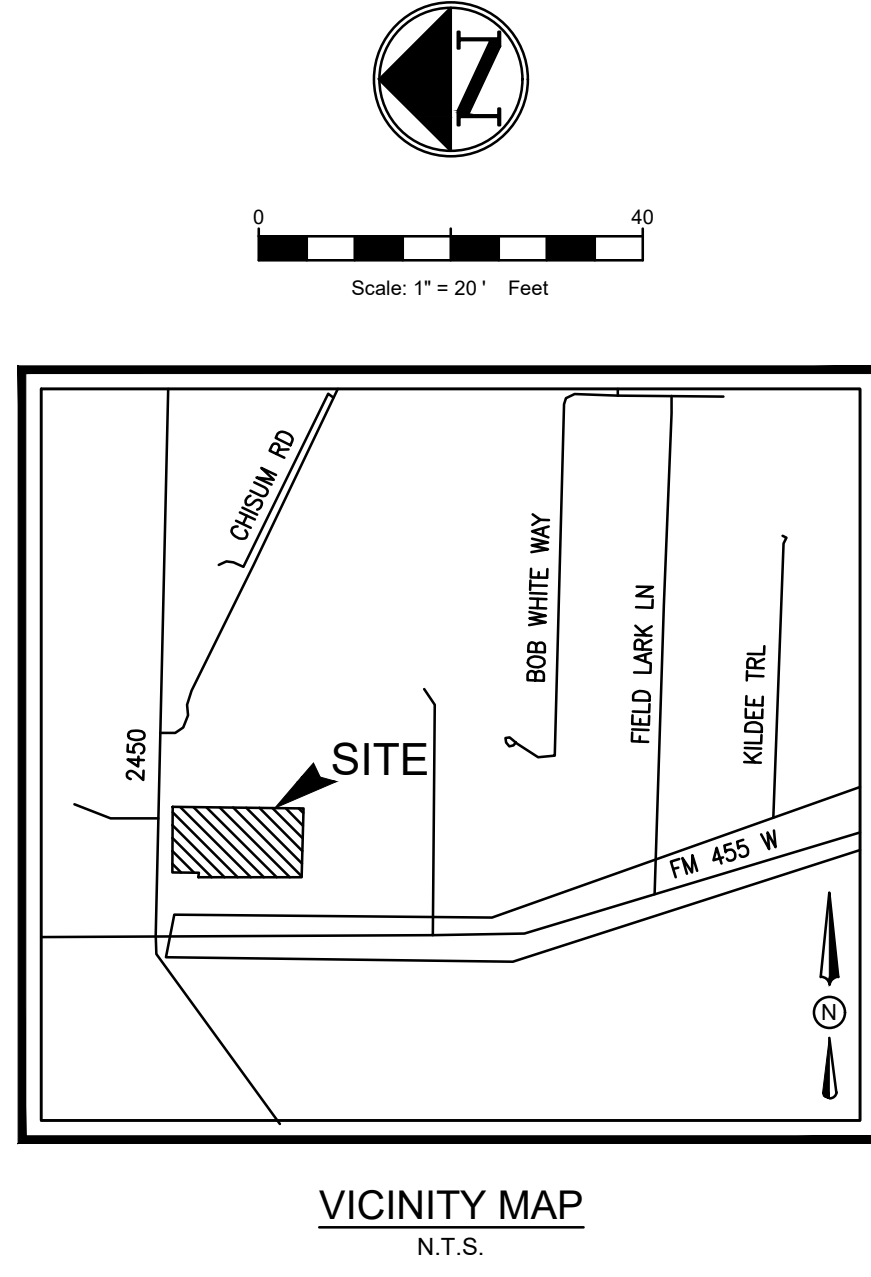
T: 469.331.8566 | F: 469.213.7145 | E: info@triangle-engr.com
W: triangle-engr.com | O: 1784 McDermott Drive, Suite 110, Allen, TX 75013

Planning | Civil Engineering | Construction Management

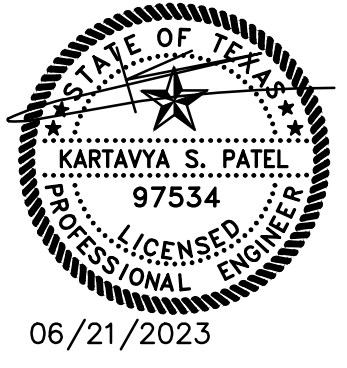
P.E.	DES.	DATE	SCALE	PROJECT NO.	SHEET NO.
KP	AP	06-02-23	SCALE BAR	050-23	C-1.1
TX. P.E. FIRM #11525					



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 - AS SOON AS DEMOLITION WORK HAS BEEN COMPLETED, THE FINAL GRADE OF BACKFILL IN DEMOLITION AREAS SHALL BE COMPACTED PER THE GEOTECHNICAL REPORT. CONTRACTOR TO PREVENT WATER FROM DRAINING ONTO ADJACENT PROPERTIES.
 - EXISTING TREES TO REMAIN SHOULD BE PROTECTED FROM DAMAGE DURING DEMOLITION AND CONSTRUCTION.



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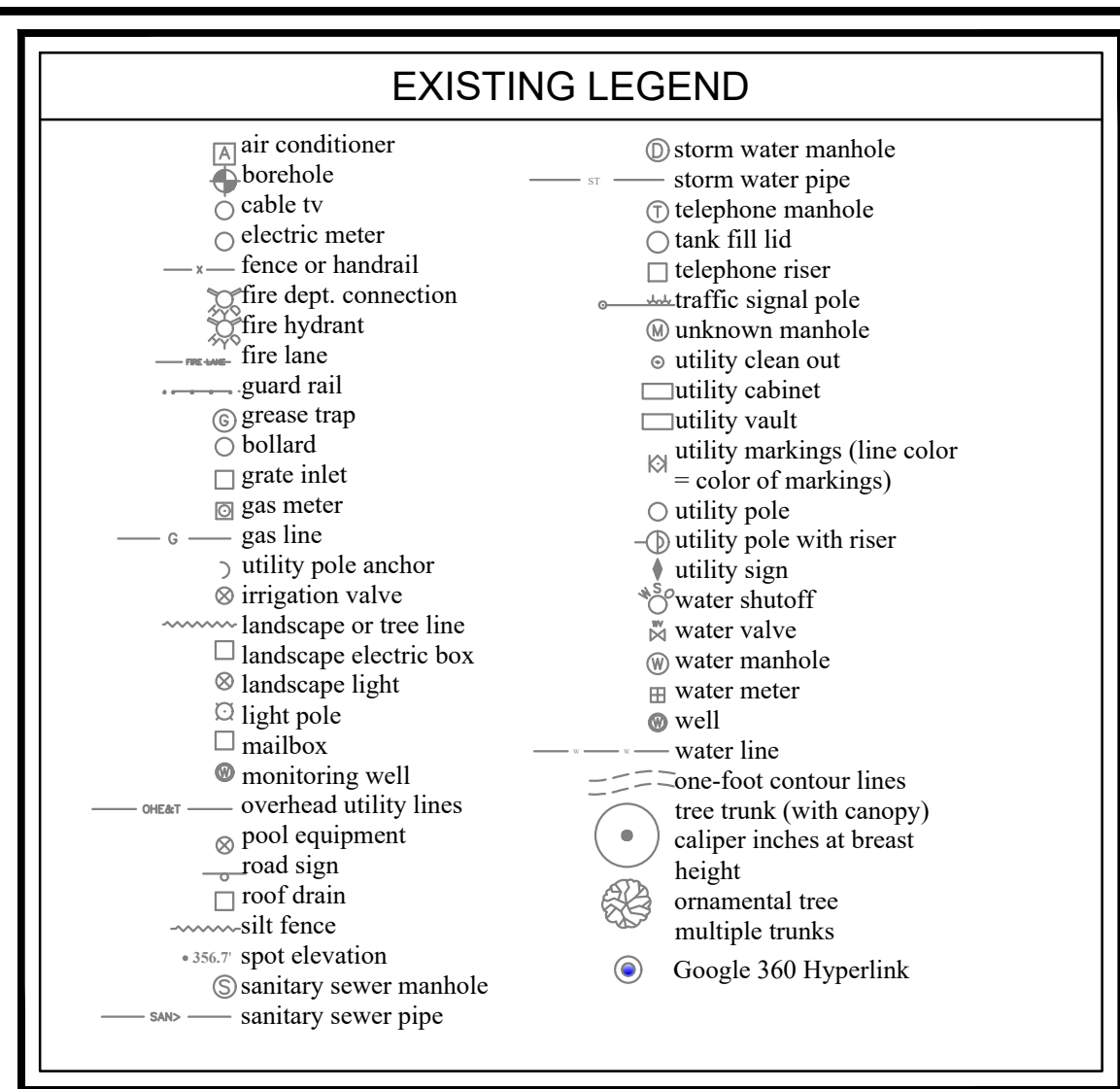
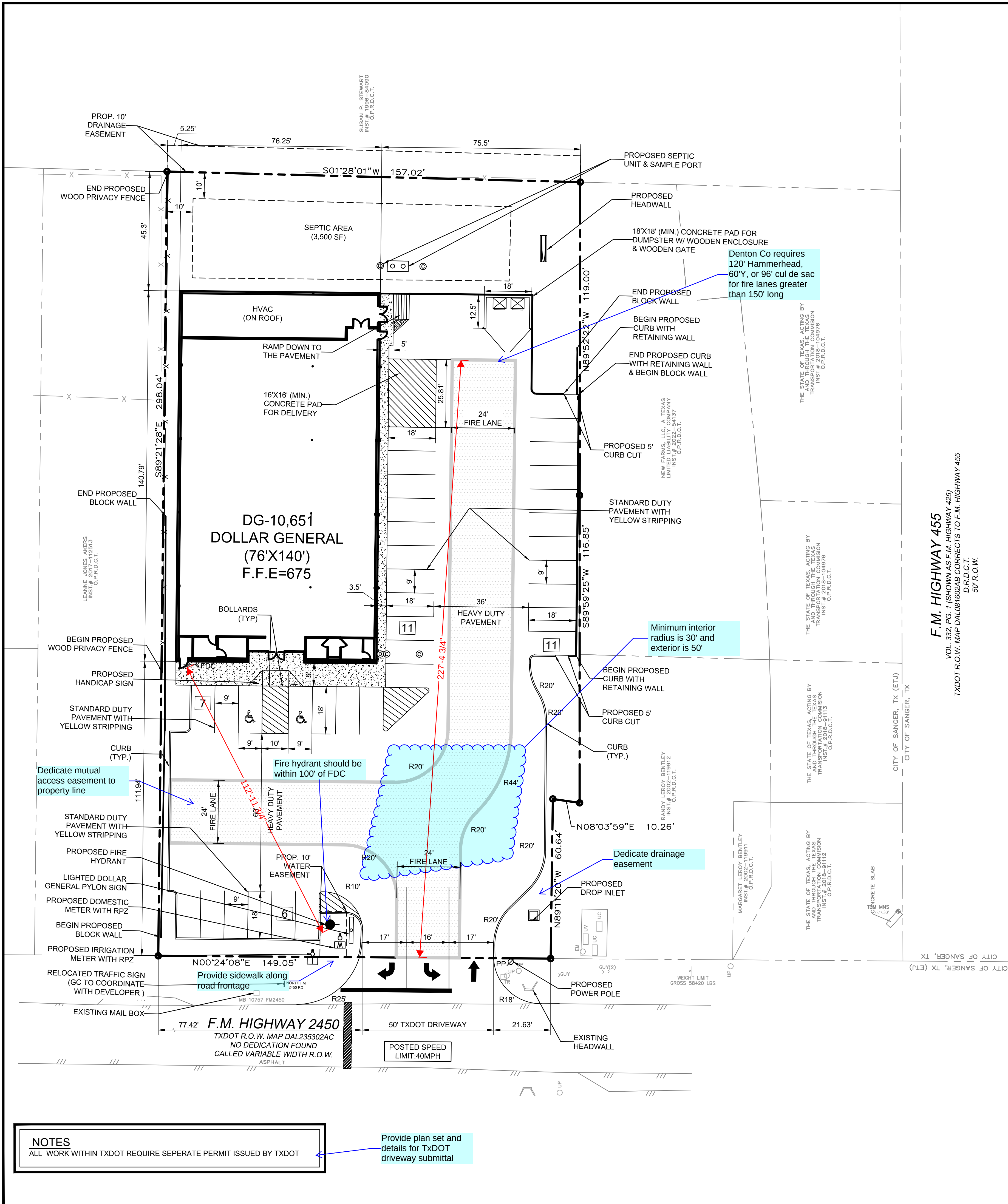
DEMOLITION PLAN
DOLLAR GENERAL
NE QUADRANT OF FM 2450 & CHAPMAN ROAD
CITY OF SANGER ETJ
DENTON COUNTY, TEXAS 76266
JAMES B.P. JANUARY SURVEY ABSTRACT NO # 658

TRIANGLE ENGINEERING LLC
T: 469.331.8566 | F: 469.213.7145 | E: info@triangle-engr.com
W: triangle-engr.com | O: 1784 McDermott Drive, Suite 110, Allen, TX 75013

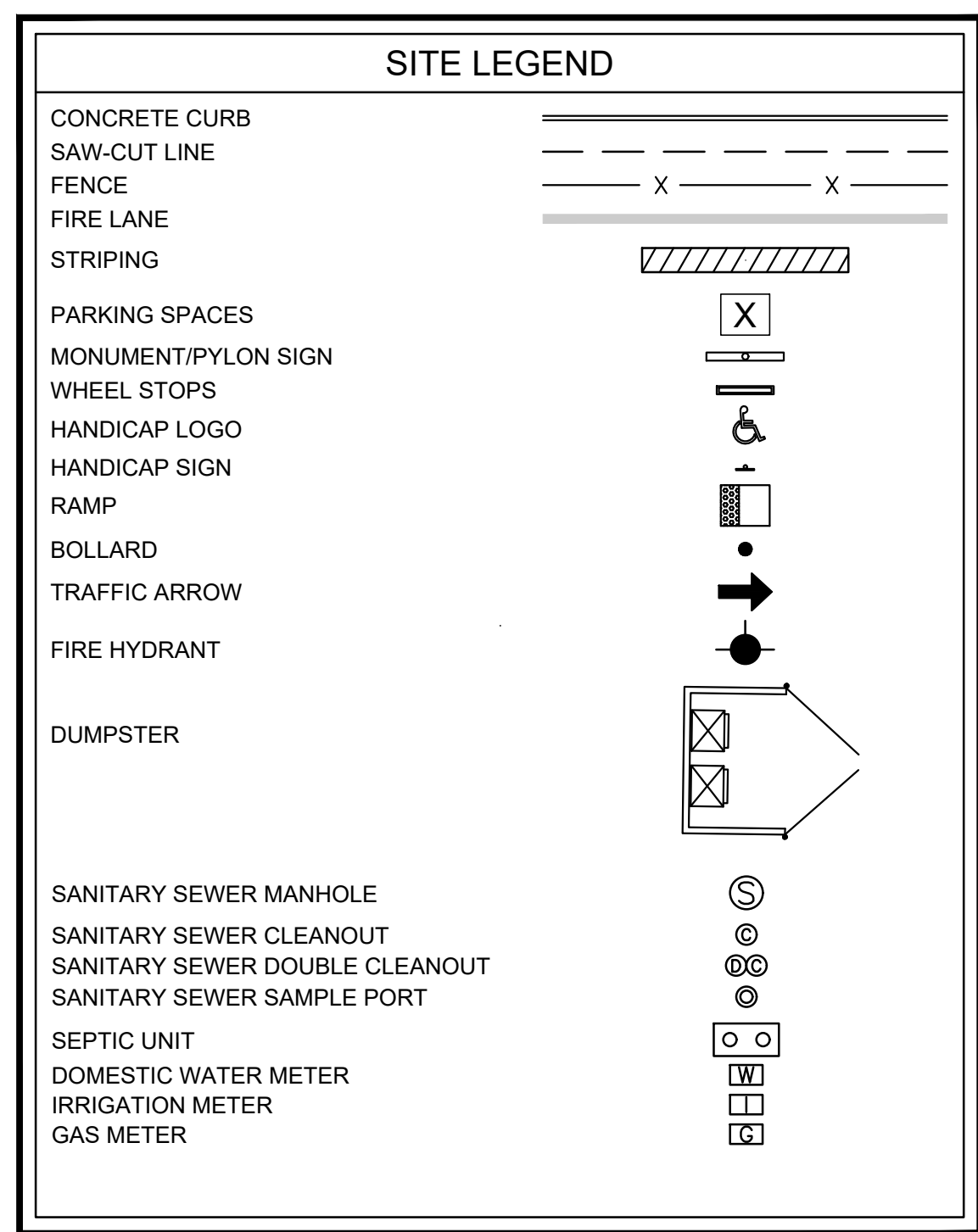
Planning | Civil Engineering | Construction Management

P.E.	DES.	DATE	SCALE	PROJECT NO.	SHEET NO.
KP	AP	06-02-23	SCALE BAR	050-23	C-2.0

TX. P.E. FIRM #11525

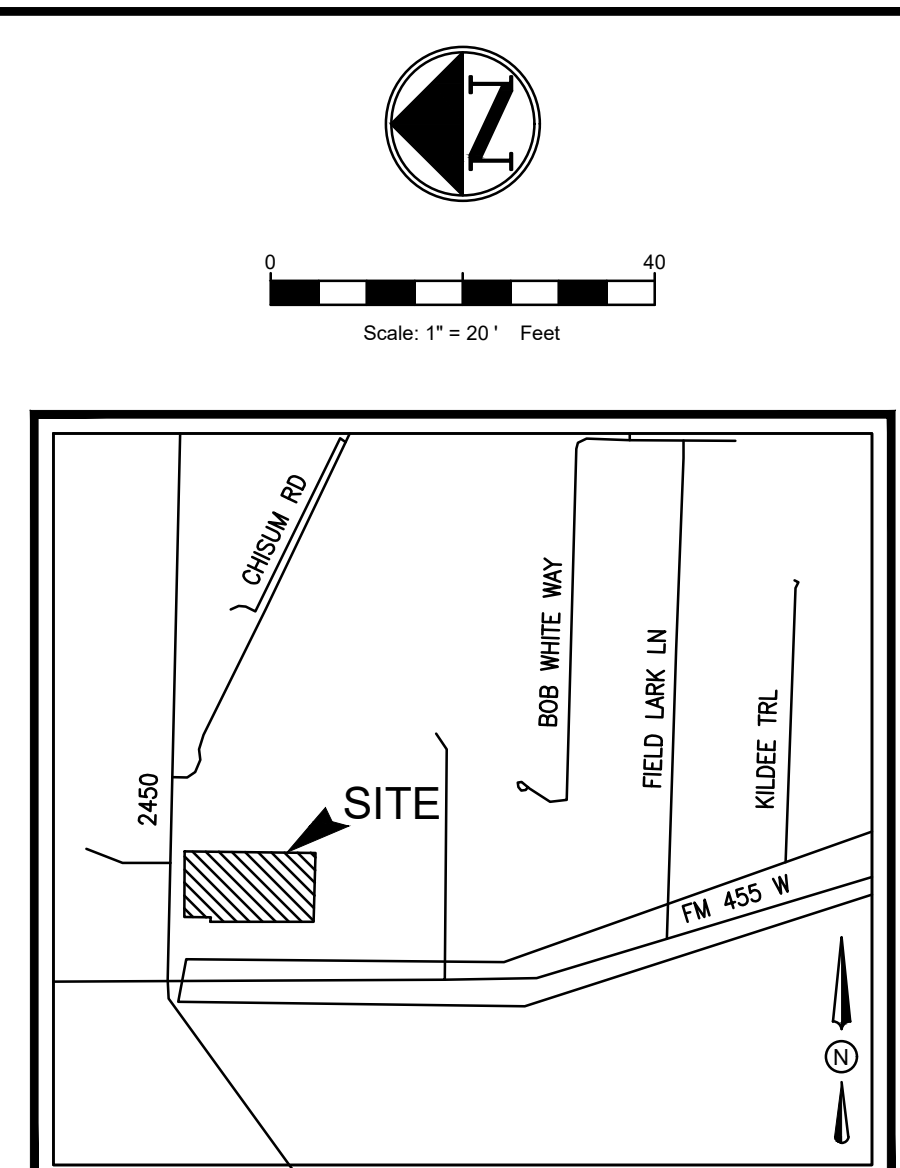


SITE DATA SUMMARY TABLE	
SITE ACREAGE:	1.064 ACRES (46,357 S.F.)
ZONING:	
PROPOSED USE:	RETAIL STORE-DOLLAR GENERAL
BUILDING AREA:	10,651 S.F.
NUMBER OF STORIES:	1
BUILDING HEIGHT:	18'-0"
BUILDING COVERAGE:	22.9%
FLOOR AREA RATIO:	0.22
IMPERVIOUS AREA:	35,372 S.F. (76.30%)
PERVIOUS/LANDSCAPE AREA:	10,985 S.F. (23.69%)
REGULAR PARKING REQUIRED:	35 SPACES
1 SP PER 300 S.F.	
REGULAR PARKING PROVIDED:	33 SPACES
HANDICAP PARKING REQUIRED:	2 SPACES (1 VAN ACCESSIBLE)
HANDICAP PARKING PROVIDED:	2 SPACES (1 VAN ACCESSIBLE)
TOTAL PARKING PROVIDED:	35 SPACES



FLOOD PLAIN NOTE

THIS PROPERTY LIES WITHIN ZONE(S) X (UNSHADED) OF THE FLOOD INSURANCE RATE MAP FOR DENTON COUNTY, TEXAS AND INCORPORATED AREAS, MAP NO.4812C0205G, DATED 2011/04/18, VIA SCALED MAP LOCATION AND GRAPHIC PLOTTING AND/OR THE NATIONAL FLOOD HAZARD LAYER (NFHL) WEB MAP SERVICE (WMS) AT <http://hazards.fema.gov>.



- SITE GENERAL NOTES**
- ALL CONSTRUCTION SHALL BE IN STRICT ACCORDANCE WITH THE CITY OR LOCAL JURISDICTION STANDARDS.
 - THE LOCATION OF UNDERGROUND UTILITIES INDICATED ON THE PLANS IS TAKEN FROM AS-BUILTS. UTILITY PLANS OR SURVEY, IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAKE ARRANGEMENTS WITH THE OWNERS OF SUCH UNDERGROUND UTILITIES PRIOR TO WORKING IN THE AREA TO CONFIRM THEIR EXACT LOCATION AND TO DETERMINE WHETHER ANY ADDITIONAL UTILITIES OTHER THAN THOSE SHOWN ON THE PLANS MAY BE PRESENT. THE CONTRACTOR SHALL PRESERVE AND PROTECT ALL UNDERGROUND UTILITIES. IF EXISTING UNDERGROUND UTILITIES ARE DAMAGED, THE CONTRACTOR WILL BE RESPONSIBLE FOR THE COST OF REPAIRING THE UTILITY.
 - WHERE EXISTING UTILITIES OR SERVICE LINES ARE CUT, BROKEN OR DAMAGED, THE CONTRACTOR SHALL REPLACE OR REPAIR THE UTILITIES OR SERVICE LINES WITH THE SAME TYPE OF ORIGINAL MATERIAL AND CONSTRUCTION, OR BETTER, UNLESS OTHERWISE SHOWN OR NOTED ON THE PLANS, AT HIS OWN COST AND EXPENSE. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AT ONCE OF ANY CONFLICTS WITH UTILITIES.
 - ALL EXCAVATIONS, TRENCHING AND SHORING OPERATIONS SHALL COMPLY WITH THE REQUIREMENTS OF THE U. S. DEPARTMENT OF LABOR, OSHA, CONSTRUCTION SAFETY AND HEALTH REGULATIONS AND ANY AMENDMENTS THERETO.
 - THE CONTRACTOR SHALL RESTORE ALL AREAS DISTURBED BY CONSTRUCTION TO ORIGINAL CONDITION OR BETTER. RESTORED AREAS INCLUDE, BUT ARE NOT LIMITED TO TRENCH BACKFILL, SIDE SLOPES, FENCES, DRAINAGE DITCHES, DRIVEWAYS, PRIVATE YARDS AND ROADWAYS.
 - ANY CHANGES NEEDED AFTER CONSTRUCTION PLANS HAVE BEEN RELEASED, SHALL BE APPROVED BY THE CITY ENGINEER. THESE CHANGES MUST BE RECEIVED IN WRITING.
 - THE CONTRACTOR SHALL PROVIDE "RED LINED" MARKED PRINTS TO THE ENGINEER PRIOR TO FINAL INSPECTION INDICATING ALL CONSTRUCTION WHICH DEVIATED FROM THE PLANS OR WAS CONSTRUCTED IN ADDITION TO THAT INDICATED ON THE PLANS.
 - ALL CURB RADIUS TO BE 10' OR 2' UNLESS OTHERWISE NOTED ON THE SITE PLAN.

PROJECT CONTACT LIST	
ENGINEER TRIANGLE ENGINEERING LLC 1782 McDERMOTT DR ALLEN, TX. 75013 KARTAVYA PATEL 214-609-9271	OWNER/DEVELOPER VAQUERO DG FM 2450 PARTNERS, LP 2627 TILLAR ST, STE 111 FORT WORTH, TX 76107 KELLY AGNOR 512-983-1793
SURVEYOR JPH LAND SURVEYING, INC 785 LONESOME DOVE TRAIL, HURST, TX 76054 JEWEL CHADD 817-431-4971	ARCHITECT FRANZ ARCHITECTS 4055 INTERNATIONAL PLAZA, STE 100 FORT WORTH, TX 76109 AVI KAIKOV 817-632-0079

BENCHMARKS

SITE BENCH MARK IS A MAG NAIL WITH A WASHER STAMPED "JPH LAND BENCHMARK" SET IN A CONCRETE SLAB IN THE NORTHEAST CORNER OF THE INTERSECTION OF F.M. HIGHWAY 455 AND F.M. HIGHWAY 2450. BENCHMARK ELEVATION=677.33'. SEE SURVEY FOR GENERAL LOCATION.

SITE PLAN
DOLLAR GENERAL
NE QUADRANT OF FM 2450 & CHAPMAN ROAD
CITY OF SANGER ETJ
DENTON COUNTY, TEXAS 76266
JAMES B.P. JANUARY SURVEY ABSTRACT NO # 658

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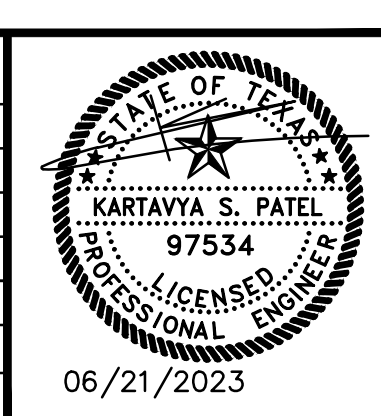
Planning | Civil Engineering | Construction Management

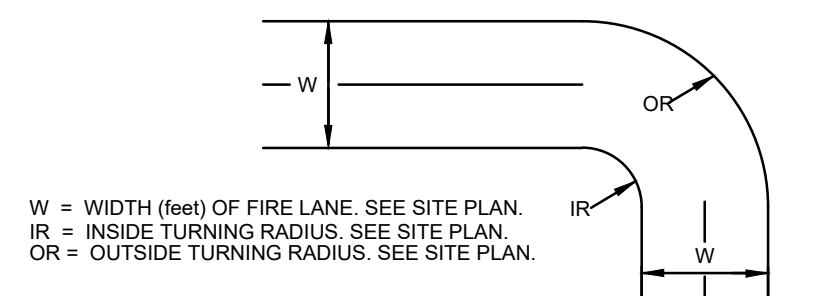
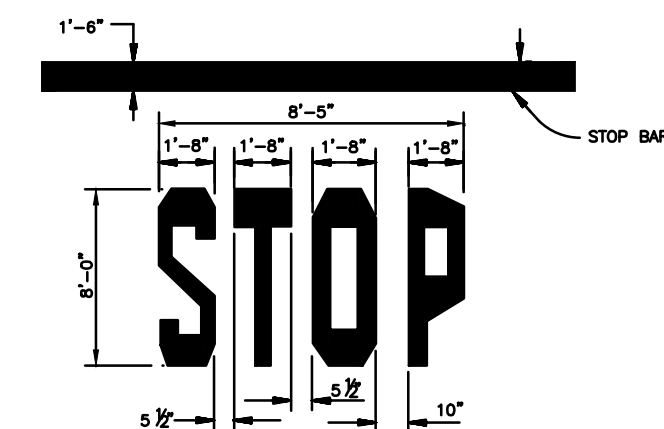
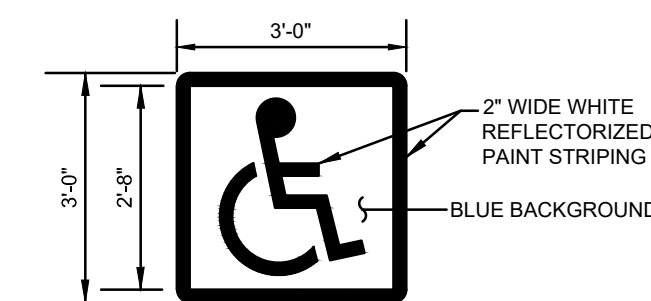
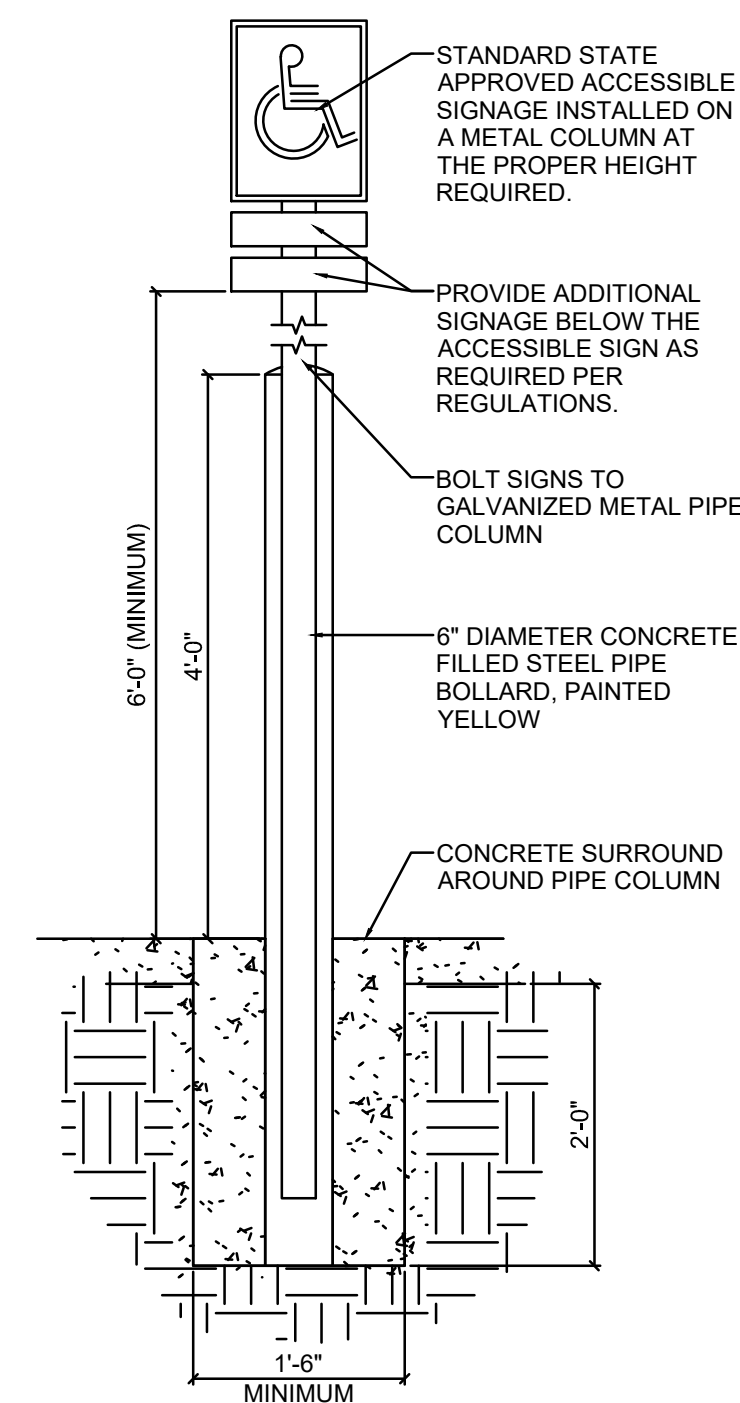
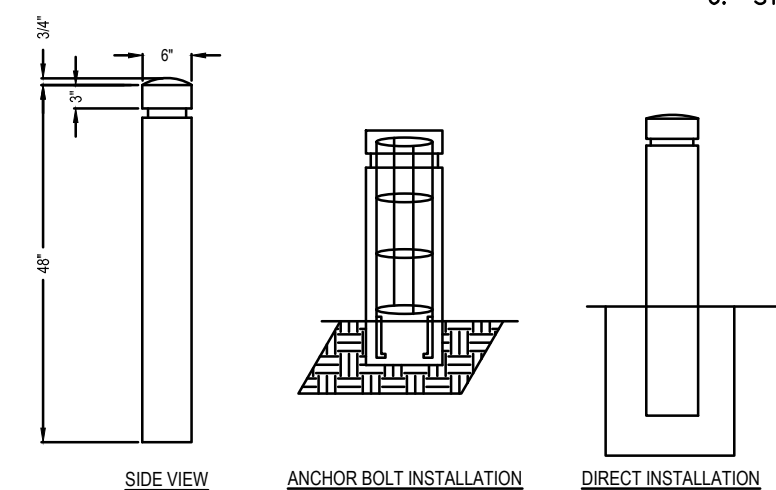
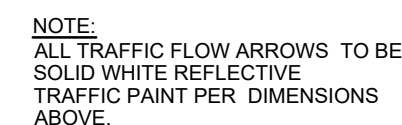
P.E.	DES.	DATE	SCALE	PROJECT NO.	SHEET NO.
KP	AP	06-02-23	SCALE BAR	050-23	C-3.0

TX. P.E. FIRM #11525

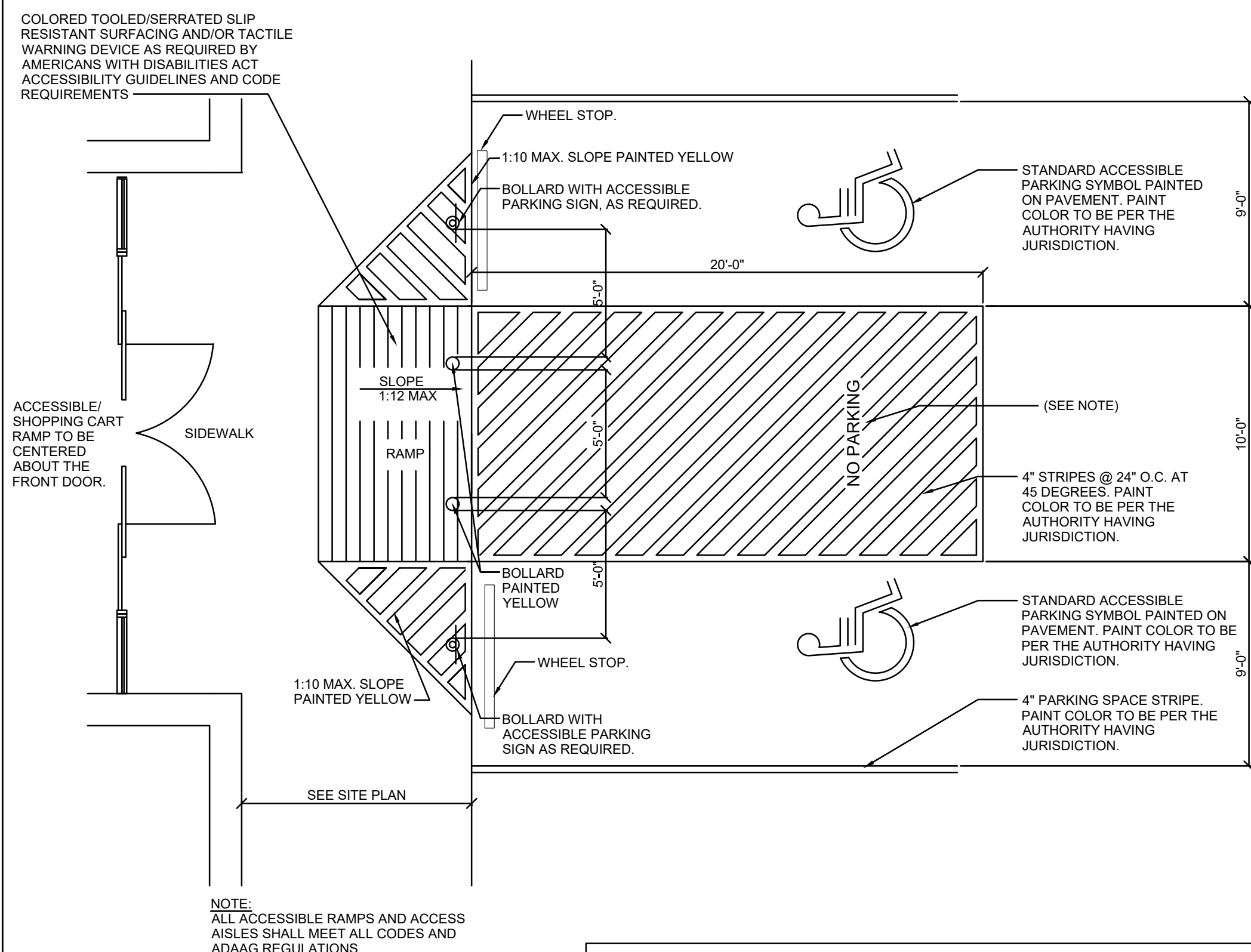
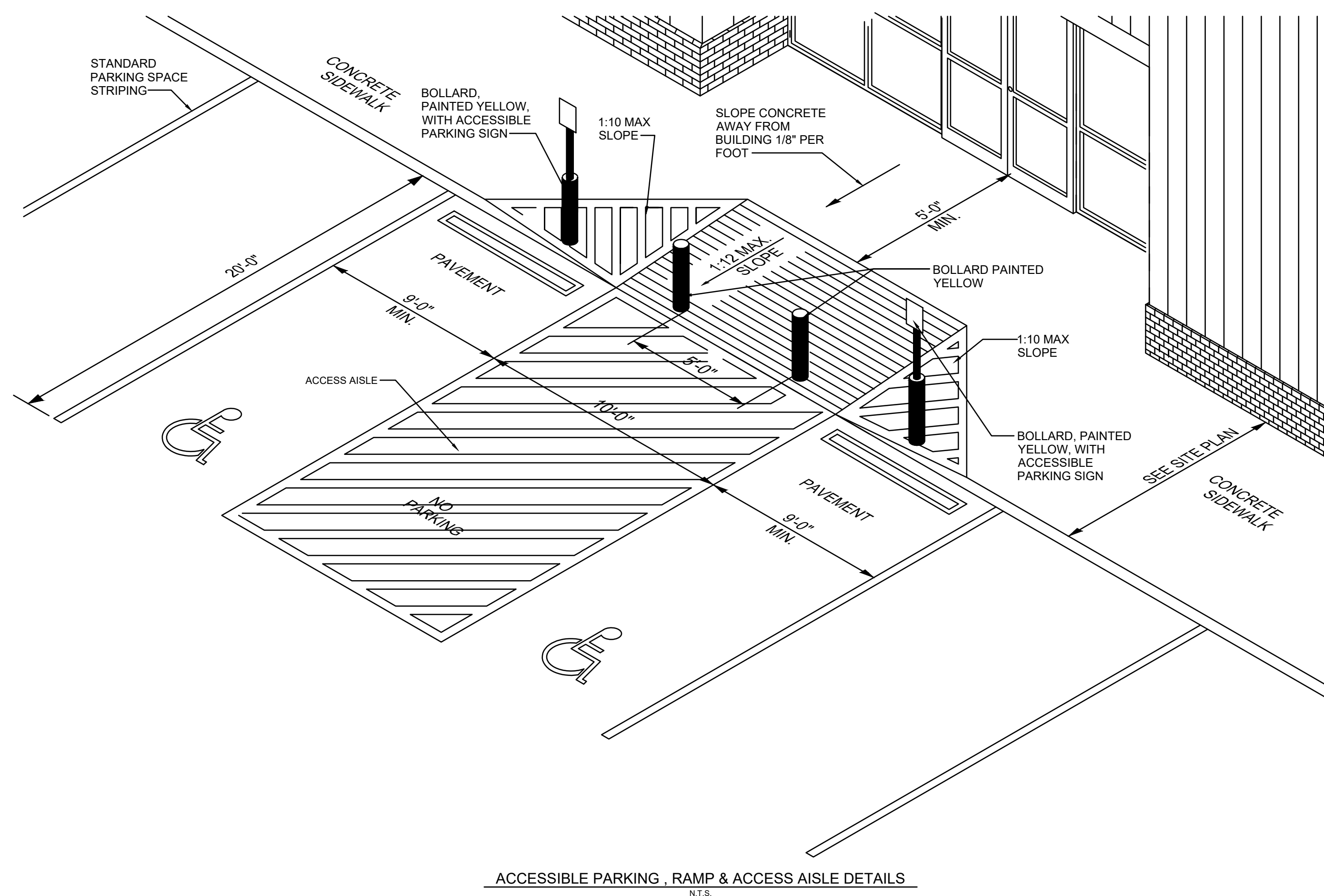
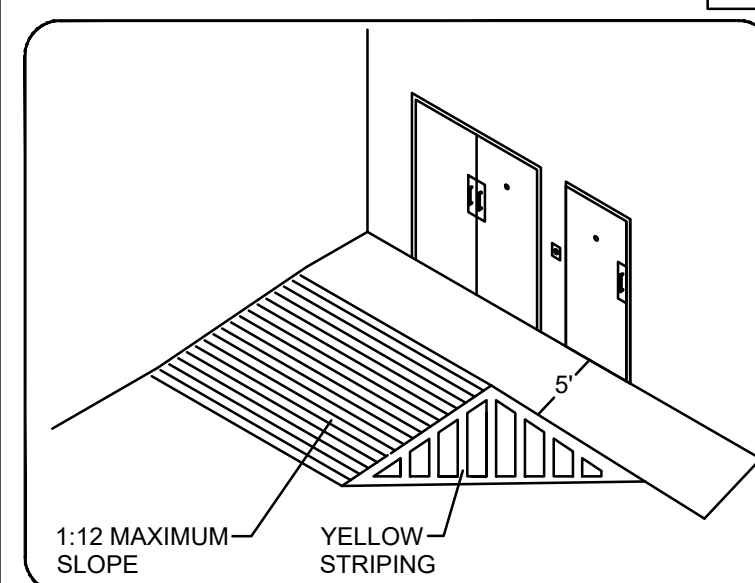


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2	06-21-23	REVISED PER CLIENT COMMENT	AP
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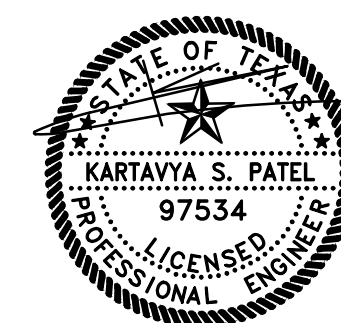
STRIPING LEGEND	
YELLOW CURBING AND BOLLARDS	SURFACES SHOULD BE CLEAN, DRY AND METAL SURFACES FREE OF HEAVY RUST 2 COATS SHERWIN WILLIAMS - KEM 4000 ACRYLIC ALKID ENAMEL SAFETY YELLOW B55Y300
PARKING LOT STRIPING - PARKING LOT	SURFACES SHOULD BE CLEAN, DRY. TOP COAT SHERWIN WILLIAMS - PROMAR TRAFFIC MARKING PAINT YELLOW TM5495
HANDICAP STRIPING - PARKING LOT	SURFACES SHOULD BE CLEAN, DRY. TOP COAT SHERWIN WILLIAMS - PROMAR TRAFFIC MARKING PAINT "H.C." BLUE



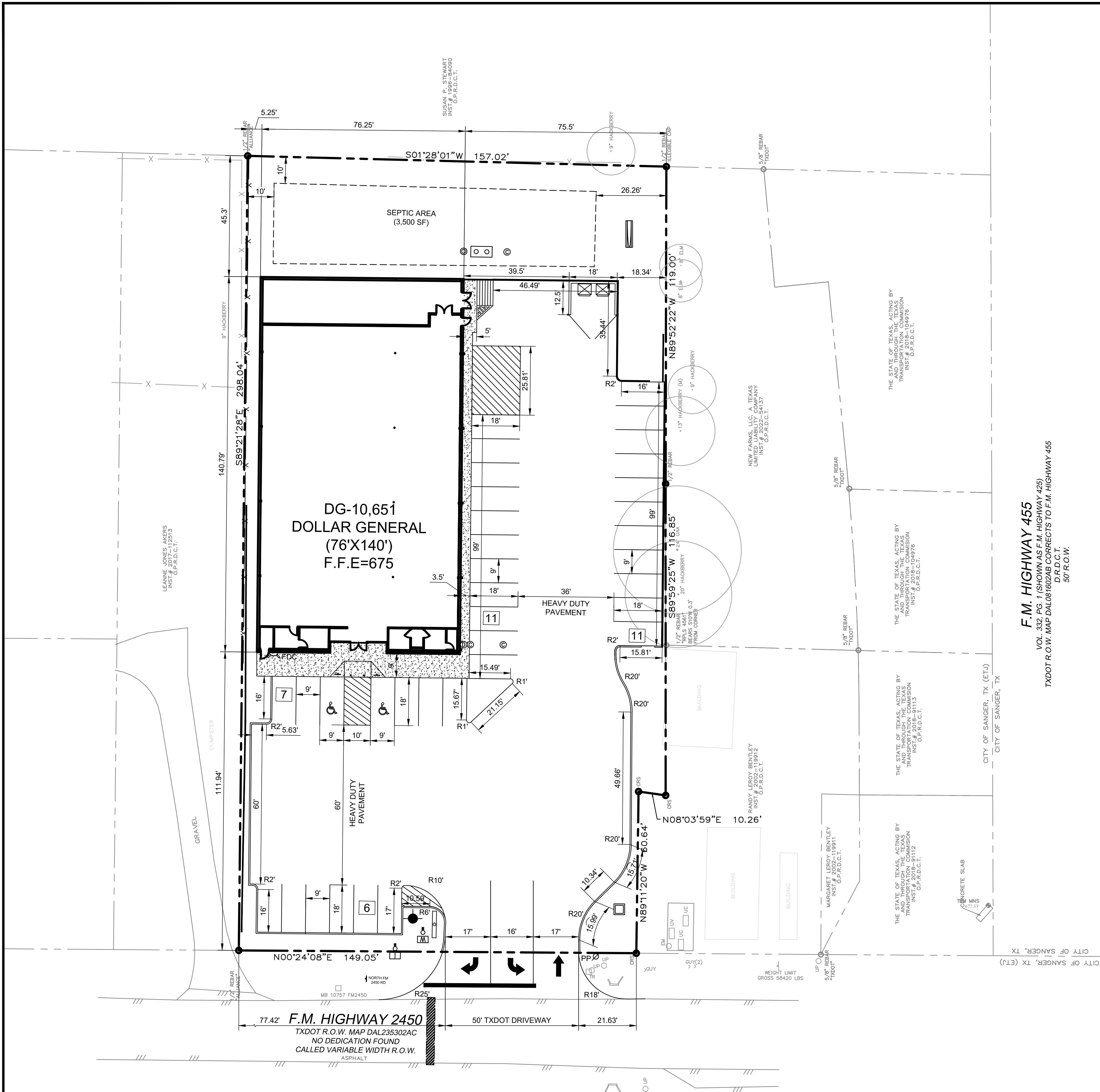
NOTE

1. "NO PARKING" SHALL BE PAINTED ON THE ACCESS AISLE IN CAPITAL LETTERS WITH HEIGHT OF ATLEAST 12" AND A STROKE OF AT LEAST 2" CENTERED DOWN THE AISLE
2. A SIGN MUST BE PROVIDED STATING VIOLATORS SUBJECT TO FINE AND TOWING" IN A HEIGHT OF ATLEAST 1" MOUNTED ON POLE OR WALL, INSTALLED SO THAT THE BOTTOM EDGE OF THE SIGN IS NO LOWER THAN 18" AND NO HIGHER THAN 80" ABOVE GROUND LEVEL.

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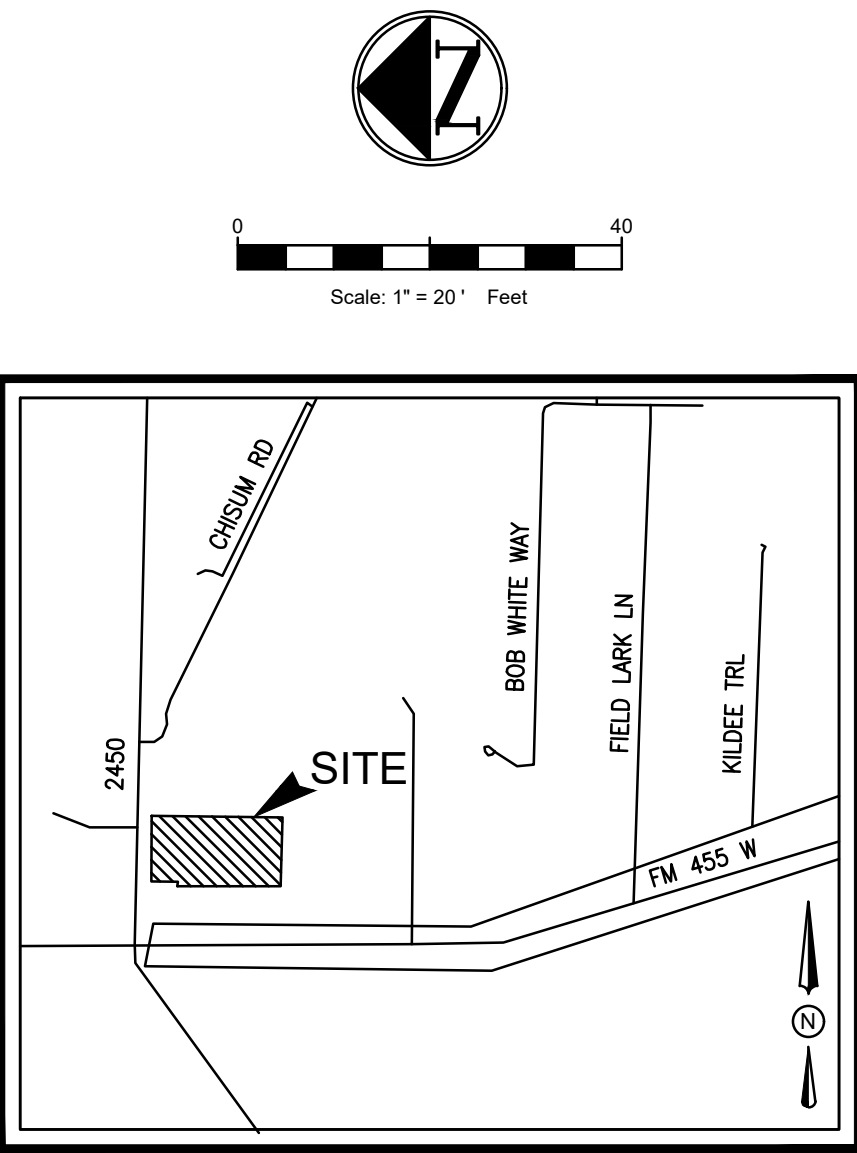
SITE DETAILS			
DOLLAR GENERAL			
NE QUADRANT OF FM 2450 & CHAPMAN ROAD			
CITY OF SANGER ETJ			
DENTON COUNTY, TEXAS 76266			
JAMES B.P. JANUARY SURVEY ABSTRACT NO #658			
			
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Planning Civil Engineering Construction Management			
P.E.	DES.	DATE	SHEET NO.
KP	AP	06-02-23	050-23
SEE SCALE BAR			C-3.1
TX, P.E. FIRM #11525			



EXISTING LEGEND	
	air conditioner
	borehole
	cable tv
	electric meter
	fence or handrail
	fire dept. connection
	fire hydrant
	fire lane
	guard rail
	grease trap
	bollard
	gate inlet
	gas meter
	gas line
	utility pole anchor
	irrigation valve
	landscape or tree line
	landscape electric box
	landscape light
	light pole
	mailbox
	monitoring well
	overhead utility lines
	pool equipment
	road sign
	roof drain
	silt fence
	spot elevation
	sanitary sewer manhole
	sanitary sewer pipe
	storm water manhole
	storm water pipe
	telephone manhole
	tank fill lid
	telephone riser
	traffic signal pole
	unknown manhole
	utility clean out
	utility cabinet
	utility vault
	utility markings (line color color of markings)
	utility pole
	utility pole with riser
	utility sign
	water shutoff
	water valve
	water manhole
	water meter
	well
	water line
	one-foot contour lines
	tree trunk (with canopy)
	caliper inches at breast height
	ornamental tree
	multiple trunks
	Google 360 Hyperlink

DIMENSION CONTROL LEGEND	
CONCRETE CURB	
SAW-CUT LINE	
FENCE	
STRIPING	
PARKING SPACES	
MONUMENT/PYLON SIGN	
WHEEL STOPS	
HANDICAP LOGO	
HANDICAP SIGN	
RAMP	
BOLLARD	
TRAFFIC ARROW	
FIRE HYDRANT	
DUMPSTER	
LIGHT POLE	
SANITARY SEWER MANHOLE	
SANITARY SEWER CLEANOUT	
SANITARY SEWER DOUBLE CLEANOUT	
SANITARY SEWER SAMPLE PORT	
SEPTIC UNIT	
DOMESTIC WATER METER	
IRRIGATION METER	
GAS METER	

- DIMENSION CONTROL GENERAL NOTES**
- ALL DIMENSIONS ARE MEASURED TO FACE OF CURB AS SHOWN. CONTACT ENGINEER/ARCHITECT IF THERE IS ANY DISCREPANCIES IN THE DIMENSIONS.
 - REFER TO ARCHITECTURAL FLOOR PLAN FOR EXACT BUILDING DIMENSIONS.
 - LIGHTED MONUMENT SIGN SHALL BE BY SEPARATE PERMIT.
 - BARRIER-FREE RAMPS ARE REQUIRED ON ALL STREET FRONTAGES. RAMPS WITH DETECTABLE WARNING SURFACES IS REQUIRED AT ALL INTERSECTIONS.

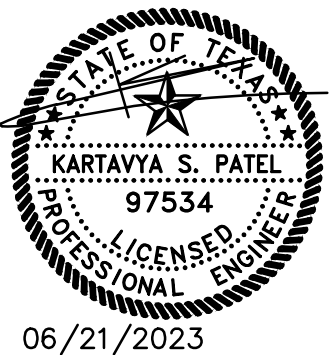


VICINITY MAP
N.T.S.

F.M. HIGHWAY 455
VOL 332, PG 1 (SHOWN AS F.M. HIGHWAY 425)
TXDOT R.O.W. MAP DAL081602AB CORRECTS TO F.M. HIGHWAY 455
D.R.D.C.T.
50' R.O.W.



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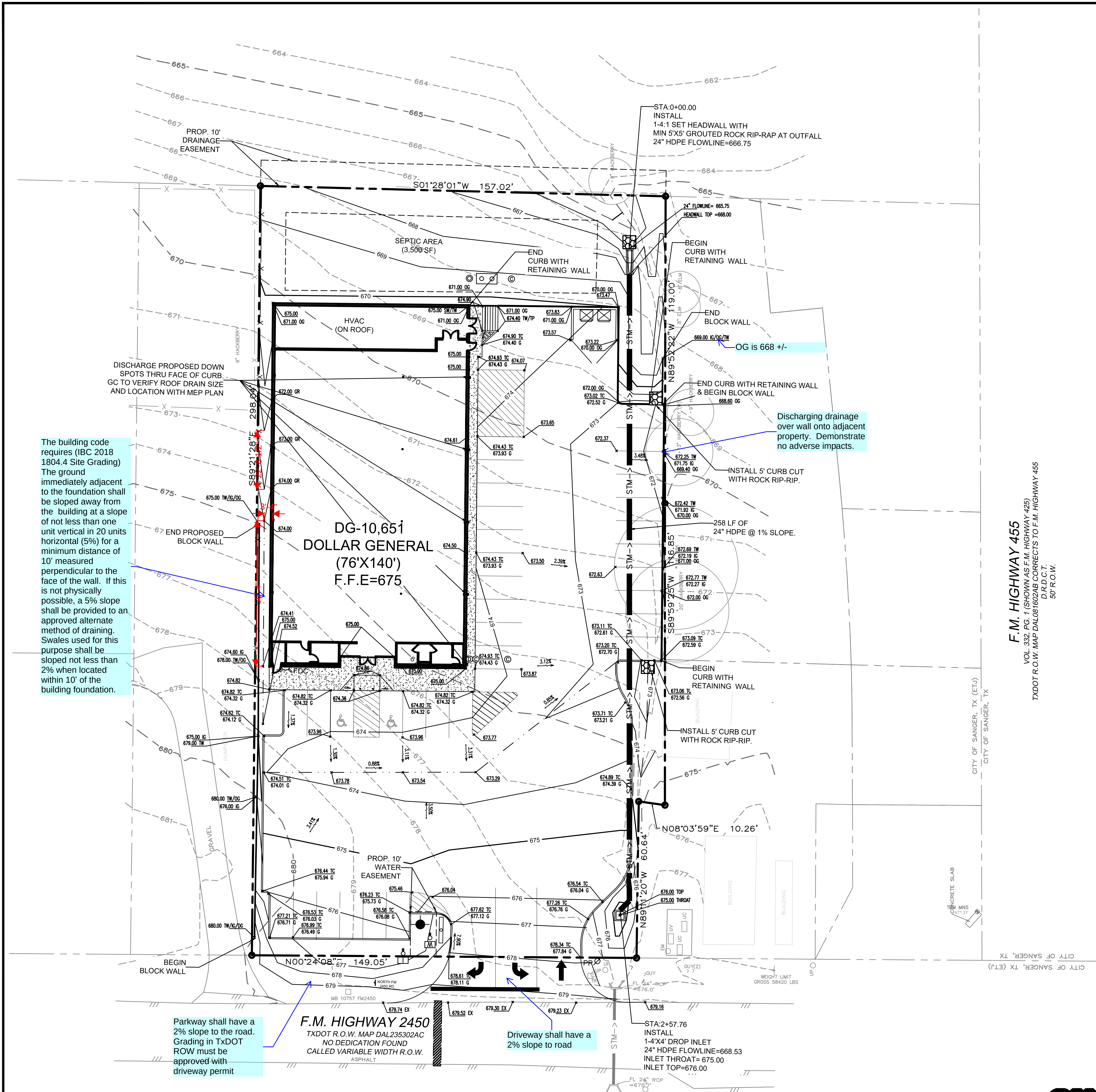
DIMENSION CONTROL PLAN
DOLLAR GENERAL
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CITY OF SANGER ETJ
DENTON COUNTY, TEXAS 76266
JAMES B.P. JANUARY SURVEY ABSTRACT NO # 658

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TX. P.E. FIRM #11525



The building code requires (IBC 2018 1804.4 Site Grading) The ground immediately adjacent to the foundation shall be sloped away from the building at a slope of not less than one unit vertical in 20 units horizontal (5%) for a minimum distance of 10' measured perpendicular to the face of the wall. If this is not physically possible, a 5% slope shall be provided to an approved alternate method of draining. Swales used for this purpose shall be sloped not less than 2% when located within 10' of the building foundation.

Parkway shall have a 2% slope to the road. Grading in TxDOT ROW must be approved with driveway permit

F.M. HIGHWAY 2450
TXDOT R.O.W. MAP DAL23302AC
NO DEDICATION FOUND
CALLED VARIABLE WIDTH R.O.W.
ASPHALT

Driveway shall have a 2% slope to road

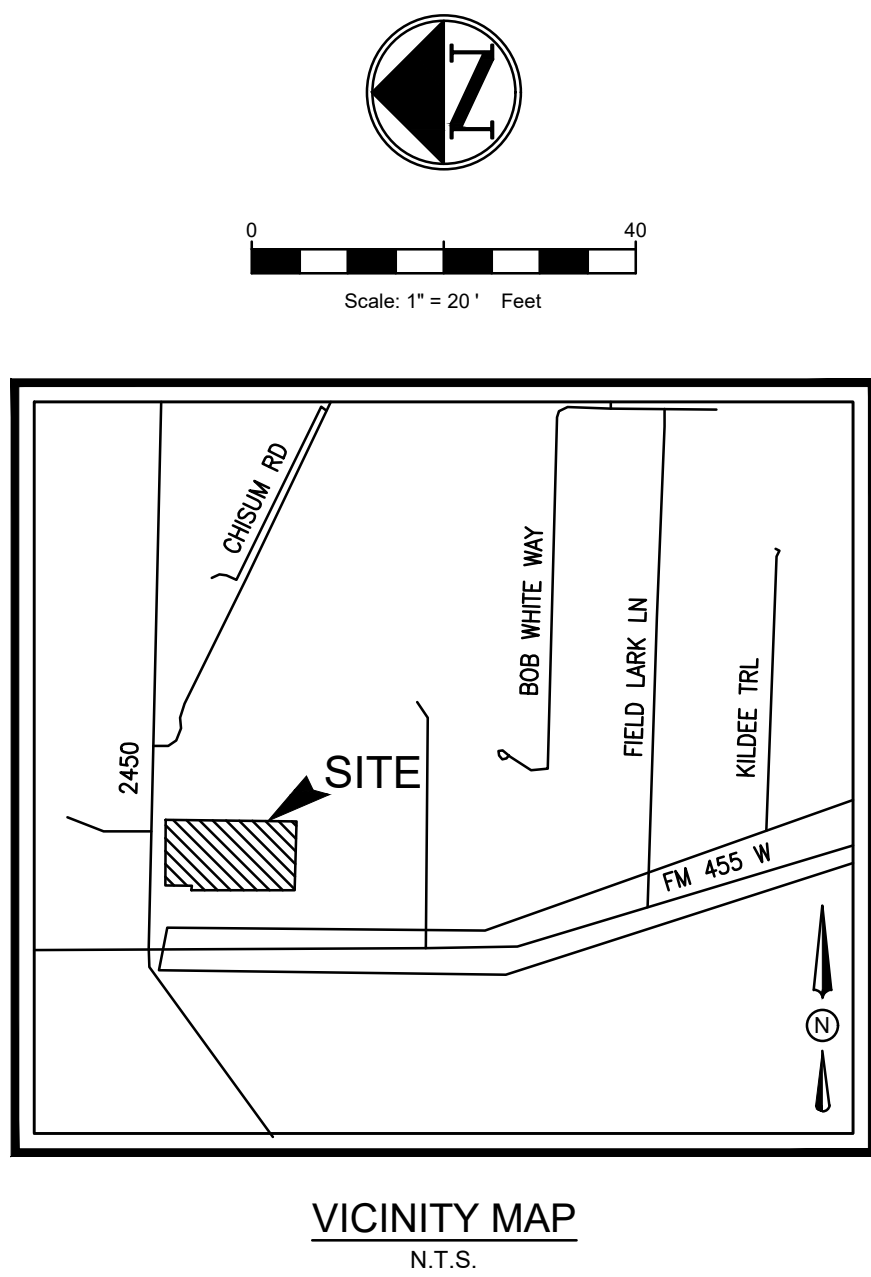
F.M. HIGHWAY 455
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TXDOT R.O.W. MAP DAL081602AB CORRECTS TO F.M. HIGHWAY 455
D.R.D.C.T.
50' R.O.W.

EXISTING LEGEND

air conditioner	storm water manhole
borehole	storm water pipe
cable tv	telephone manhole
electric meter	tank fill lid
fence or handrail	telephone riser
fire dept. connection	traffic signal pole
fire hydrant	unknown manhole
fire lane	utility clean out
guard rail	utility cabinet
grease trap	utility vault
bollard	utility markings (line color)
grate inlet	= color of markings)
gas meter	utility pole
gas line	utility pole with riser
utility pole anchor	utility sign
irrigation valve	water shutoff
landscape or tree line	water valve
landscape electric box	water manhole
landscape light	water meter
light pole	well
mailbox	water line
monitoring well	one-foot contour lines
overhead utility lines	tree trunk (with canopy)
pool equipment	caliper inches at breast
road sign	height
roof drain	ornamental tree
silt fence	multiple trunks
36" spot elevation	Google 360 Hyperlink
sanitary sewer manhole	
sand	sanitary sewer pipe

GRADING LEGEND

EXISTING ELEVATION	464.00 EX
EXISTING MINOR CONTOURS	464
EXISTING MAJOR CONTOURS	465
MINOR CONTOURS	464
MAJOR CONTOURS	465
SWALE	
HIGH POINT	HP—HP—HP—HP
STORM PIPE	STM—>
RETAINING WALL	
RIP RAP	
FINISH FLOOR ELEVATION	467.00 FF
TOP OF CURB ELEVATION	466.00 TC
GUTTER ELEVATION	465.50 G
SIDEWALK ELEVATION	465.00 SW
TOP OF PAVEMENT	464.00 TP
GROUND ELEVATION	463.00 GR
DRAINAGE FLOW DIRECTION	1%
CURB INLET	
STORM MANHOLE	
STORM CLEANOUT	
SANITARY SEWER MANHOLE	
SANITARY SEWER CLEANOUT	
SANITARY SEWER DOUBLE CLEANOUT	
SANITARY SEWER SAMPLE PORT	
SEPTIC UNIT	
DOMESTIC WATER METER	
IRRIGATION METER	
GAS METER	
TRANSFORMER	
LIGHT POLE	
POWER POLE	



BENCHMARKS

SITE BENCH MARK IS A MAG NAIL WITH A WASHER STAMPED "JPH LAND BENCHMARK" SET IN A CONCRETE SLAB IN THE NORTHEAST CORNER OF THE INTERSECTION OF F.M. HIGHWAY 455 AND F.M. HIGHWAY 2450. BENCHMARK ELEVATION=677.33'. SEE SURVEY FOR GENERAL LOCATION.

FLOOD PLAIN NOTE

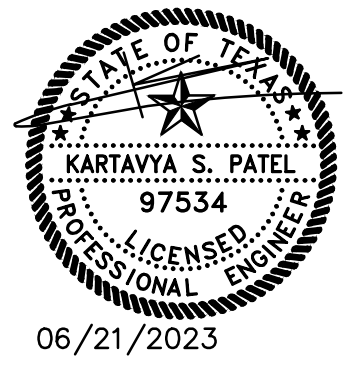
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GRADING GENERAL NOTES

- ALL SURPLUS EXCAVATION AND WASTE MATERIAL SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND IT SHALL BE HIS SOLE RESPONSIBILITY TO REMOVE SUCH SURPLUS EXCAVATION AND WASTE MATERIAL FROM THE SITE TO A PUBLIC DUMP SITE APPROVED FOR THE DISPOSAL OF SUCH MATERIALS. IF SURPLUS EXCAVATION IS REMOVED FROM THIS SITE TO ANOTHER PROPERTY, IT SHALL BE PLACED ON SUCH PROPERTY WITH THE WRITTEN CONSENT OF THE OWNER(S) OF SUCH PROPERTY. A COPY OF SUCH WRITTEN CONSENT SHALL BE PROVIDED TO THE OWNER. IF THE CONTRACTOR WISHES TO DISPOSE OF SURPLUS EXCAVATION ON-SITE, IT SHALL BE ONLY WITH THE PRIOR APPROVAL OF THE OWNERS PROJECT REPRESENTATIVE AND CARE SHOULD BE TAKEN TO AVOID BLOCKING NATURAL DRAINAGE AND INCREASING STEEP SLOPES. THE CONTRACTOR IS REQUIRED TO PROVIDE HIS OWN STAKING AND TO VERIFY PROJECT ELEVATIONS. "MATCH EXISTING" SHALL BE UNDERSTOOD TO APPLY TO BOTH VERTICAL ELEVATION AND HORIZONTAL ALIGNMENT.
- THE CONTRACTOR SHALL PREPARE ALL LANDSCAPE AREAS INCLUDING STREET RIGHT-OF-WAY AREAS TO AN ACCEPTABLE SUBGRADE CONDITION IN ACCORDANCE WITH THE LANDSCAPE PLANS. IF THE CONTRACTOR IS NOT EMPLOYED TO PROVIDE AND INSTALL LANDSCAPING, HE SHALL PREPARE A FINISHED AND COMPACTED SUB-GRADE IN THE LANDSCAPING AREAS.
- NO SLOPES TO EXCEED 3H:1V WITHOUT SLOPE STABILIZATION.



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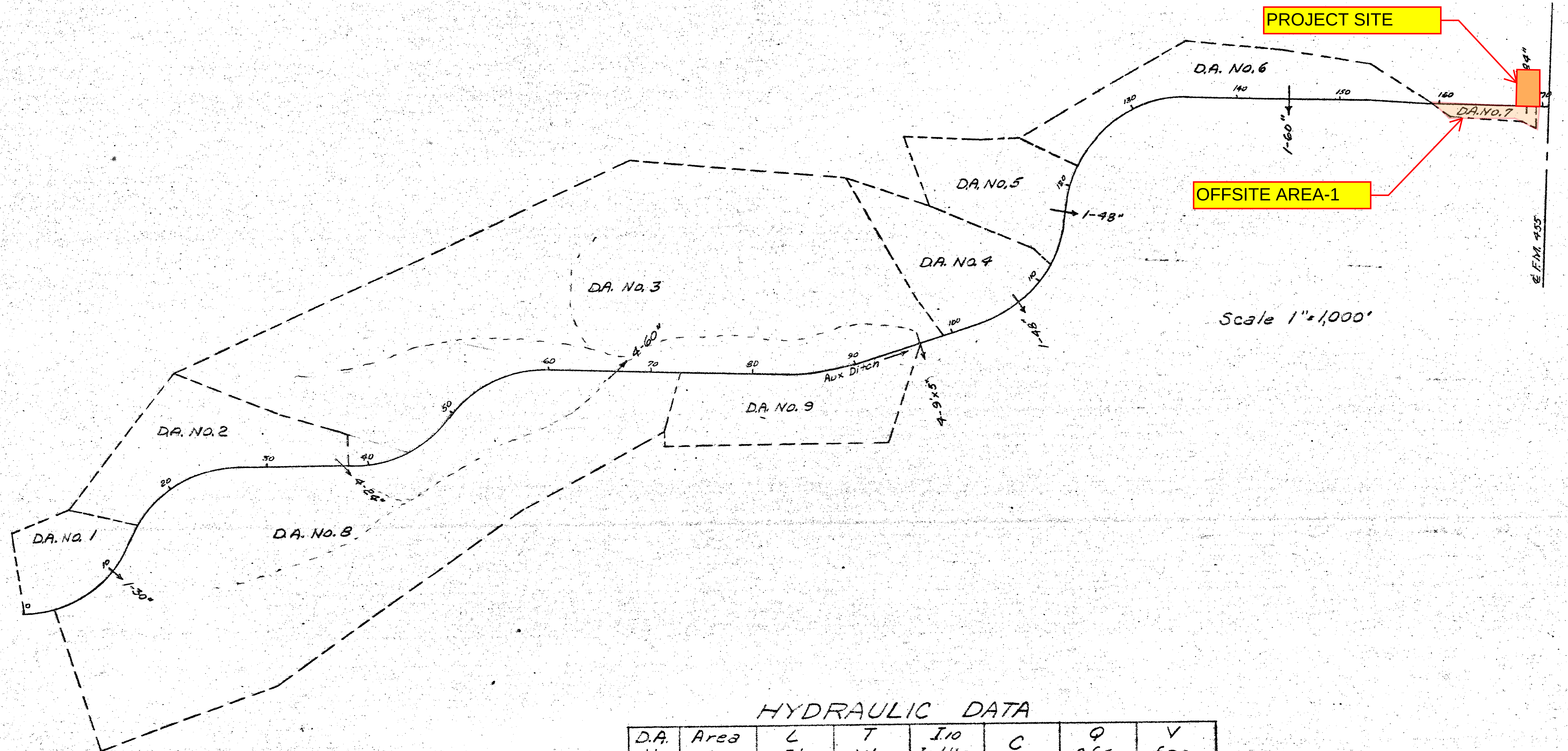
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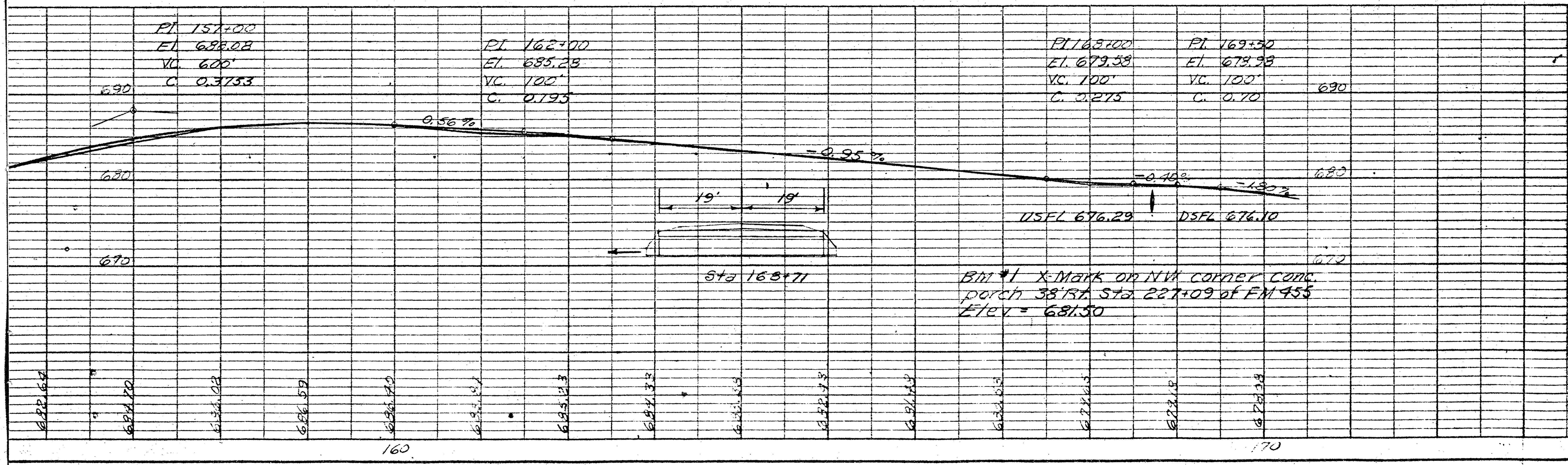
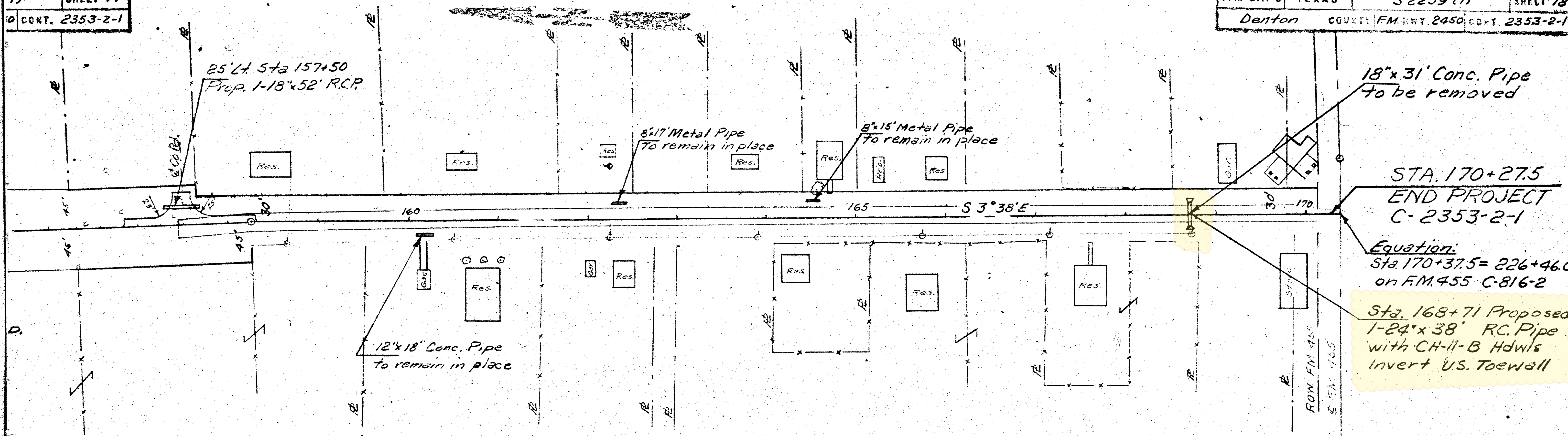


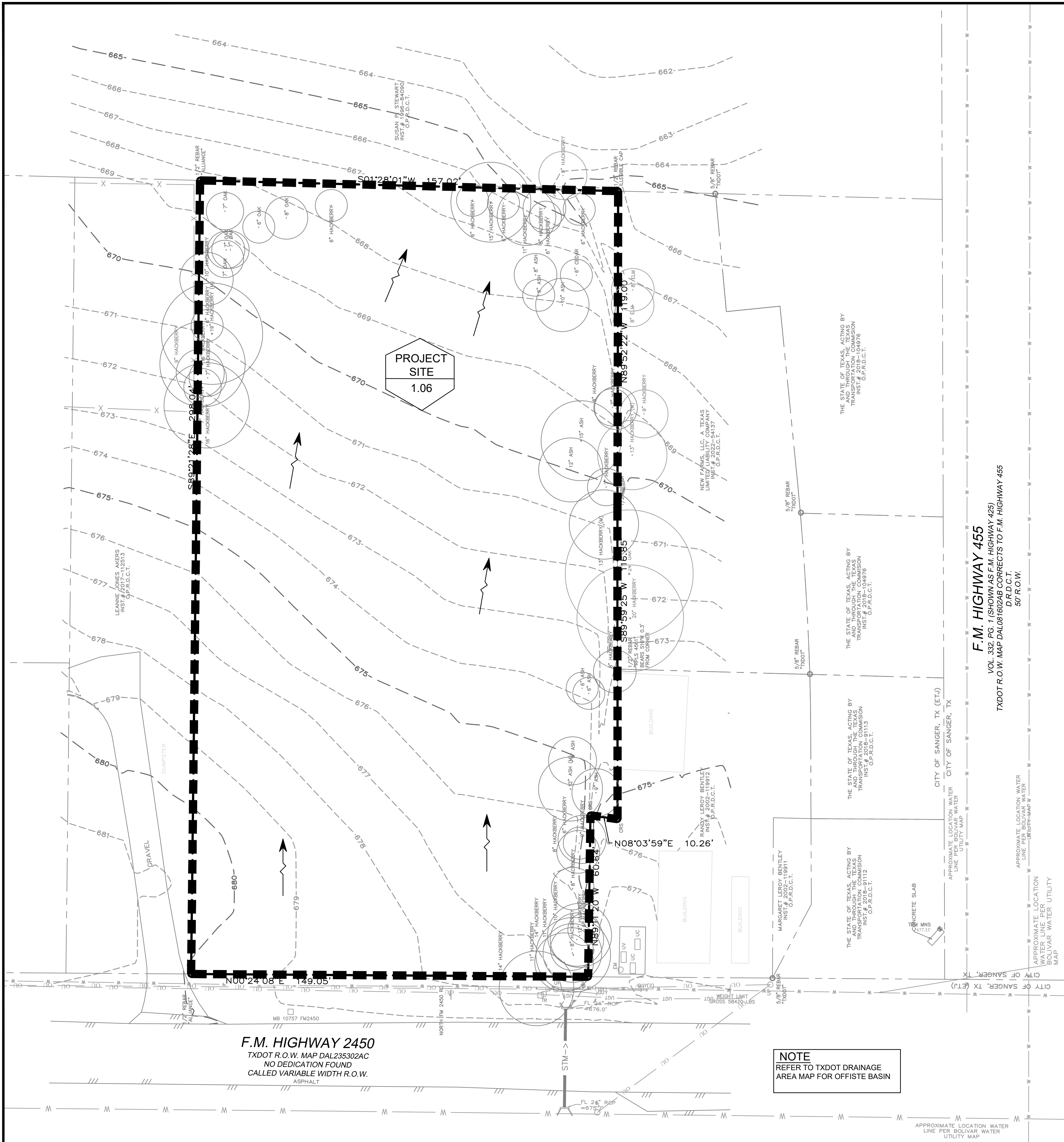
HYDRAULIC DATA

D.A. No.	Area Ac.	L Ft.	T Min.	I ₁₀ In./Hr.	C	Q c.f.s.	V f.p.s.
1	18	1050	30	3.7	0.50	33	8.0
2	43	3130	30	3.7	0.45	72	6.5
1,2+8	280	6650	55	2.8	0.45	353	8.2*
1,2,3+8	525	9700	81	2.3	0.45	544	7.9
4	30	2050	30	3.7	0.40	45	7.0
5	30	1780	30	3.7	0.50	56	8.0
6	34	2700	30	3.7	0.50	63	7.3
7	3	950	30	3.7	0.50	6	4.6
9	39	2750	30	3.7	0.45	65	5.6

*Outfall channel is rock bottom

DRAINAGE AREA MAP





EXISTING LEGEND

air conditioner	storm water manhole
borehole	storm water pipe
cable tv	telephone manhole
electric meter	tank fill lid
fence or handrail	telephone riser
fire dept. connection	traffic signal pole
fire hydrant	unknown manhole
fire lane	utility clean out
guard rail	utility cabinet
grease trap	utility vault
bollard	utility markings (line color = color of markings)
gas inlet	utility pole
gas meter	utility pole with riser
gas line	utility sign
utility pole anchor	water shutoff
irrigation valve	water valve
landscape or tree line	water manhole
landscape electric box	water meter
landscape light	well
light pole	water line
mailbox	one-foot contour lines
monitoring well	tree trunk (with canopy)
overhead utility lines	caliper inches at breast
pool equipment	height
road sign	ornamental tree
roof drain	multiple trunks
silt fence	Google 360 Hyperlink
spot elevation	
sanitary sewer manhole	
sanitary sewer pipe	

PRE-DRAINAGE LEGEND

EXISTING MINOR CONTOURS: 464, 465

EXISTING MAJOR CONTOURS: 464, 465

DRAINAGE DIVIDE: [Symbol]

DRAINAGE AREA NO.: PROJECT SITE 1.06

DRAINAGE AREA ACREAGE: [Symbol]

DRAINAGE FLOW DIRECTION: [Symbol]

FLOOD PLAIN NOTE

THIS PROPERTY LIES WITHIN ZONE(S) X (UNSHADED) OF THE FLOOD INSURANCE RATE MAP FOR DENTON COUNTY, TEXAS AND INCORPORATED AREAS, MAP NO.48121C0205G, DATED 2011/04/18, VIA SCALED MAP LOCATION AND GRAPHIC PLOTTING AND/OR THE NATIONAL FLOOD HAZARD LAYER (NFHL) WEB MAP SERVICE (WMS) AT <http://hazards.fema.gov>.

Table 1 -Existing Hydrologic Parameters

Sub Basin	Area (ac)	Area(mi ²)	C	Time of concentration (min)
Offsite 1	3	0.0046	0.5	30
Project Site	1.06	0.0016	0.35	30

Table 4- Existing Peak Discharge (cfs)

Hydrologic Element	Peak Discharge (cfs)		
	1-year	25-year	100-year
Offsite 1	3.510	6.675	8.175
Project Site	0.868	1.651	2.022

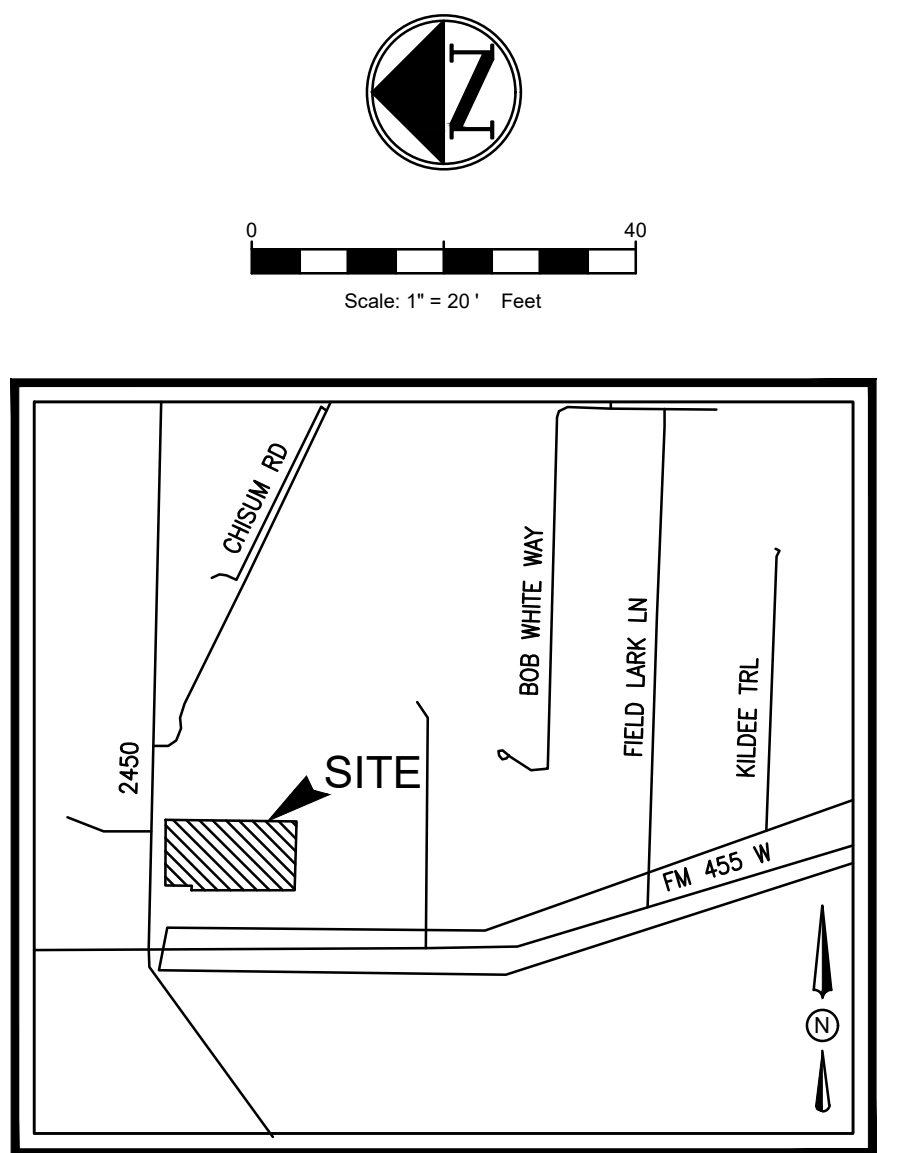


Table 3- Rainfall Intensity Data

N.T.S.

Duration	Rainfall Intensity (inch/hr)		
	1-year	25-year	100-year
5-min	5.06	9.73	12.0
15-min	3.37	6.45	7.90
30-min	2.34	4.45	5.45
60-min	1.52	2.92	3.59
2-hr	0.928	1.86	2.32
3-hr	0.683	1.41	1.78
6-hr	0.403	0.859	1.10
12-hr	0.235	0.507	0.651
24-hr	0.137	0.298	0.383

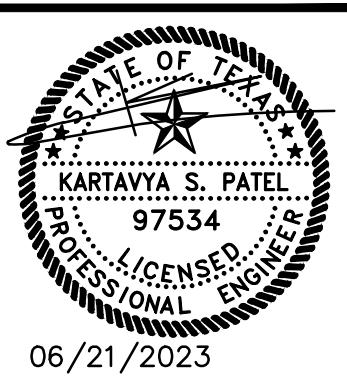
NOTE
REFER TO DOWNSTREAM ASSESSMENT REPORT FOR DOLLAR GENERAL PREPARED BY TRIANGLE ENGINEERING DATED JUN 06/08/2023 FOR MORE DETAILS

F.M. HIGHWAY 2450
TXDOT R.O.W. MAP DAL235302AC
NO DEDICATION FOUND
CALLED VARIABLE WIDTH R.O.W.

NOTE
REFER TO TXDOT DRAINAGE AREA MAP FOR OFFSITE BASIN



NO.	DATE	DESCRIPTION	BY
1	06-08-23	1st CITY SUBMITTAL	AP
2	06-21-23	REVISED PER CLIENT COMMENT	AP
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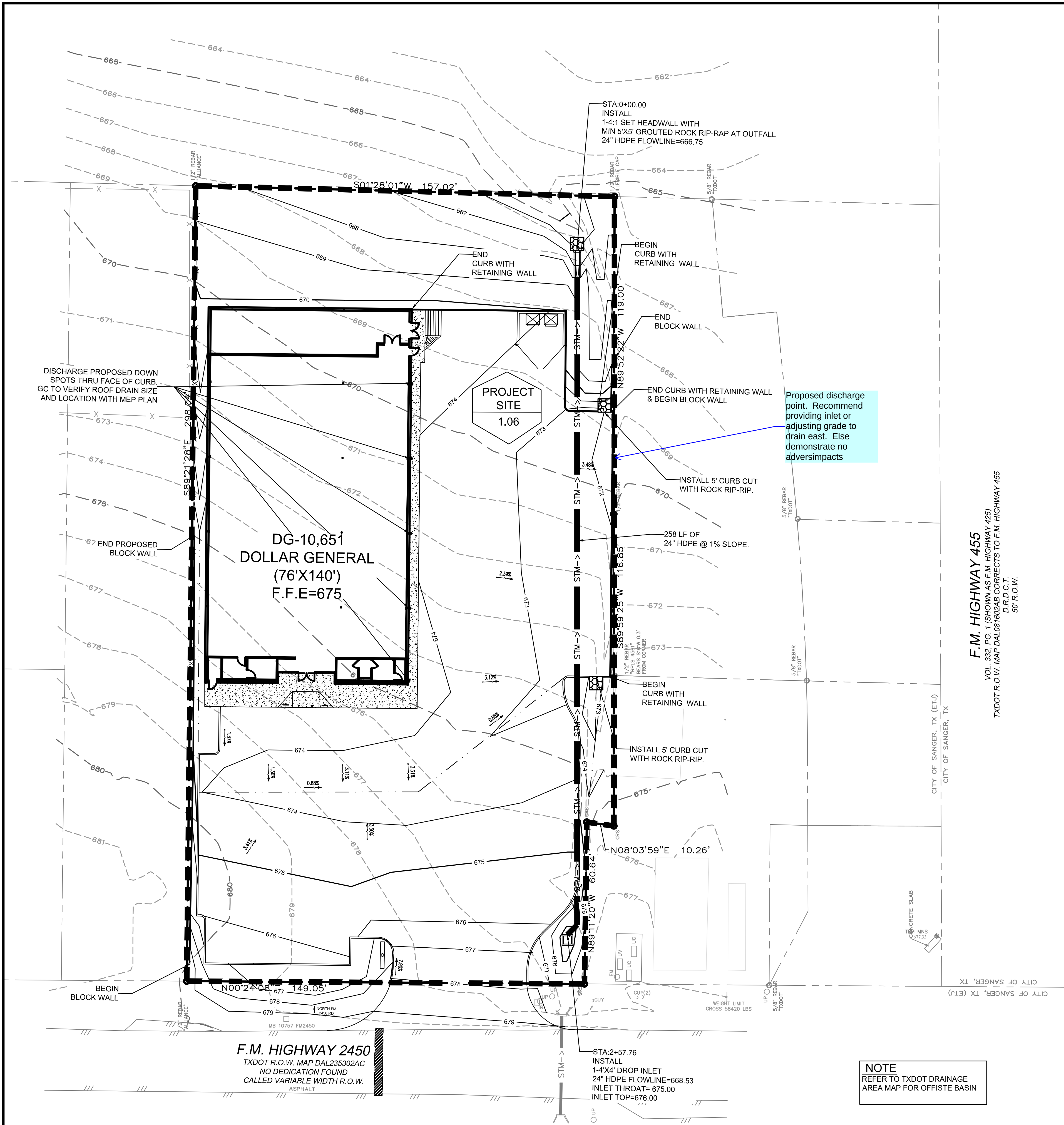
PRE-DRAINAGE PLAN
DOLLAR GENERAL
NE QUADRANT OF FM 2450 & CHAPMAN ROAD
CITY OF SANGER ETJ
DENTON COUNTY, TEXAS 76266
JAMES B.P. JANUARY SURVEY ABSTRACT NO # 658

TRIANGLE ENGINEERING LLC
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W: triangle-engr.com | O: 1784 McDermott Drive, Suite 110, Allen, TX 75013

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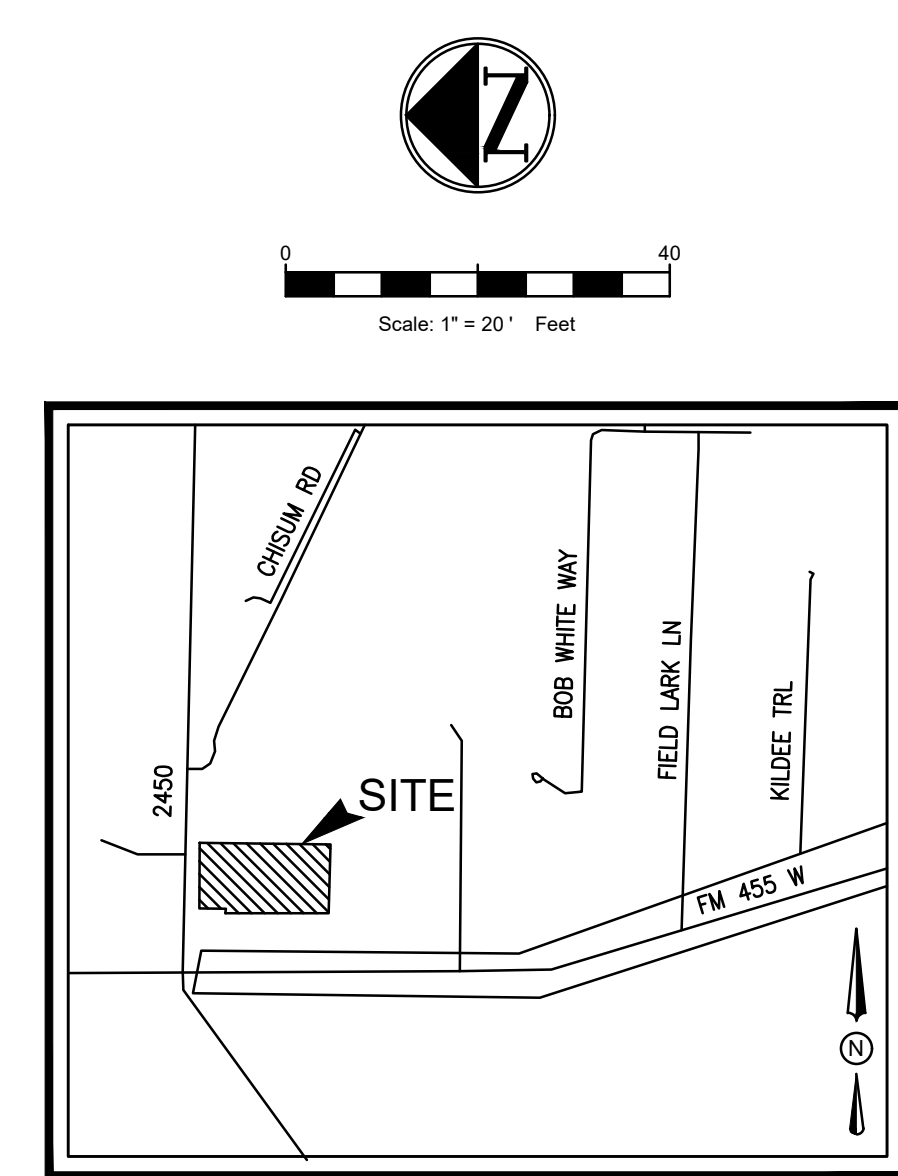
P.E.	DES.	DATE	SCALE	PROJECT NO.	SHEET NO.
KP	AP	06-02-23	SCALE BAR	050-23	C-5.0

TX. P.E. FIRM #11525



EXISTING LEGEND

- air conditioner
- borehole
- cable tv
- electric meter
- fence or handrail
- fire dept. connection
- fire hydrant
- fire lane
- guard rail
- grease trap
- bollard
- grate inlet
- gas meter
- gas line
- utility pole anchor
- irrigation valve
- landscape or tree line
- landscape electric box
- landscape light
- light pole
- mailbox
- monitoring well
- overhead utility lines
- pool equipment
- road sign
- roof drain
- silt fence
- spot elevation
- sanitary sewer manhole
- sanitary sewer pipe
- storm water manhole
- storm water pipe
- telephone manhole
- tank fill lid
- telephone riser
- traffic signal pole
- unknown manhole
- utility clean out
- utility cabinet
- utility vault
- utility markings (line color)
- color of markings
- utility pole
- utility pole with riser
- utility sign
- water shutoff
- water valve
- water manhole
- water meter
- well
- water line
- one-foot contour lines
- tree trunk (with canopy)
- caliper inches at breast
- height
- ornamental tree
- multiple trunks
- Google 360 Hyperlink



POST-DRAINAGE LEGEND

EXISTING MINOR CONTOURS: 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

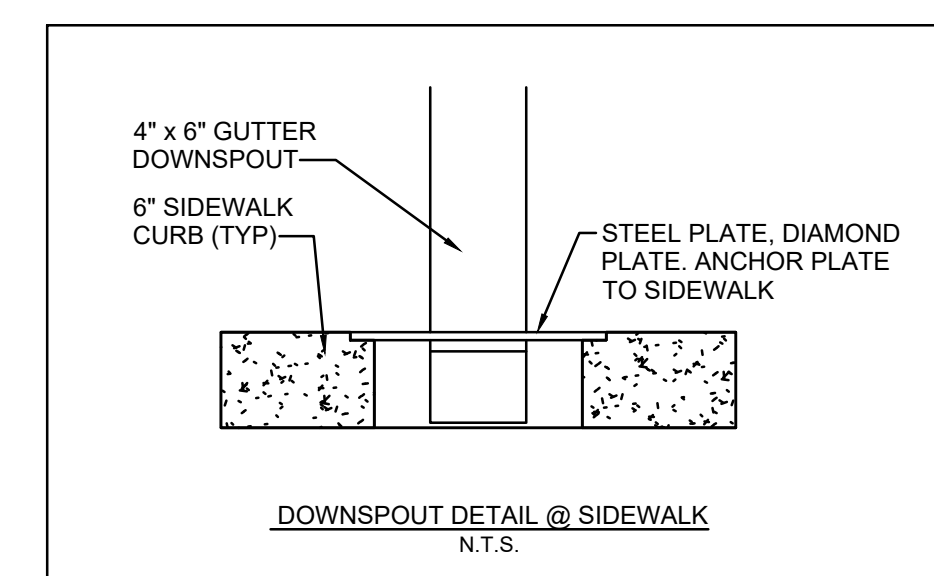


Table 2-Proposed Hydrologic Parameters

Sub Basin	Area (ac)	Area (mi ²)	C	Time of concentration (min)
Offsite 1	3	0.0046	0.5	30
Project Site	1.06	0.0016	0.75	10

Table 5- Proposed Peak Discharge (cfs)

Hydrologic Element	Peak Discharge (cfs)		
	1-year	25-year	100-year
Offsite 1	3.510	6.675	8.175
Project Site	3.198	6.09	7.469

FLOOD PLAIN NOTE

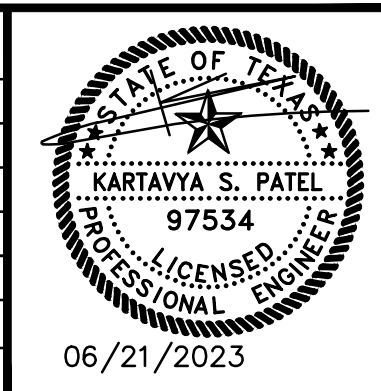
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NOTE
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NOTE
REFER TO TXDOT DRAINAGE AREA MAP FOR OFFSITE BASIN



NO.	DATE	DESCRIPTION	BY
1	06-08-23	1st CITY SUBMITTAL	AP
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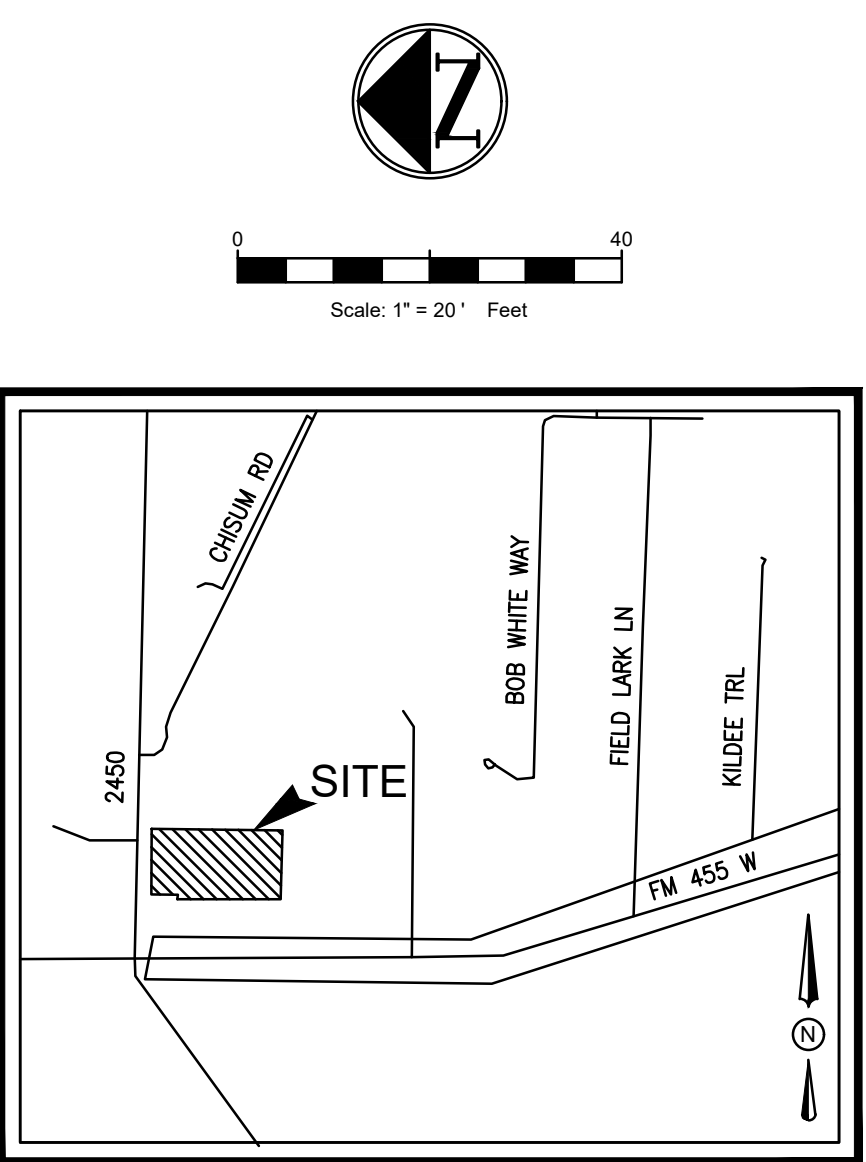
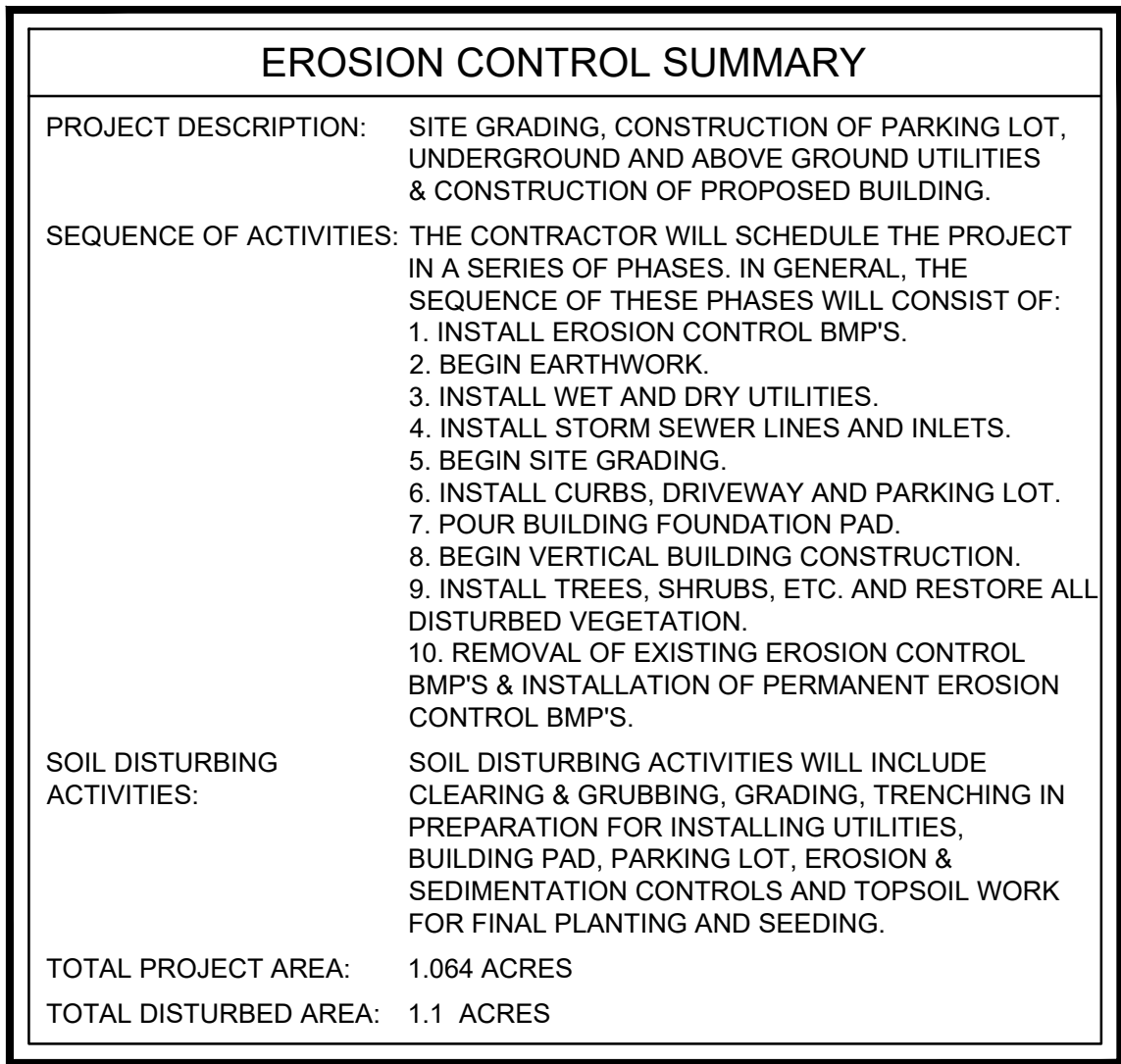
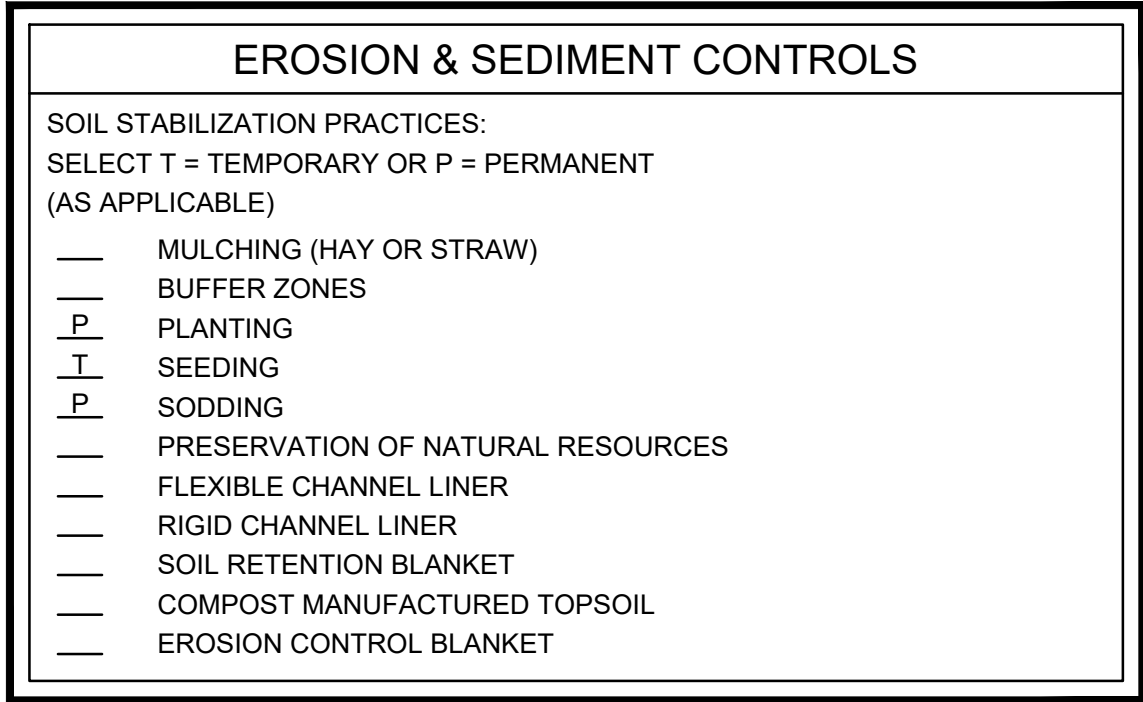
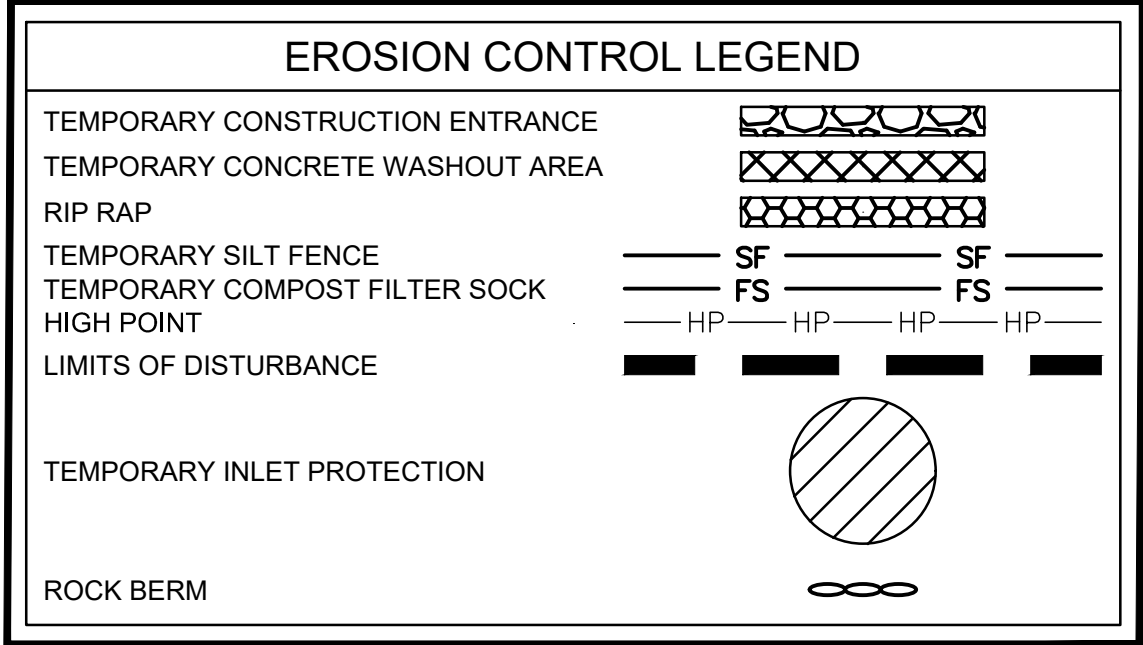
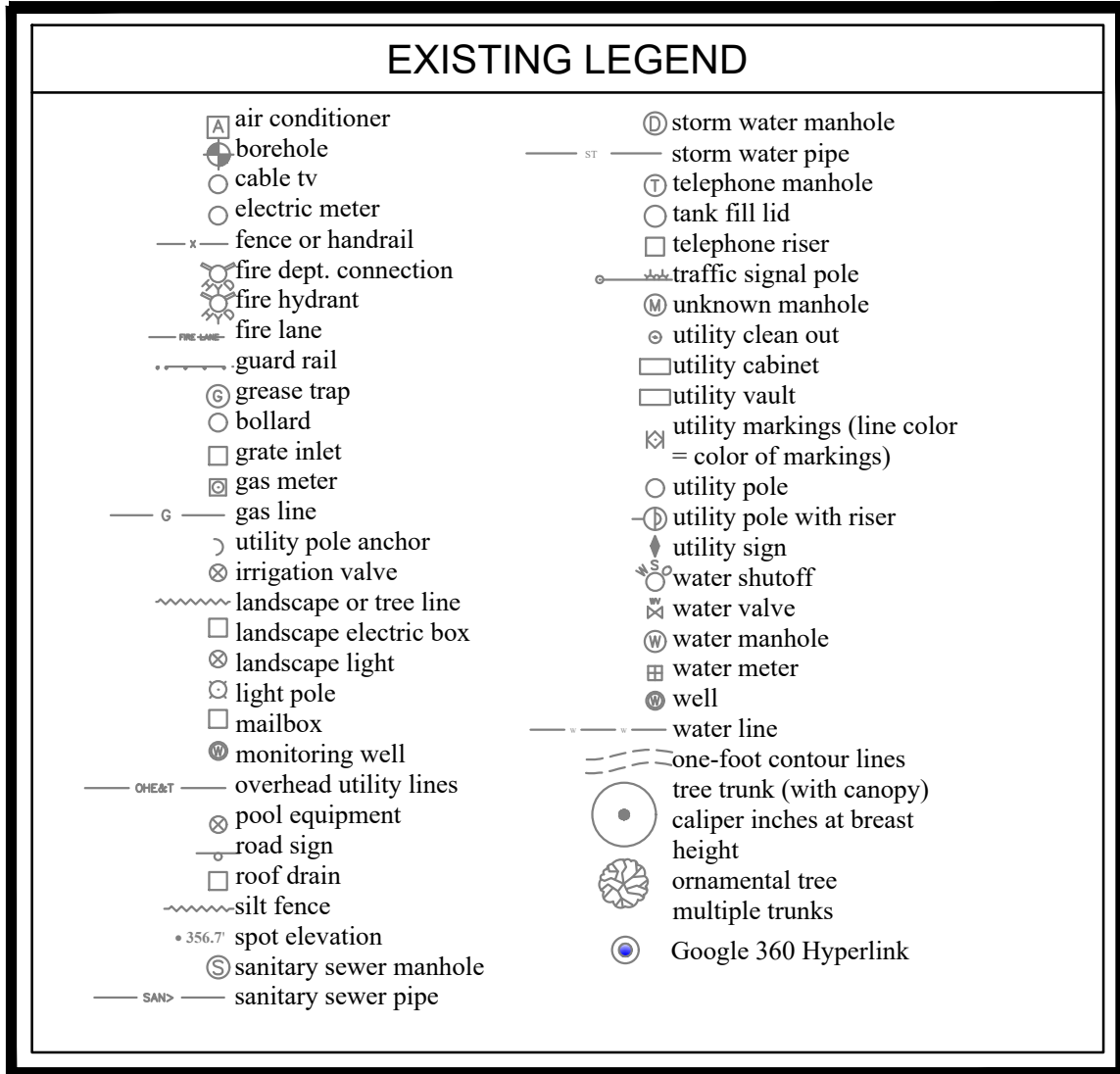
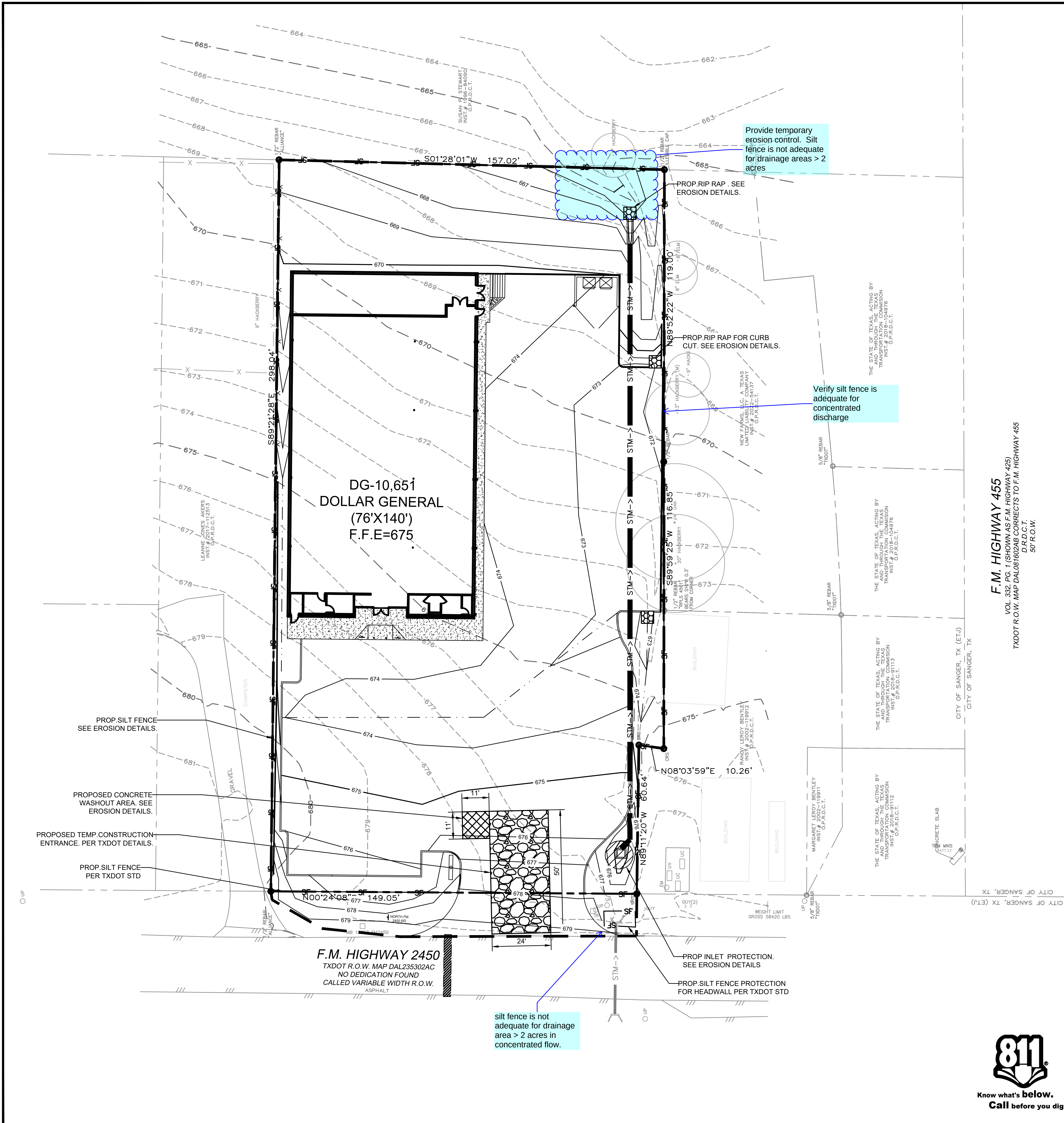
POST-DRAINAGE PLAN
DOLLAR GENERAL
NE QUADRANT OF FM 2450 & CHAPMAN ROAD
CITY OF SANGER ETJ
DENTON COUNTY, TEXAS 76266
JAMES B.P. JANUARY SURVEY ABSTRACT NO # 658

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P.E.	DES.	DATE	SCALE	PROJECT NO.	SHEET NO.
KP	AP	06-02-23	SCALE BAR	050-23	C-6.0

TX. P.E. FIRM #11525



- EROSION CONTROL GENERAL NOTES**
1. EVERY SOIL DISTURBING ACTIVITY SHALL HAVE AN ACCOMPANYING EROSION CONTROL PLAN.
 2. THE STORM WATER POLLUTION PREVENTION PLAN (SWP3) SHALL BE READILY AVAILABLE FOR REVIEW BY FEDERAL, STATE, OR LOCAL OFFICIALS.
 3. NO SOIL DISTURBING ACTIVITIES WILL OCCUR PRIOR TO THE SWP3 AND ASSOCIATED BEST MANAGEMENT PRACTICES (BMP) BEING FULLY IMPLEMENTED AND THEN INSPECTED.
 4. THE CONTRACTOR SHALL COMPLY WITH THE CITY'S STORM WATER ORDINANCE, THE TPDES GENERAL CONSTRUCTION PERMIT TXR150000 AND ANY OTHER STATE AND/OR LOCAL REGULATIONS.
 5. THE SITE SHALL BE INSPECTED BY THE CONTRACTOR OR HIS REPRESENTATIVE WEEKLY, AND AFTER ANY MAJOR STORM. ADJUSTMENTS/REPAIRS TO THE EROSION CONTROL MEASURES SHOULD BE MADE AS NEEDED.
 6. CONTRACTOR SHALL VEGETATE ALL DISTURBED AREAS IMMEDIATELY UPON COMPLETION OF GRADING ACTIVITIES. FINAL ACCEPTANCE OF A SITE SHALL BE CONTINGENT UPON VEGETATION BEING ESTABLISHED IN ALL DISTURBED AREAS.
 7. ADEQUATE MEASURES SHALL BE TAKEN TO PREVENT EROSION. IN THE EVENT THAT SIGNIFICANT EROSION OCCURS AS A RESULT OF CONSTRUCTION THE CONTRACTOR SHALL RESTORE THE ERODED AREA TO ORIGINAL CONDITION OR BETTER.
 8. TEMPORARY STONE STABILIZED CONSTRUCTION ENTRANCE SHALL HAVE THE FOLLOWING MINIMUM DIMENSIONS: 24" WIDE X 50' LONG X 6" DEEP. (3'-5" COURSE AGGREGATE). PLACE FILTER FABRIC UNDER STONE.
 9. THE CONCRETE WASHOUT AREA IS TO BE USED AS A VEHICLE WASH DOWN AREA FOR DEBRIS AND SOIL REMOVAL PRIOR TO EXITING THE SITE.

EROSION CONTROL PLAN

DOLLAR GENERAL

NE QUADRANT OF FM 2450 & CHAPMAN ROAD

CITY OF SANGER ETJ

DENTON COUNTY, TEXAS 76266

JAMES B.P. JANUARY SURVEY ABSTRACT NO # 658

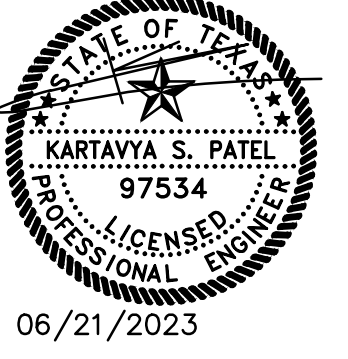
TRIANGLE ENGINEERING LLC

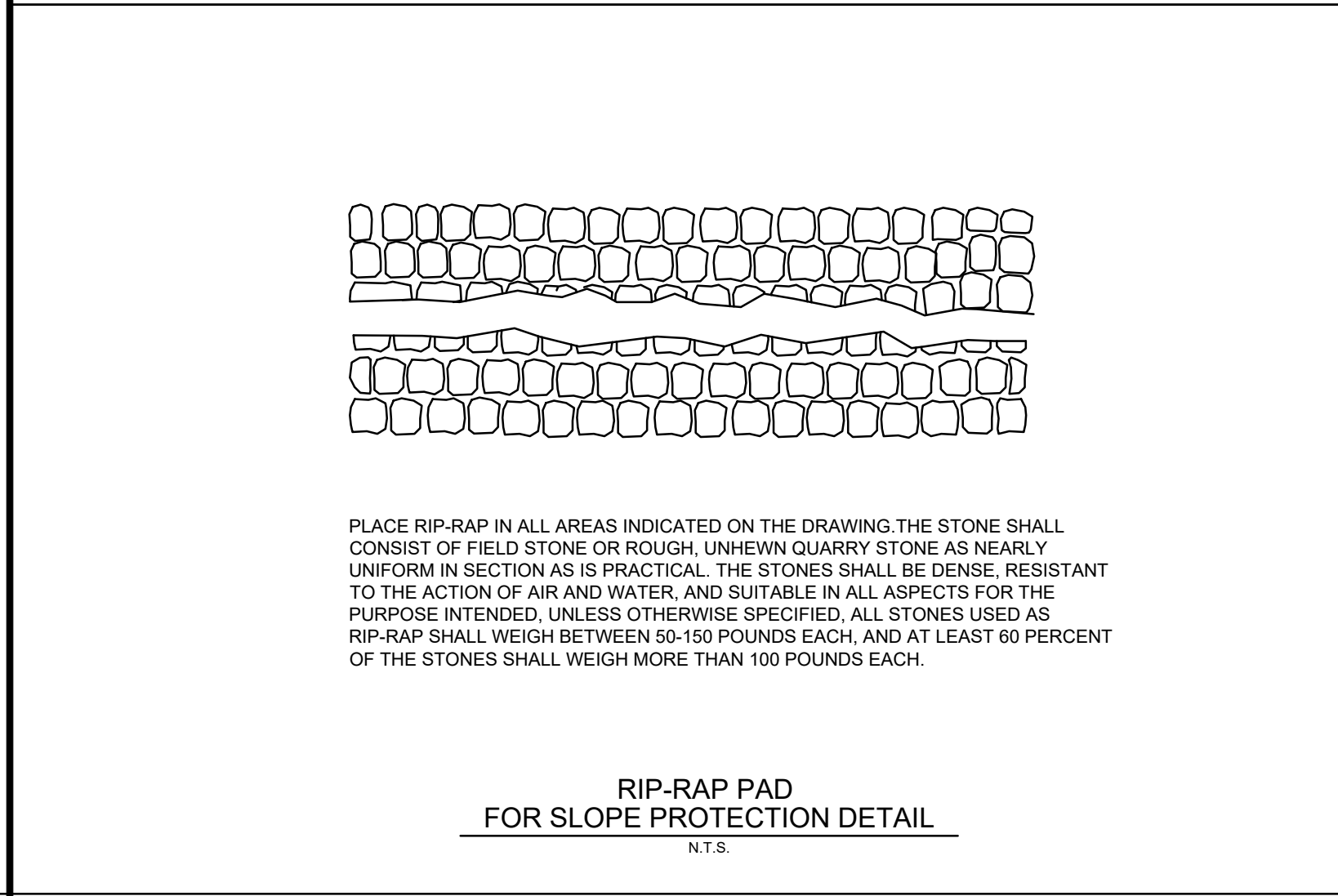
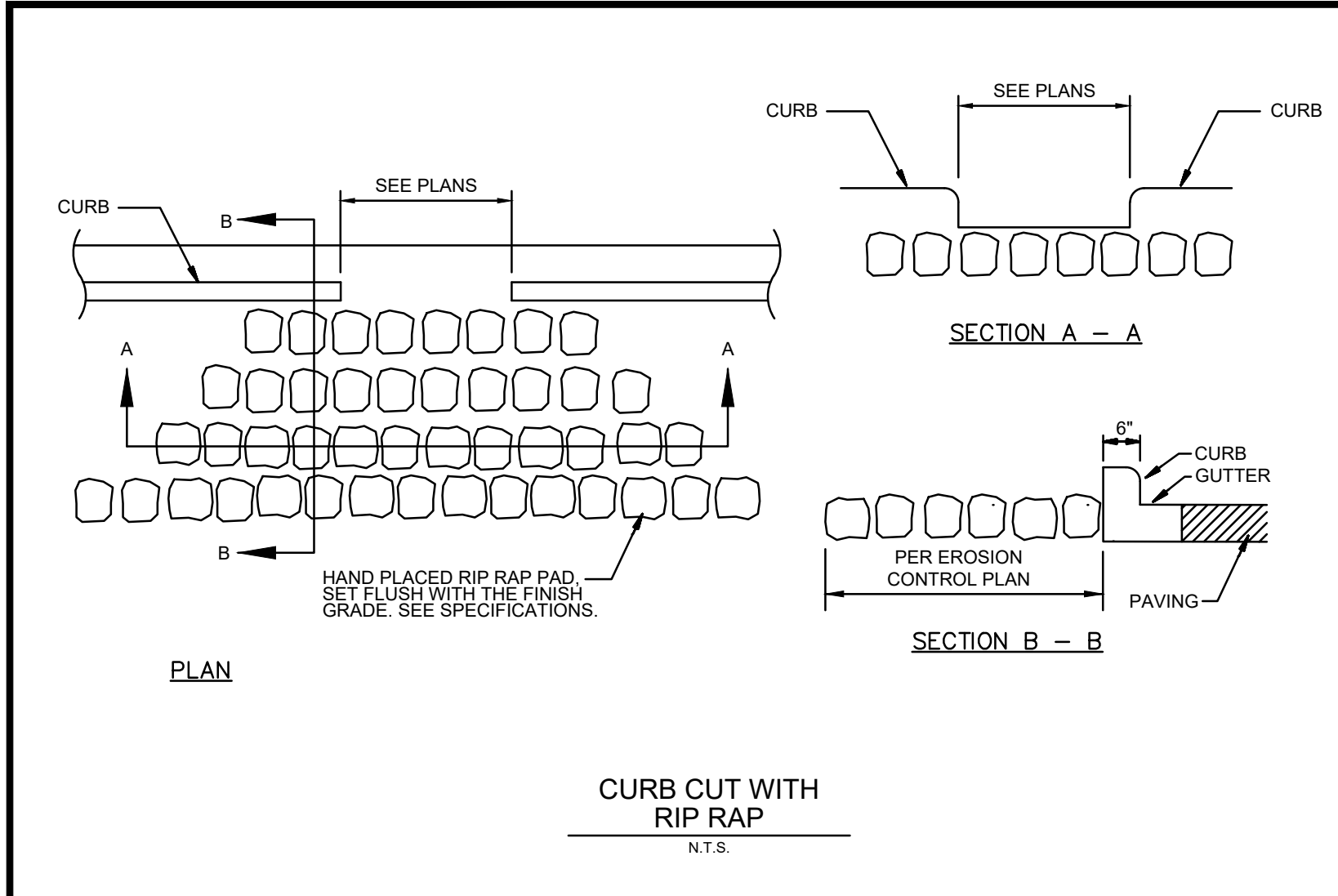
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P.E.	DES.	DATE	SCALE	PROJECT NO.	SHEET NO.
KP	AP	06-02-23	SCALE BAR	050-23	C-7.0

TX. P.E. FIRM #11525





USAGE NOTES:

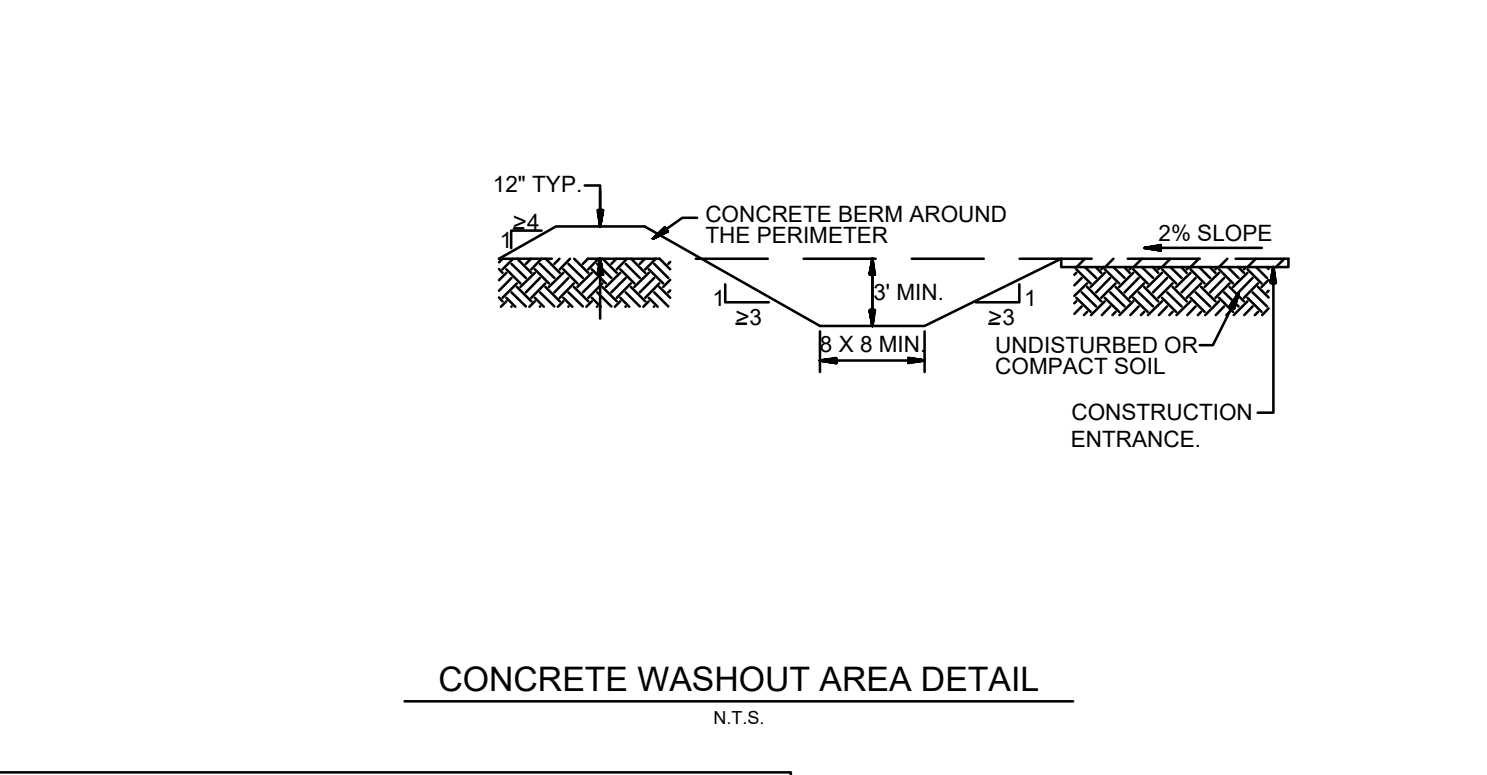
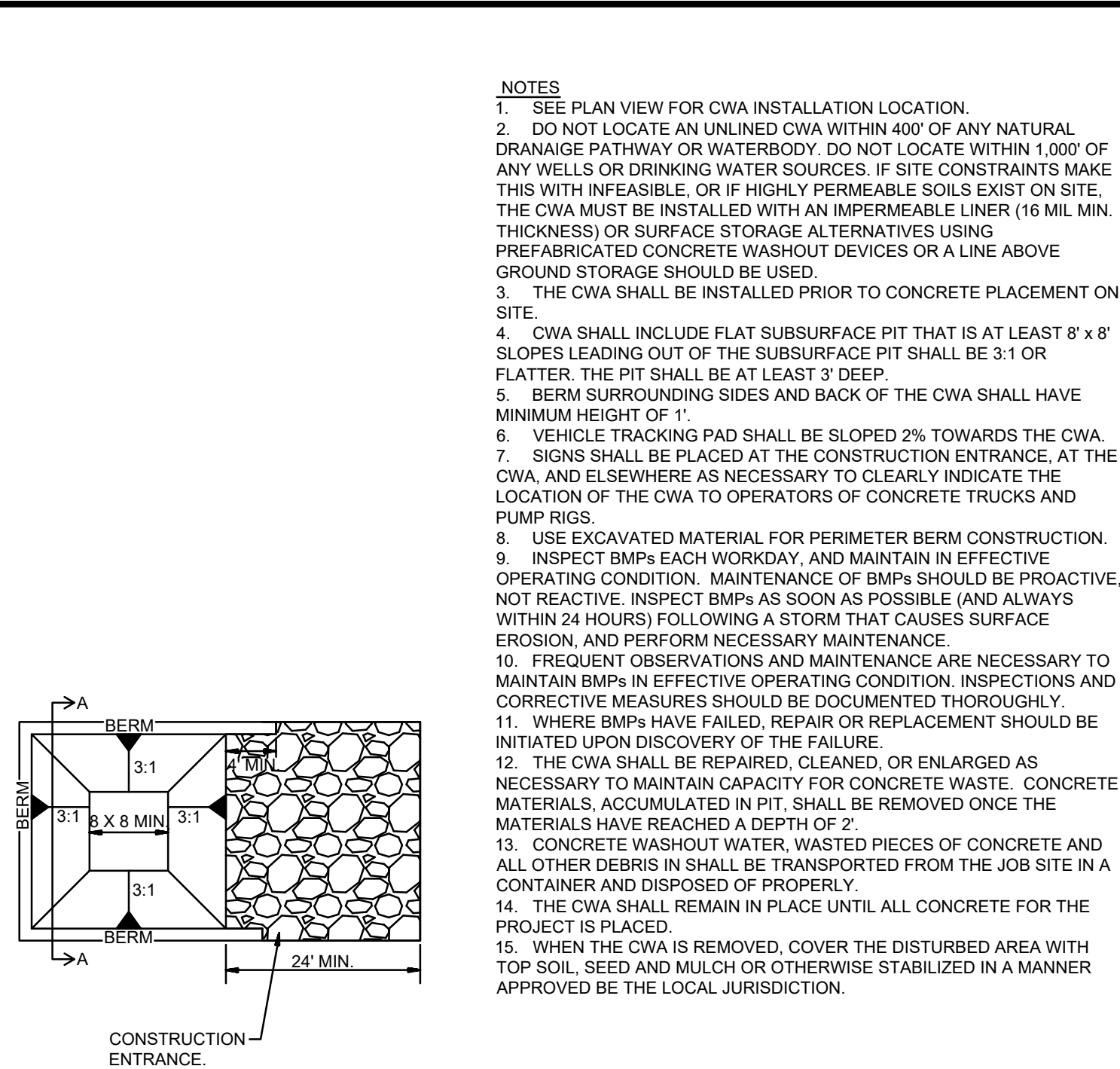
- ANCHORING STAKES SHALL BE SIZED, SPACED, AND BE OF A MATERIAL THAT EFFETIVELY SECURES THE FILTER SOCK. STAKE SPACING SHALL BE A MAXIMUM OF THREE FEET.
- OVERLAP ENDS OF SOCK PER MANUFACTURERS RECOMMENDATIONS. (1 MIN. 3 MAX.)
- USE 8" TO 12" DIA. SOCK ON CUBSIDE IN TRAFFIC AREAS.
- USE 12" - 18" DIA. SOCK IN NON-TRAFFIC AREAS OR AREAS WHERE SAFETY IS NOT A CONCERN.

DESIGN CRITERIA:

COMPOST FILTER SOCKS ARE DESIGNED TO RETAIN SEDIMENT TRANSPORTED IN SHEET FLOW FROM DISTURBED AREAS. COMPOST FILTER SOCKS PERFORM THE SAME FUNCTION AS SILT FENCE, ALLOW A HIGHER FLOW RATE, AND ARE USUALLY FASTER AND CHEAPER TO INSTALL. WHERE ALL RUNOFF IS TO BE TREATED BY THE COMPOST FILTER SOCK THE MAXIMUM SLOPE LENGTH BEHIND THE COMPOST FILTER SOCK SHALL NOT EXCEED THOSE SHOWN IN TABLE 1. THE DRAINAGE AREA SHALL NOT EXCEED ¼ ACRE FOR EVERY 100 FT OF COMPOST FILTER SOCK.

THE SEDIMENT AND POLLUTANT REMOVAL PROCESS CHARACTERISTIC TO COMPOST FILTER SOCKS COMBINES BOTH FILTERING AND DEPOSITION FROM SETTLING SOLIDS. THIS IS DIFFERENT THAN METHODS THAT RELY ON PONDING FOR DEPOSITION OF SOLIDS FOR SEDIMENT CONTROL. SUCH AS SILT FENCE. PONDING OCCURS WHEN WATER FLOWING TO THE COMPOST FILTER SOCK ACCUMULATES FASTER THAN THE HYDRAULIC FLOW THROUGH RATE OF THE COMPOST FILTER SOCK. HYDRAULIC FLOW-THROUGH RATS FOR COMPOST FILTER SOCKS ARE 50% GREATER THAN SILT FENCE FILTER FABRIC. GREATER HYDRAULIC FLOW-THROUGH RATES REDUCE PONDING. COMPOST FILTER SOCKS SHALL MEET THE NETTING SPECIFICATIONS IN TABLE 22. COMPOST FILTER SOCKS SHALL MEET THE SPECIFICATIONS IN TABLE 3. COMPOST USED IN COMPOST FILTER SOCKS SHALL MEET THE SPECIFICATION DESCRIBED UNDER COMPOST FILTER MEDIA SPECIFICATIONS.

A 12 INCH DIAMETER COMPOST FILTER SOCK SHALL BE USED ON DEVELOPMENTS WHERE THE LIFE OF THE PROJECT IS GREATER THAN OR EQUAL TO SIX MONTHS. A 12 INCH DIAMETER COMPOST FILTER SOCK MAY ALSO BE USED ON MINOR PROJECTS, SUCH AS RESIDENTIAL HOME SITES OR SMALL COMMERCIAL DEVELOPMENTS.



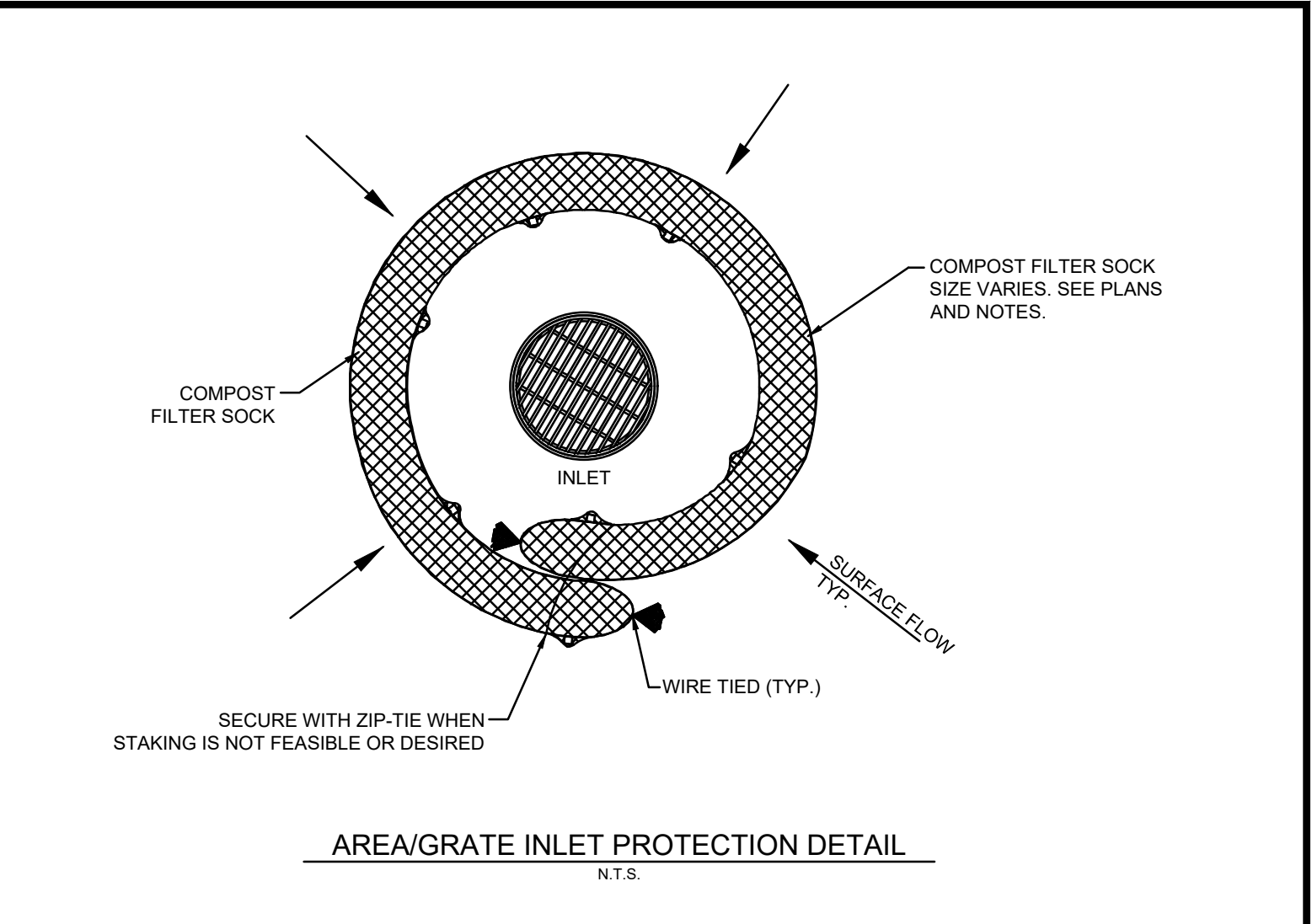
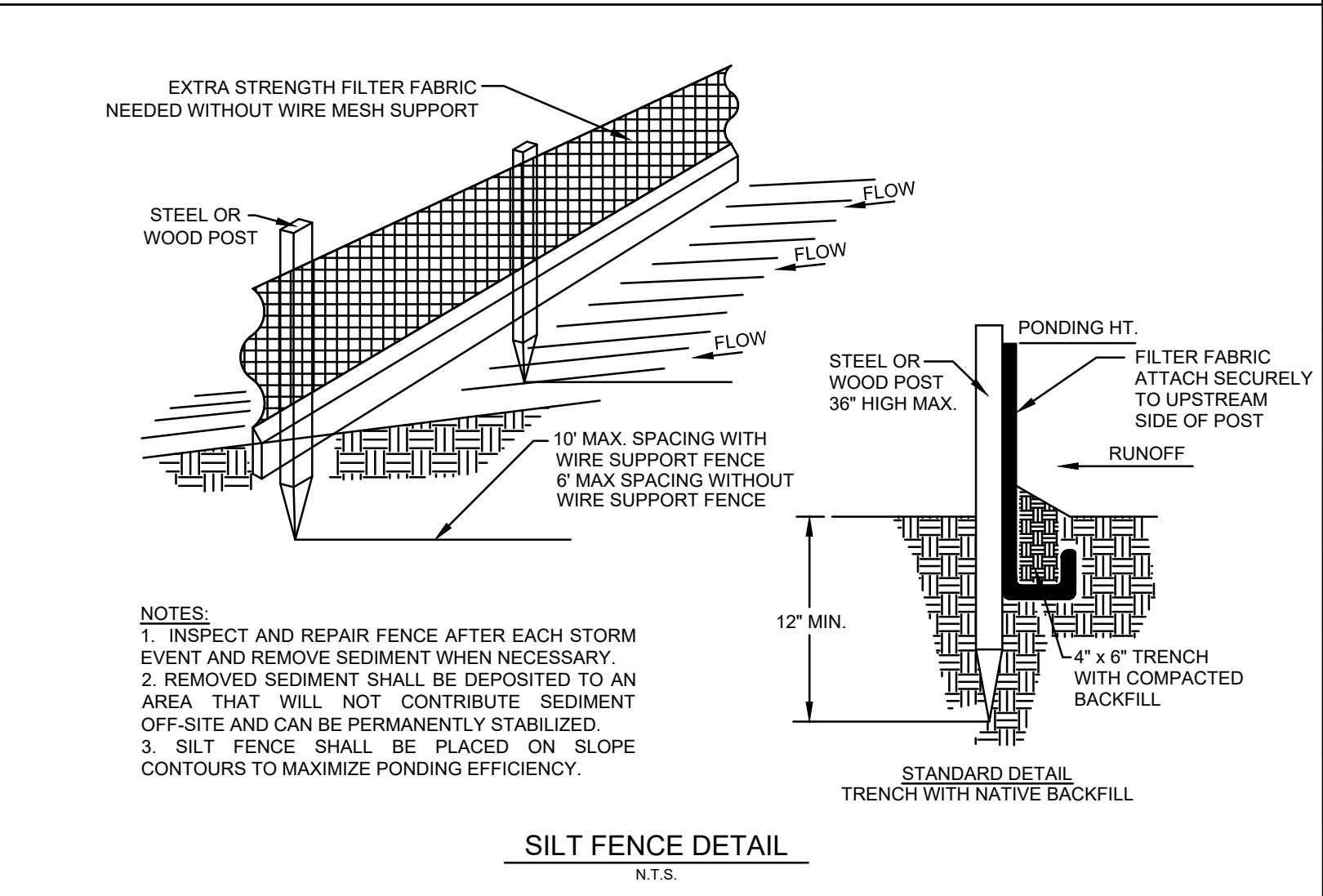
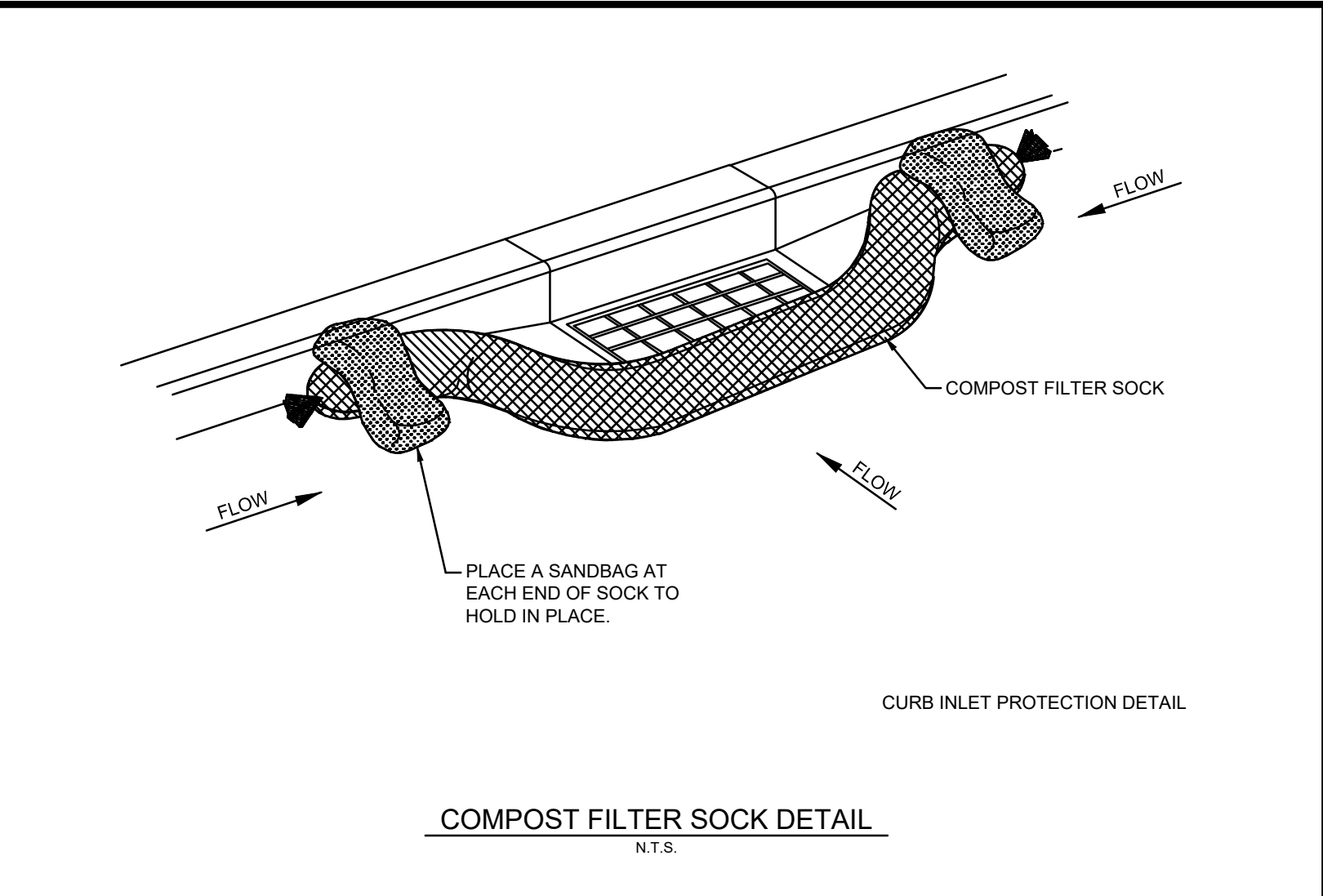
CONSTRUCTION SPECIFICATIONS:

THE COMPOST FILTER SOCK SHALL BE INSTALLED ACCORDING TO THIS SPECIFICATION, AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.

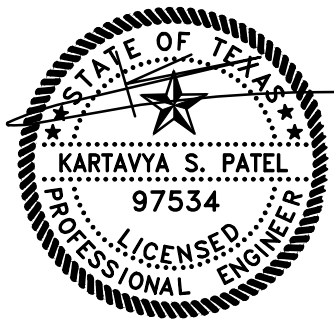
- COMPOST FILTER SOCKS SHOULD BE INSTALLED PARALLEL TO THE BASE OF THE SLOPE OR OTHER DISTURBED AREA. IN EXTREME CONDITIONS (I.E., 2:1 SLOPES), A SECOND COMPOST FILTER SOCK SHALL BE CONSTRUCTED AT THE TOP OF THE SLOPE.
- STAKES SHALL BE INSTALLED THROUGH THE MIDDLE OF THE COMPOST FILTER SOCK ON 10 FT (3M) CENTERS, USING 2 IN (50MM) BY 2 IN (50MM) BY 3 FT (1M) WOODEN STAKES. IN THE EVENT STAKING IS NOT POSSIBLE, I.E., WHEN COMPOST FILTER SOCKS ARE USED ON PAVEMENT, HEAVY CONCRETE BLOCKS SHALL BE USED BEHIND THE COMPOST FILTER SOCKS TO HELP STABILIZE DURING RAINFALL/RUNOFF EVENTS.
- STAKING DEPTH FOR SAND AND SILT LOAM SOILS SHALL BE 12 IN (300MM), AND 8 IN (200MM) FOR CLAY SOILS.
- LOOSE COMPOST MAY BE BACKFILLED ALONG THE UPSLOPE SIDE OF THE COMPOST FILTER SOCK, FILLING THE SEAM BETWEEN THE SOIL SURFACE AND THE DEVICE, IMPROVING FILTRATION AND SEDIMENT RETENTION.
- IF THE COMPOST FILTER SOCK IS TO BE LEFT AS A PERMANENT FILTER OR PART OF THE NATURAL LANDSCAPE, IT MAY BE SEEDED AT TIME OF INSTALLATION FOR ESTABLISHMENT OF PERMANENT VEGETATION. THE ENGINEER WILL SPECIFY SEED REQUIREMENTS.
- COMPOST FILTER SOCKS ARE NOT TO BE USED IN PERENNIAL, EPHEMERAL, OR INTERMITTENT STREAMS.

MAINTENANCE:

SEDIMENT SHALL BE REMOVED ONCE IT HAS ACCUMULATED TO ONE-HALF THE ORIGINAL HEIGHT OF THE BARRIER. COMPOST FILTER SOCKS SHALL BE REPLACED WHENEVER IT HAS DETERIORATED TO SUCH AN EXTENT THAT THE EFFECTIVENESS OF COMPOST FILTER SOCK IS REDUCED. COMPOST FILTER SOCKS SHALL REMAIN IN PLACE UNTIL DISTURBED AREAS HAVE BEEN PERMANENTLY STABILIZED. ALL SEDIMENT ACCUMULATION AT THE COMPOST FILTER SOCK SHALL BE REMOVED AND PROPERLY DISPOSED OF BEFORE THE COMPOST FILTER SOCK IS REMOVED.



NO.	DATE	DESCRIPTION	BY
1	06-08-23	1st CITY SUBMITTAL	AP
2	06-21-23	REVISED PER CLIENT COMMENT	AP
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06/21/2023

EROSION CONTROL DETAILS

DOLLAR GENERAL

NE QUADRANT OF FM 2450 & CHAPMAN ROAD

CITY OF SANGER ETJ

DENTON COUNTY, TEXAS 76266

JAMES B.P. JANUARY SURVEY ABSTRACT NO #658

T: 469.331.8566 | F: 469.213.7145 | E: info@triangle-engr.com

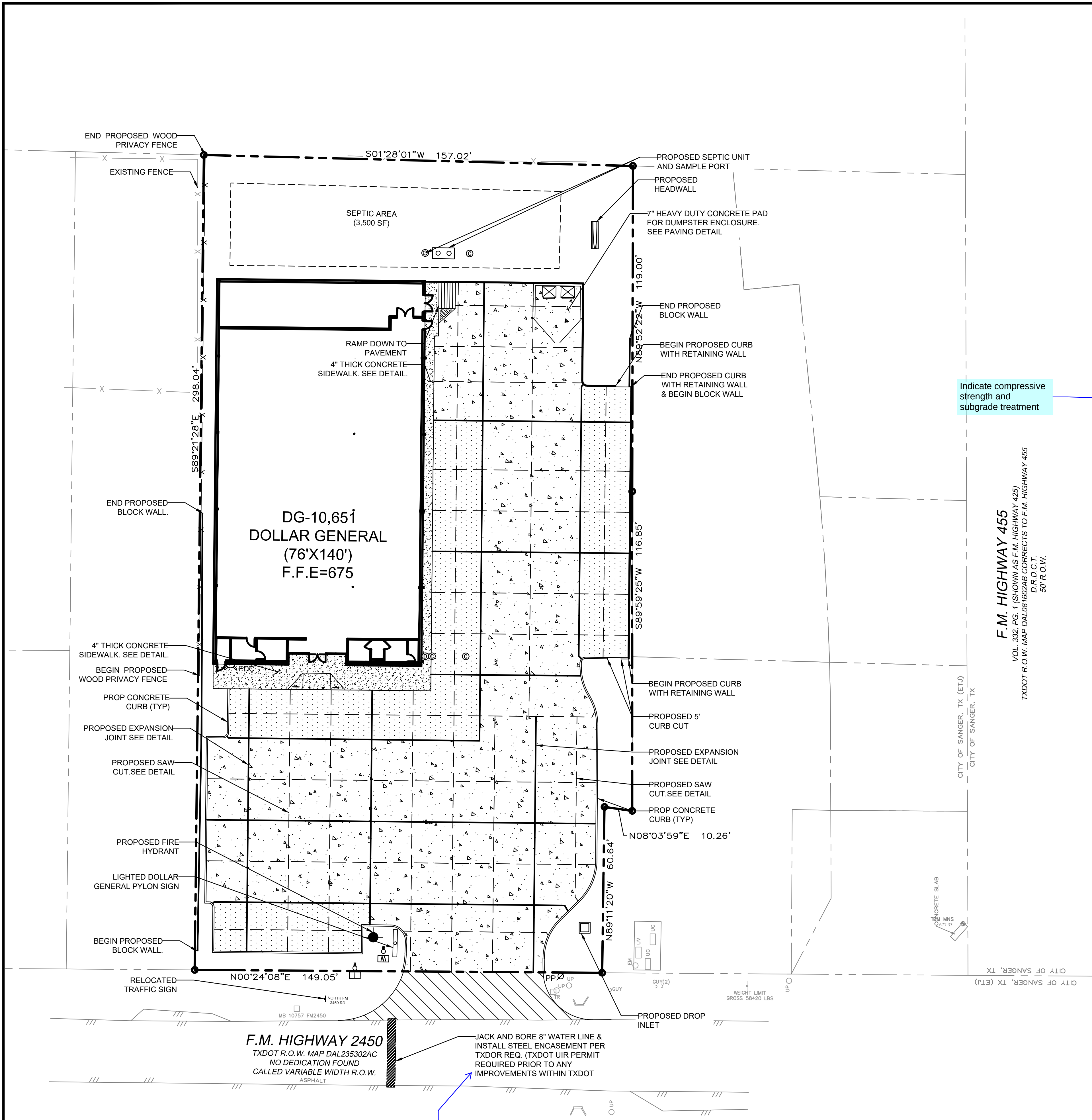
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P.E.	DES.	DATE	SCALE	PROJECT NO.	SHEET NO.
KP	AP	06-02-23	SCALE BAR	050-23	

TX. P.E. FIRM #11525

C-7.1



EXISTING LEGEND

air conditioner	storm water manhole
borehole	storm water pipe
cable tv	telephone manhole
electric meter	tank fill lid
fence or handrail	telephone riser
fire dept. connection	traffic signal pole
fire hydrant	unknown manhole
fire lane	utility clean out
guard rail	utility cabinet
grease trap	utility vault
bollard	utility markings (line color)
grate inlet	color of markings
gas meter	utility pole
gas line	utility pole with riser
utility pole anchor	utility sign
irrigation valve	water shutoff
landscape or tree line	water valve
landscape electric box	water manhole
landscape light	water meter
light pole	well
mailbox	water line
monitoring well	one-foot contour lines
overhead utility lines	tree trunk (with canopy)
pool equipment	caliper inches at breast
road sign	height
roof drain	ornamental tree
silt fence	multiple trunks
spot elevation	Google 360 Hyperlink
sanitary sewer manhole	
sanitary sewer pipe	

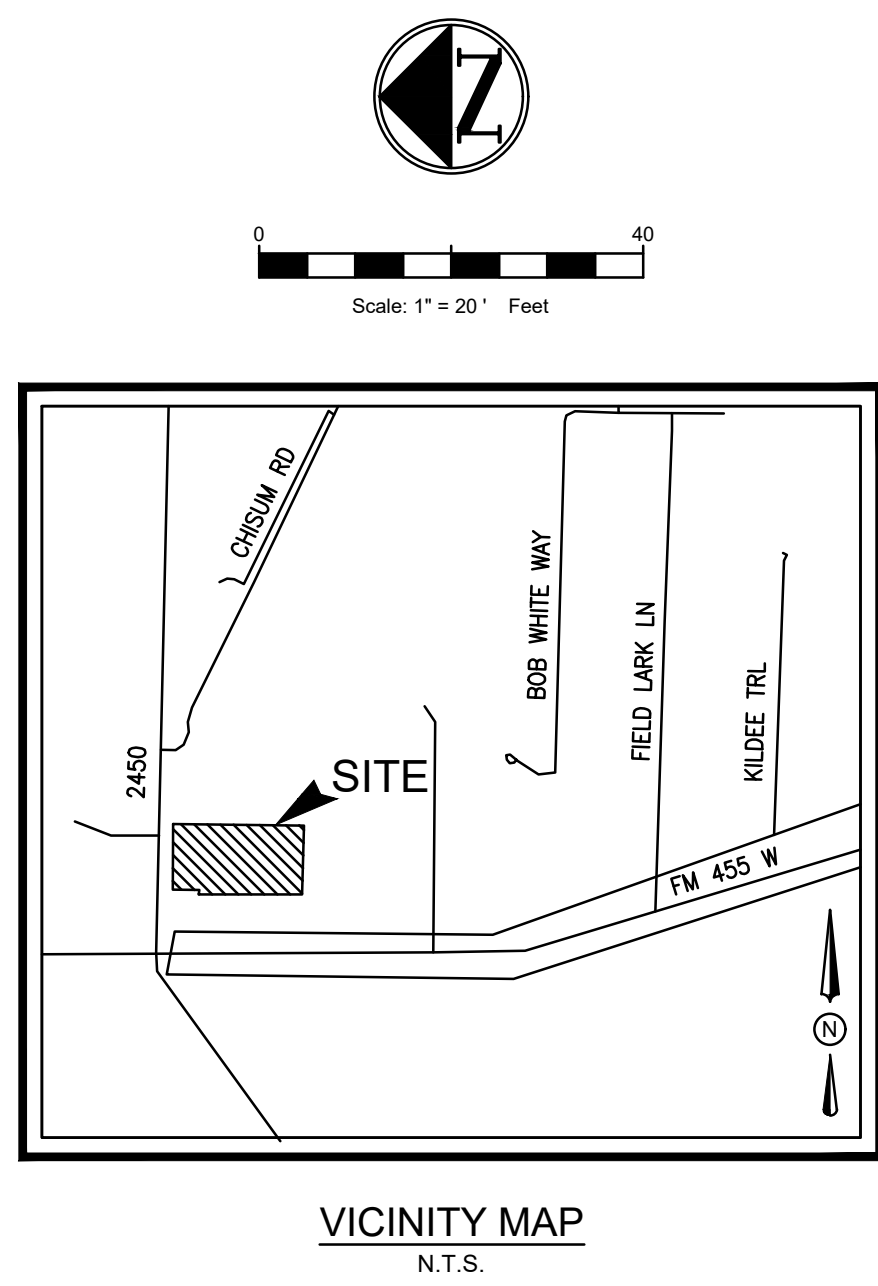
PAVING LEGEND

EXPANSION JOINT (@ 60' MAX.)
SAW CUT JOINT (@ 15' MAX.)
4" SIDEWALK
5" LIGHT DUTY CONCRETE
7" HEAVY DUTY DUMPSTER CONCRETE
TXDOT DRIVEWAY

SANITARY SEWER MANHOLE
SANITARY SEWER CLEANOUT
SANITARY SEWER DOUBLE CLEANOUT
SANITARY SEWER SAMPLE PORT
SEPTIC UNIT
DOMESTIC WATER METER
IRRIGATION METER
FIRE HYDRANT
FIRE DEPARTMENT CONNECTION-FDC

PAVING GENERAL NOTES

- STRIP & REMOVE FROM THE CONSTRUCTION AREA ALL TOPSOIL, ORGANICS & VEGETATION TO A MINIMUM DEPTH OF 6 INCHES.
- CONTROL JOINTS FORMED BY SAWING ARE RECOMMENDED BOTH LONGITUDINAL AND TRANSVERSE DIRECTIONS. CONTROL JOINT SHALL BE SAWED WITHIN 3 HOURS AFTER PLACING CONCRETE. JOINTS SHALL BE PROPERLY CLEANED AND SEALED AS SOON AS POSSIBLE AFTER JOINTS ARE CUT.
- DRAINAGE SHOULD BE MAINTAINED AWAY FROM THE FOUNDATION, BOTH DURING AND AFTER CONSTRUCTION. WATER SHOULD NOT BE ALLOWED TO POND NEAR THE FOUNDATION. THE FOLLOWING ITEMS SHOULD PROVIDE FOR POSITIVE DRAINAGE OF WATER AWAY FROM THE FOUNDATION: SIDEWALKS AND OTHER CONCRETE FLAT WORK, PARKING AREAS, DRIVEWAYS AND OTHER SURFACE DRAINAGE FEATURES, AND LANDSCAPING.
- FRENCH DRAINS ARE RECOMMENDED AROUND ANY SLABS WHERE SEEPING GROUND WATER IS ENCOUNTERED DURING CONSTRUCTION.
- SIDEWALK AROUND THE BUILDING SHALL NOT BE STRUCTURALLY CONNECTED TO THE BUILDING FOUNDATION UNLESS IT'S NOTED ON THE STRUCTURAL PLANS.
- ALL EXPANSION JOINTS AND CRACK CONTROL JOINTS SHOULD BE SEALED TO PREVENT THE INFILTRATION OF WATER INTO THE SUBSURFACE. THIS IS PARTICULARLY IMPORTANT AROUND IRRIGATED LANDSCAPING AND ALONG THE DRAINAGE PATH OF ROOF DOWNSPOUTS.
- LANDSCAPE ISLANDS SHOULD BE BACKFILLED WITH LOW PLASTICITY CLAYS TO REDUCE WATER INTRUSION INTO THE SUBSURFACE PAVEMENT STRUCTURES. CURBS SHOULD BE PROVIDED WITH WEEP HOLES IN LANDSCAPE AREAS TO REDUCE THE BUILD UP OF HYDROSTATIC PRESSURE AND TO REDUCE THE INTRUSION OF WATER INTO THE SUBSURFACE MATERIAL.
- CURB AND GUTTER SHALL CONSIST OF STEEL REINFORCED CONCRETE AND SHALL BE SIX (6") INCHES HIGH, UNLESS OTHERWISE NOTED ON THE SITE/GRADING PLANS.
- THE CONTRACTOR SHALL PROCEED WITH PAVING NO MORE THAN SEVENTY-TWO (72) HOURS AFTER DENSITY/MOISTURE TESTS HAVE BEEN TAKEN AND PASSED BY A REGULAR TESTING FIRM.
- MANHOLE RIM ELEVATIONS, CLEAN-OUTS, VALVE BOXES, ETC. SHALL BE ADJUSTED TO FINISHED GRADE BY THE PAVING CONTRACTOR AT THE TIME OF PAVING.
- SEE IRRIGATION PLAN FOR IRRIGATION SLEEVE PLACEMENT PRIOR TO PAVING CONSTRUCTION.
- GC TO FOLLOW PAVEMENT & SUB GRADE THICKNESS PER GEO TECH RECOMMENDATION ON SOIL REPORT



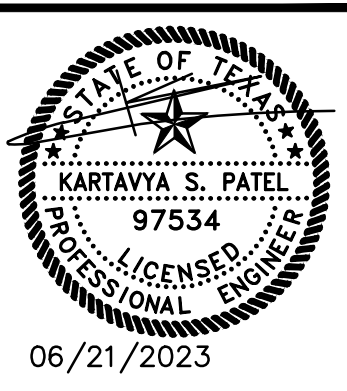
Indicate compressive strength and subgrade treatment

F.M. HIGHWAY 455
VOL. 332, PG. 1 (SHOWN AS F.M. HIGHWAY 425)
TXDOT R.O.W. MAP DAL081602AB CORRECTS TO F.M. HIGHWAY 455
D.R.D.C.T.
50' R.O.W.

Provide plans for TxDOT permit



NO.	DATE	DESCRIPTION	BY
1	06-08-23	1st CITY SUBMITTAL	AP
2	06-21-23	REVISED PER CLIENT COMMENT	AP
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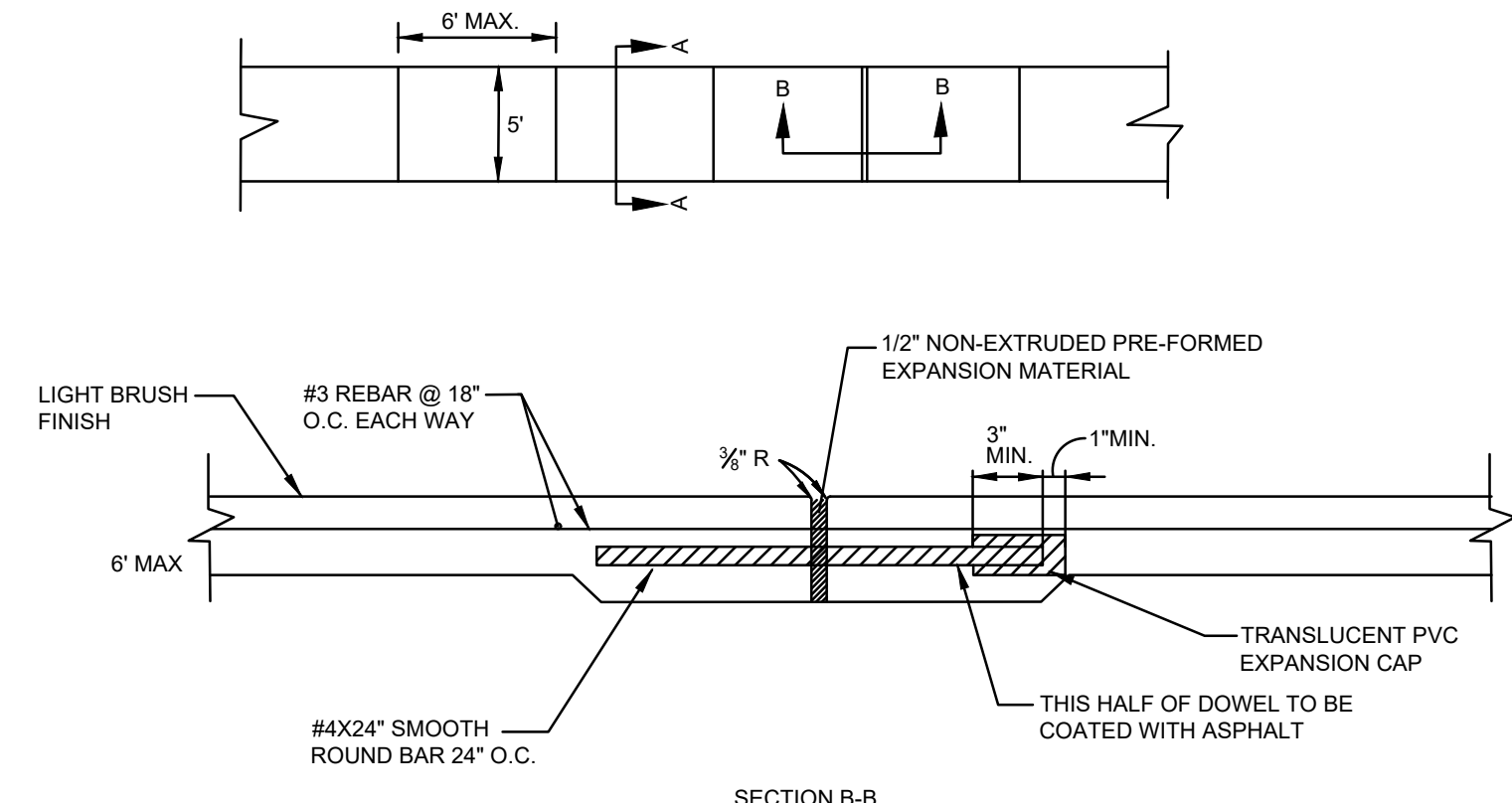
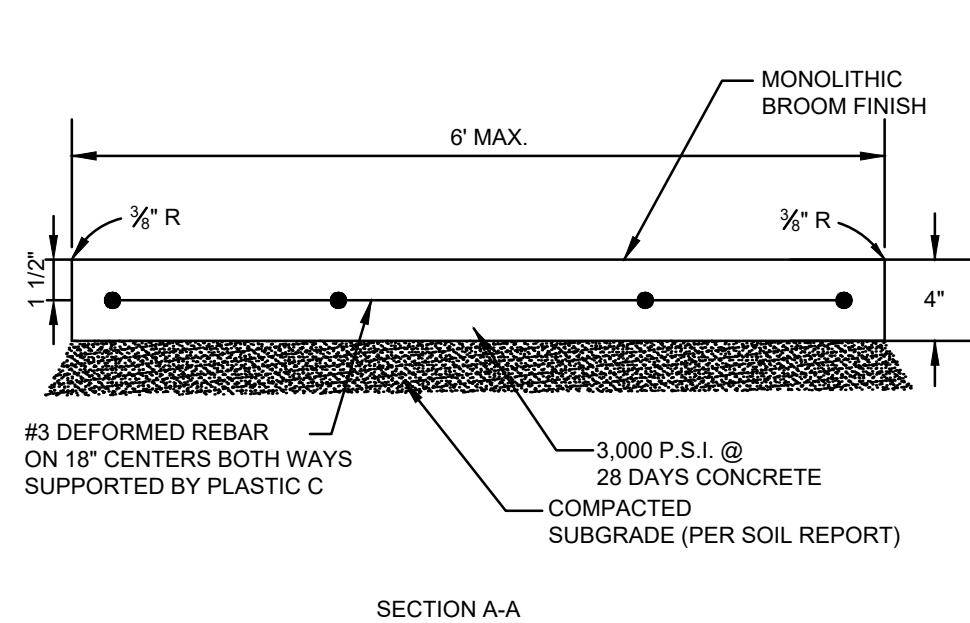
PAVING PLAN
DOLLAR GENERAL
NE QUADRANT OF FM 2450 & CHAPMAN ROAD
CITY OF SANGER ETJ
DENTON COUNTY, TEXAS 76266
JAMES B.P. JANUARY SURVEY ABSTRACT NO # 658

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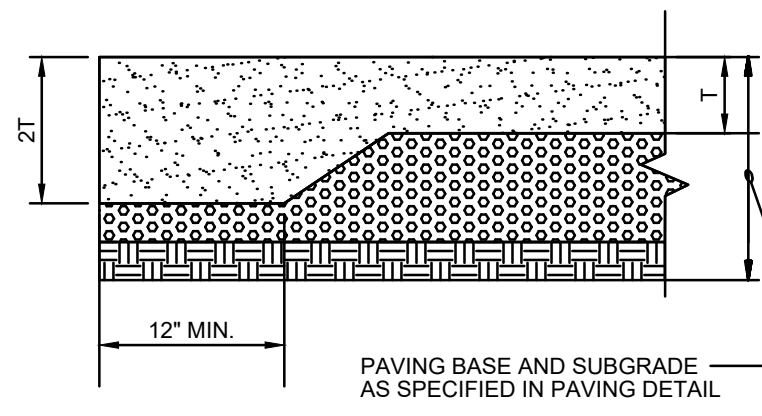
Planning | Civil Engineering | Construction Management

P.E.	DES.	DATE	SCALE	PROJECT NO.	SHEET NO.
KP	AP	06-02-23	SCALE BAR	050-23	C-8.0

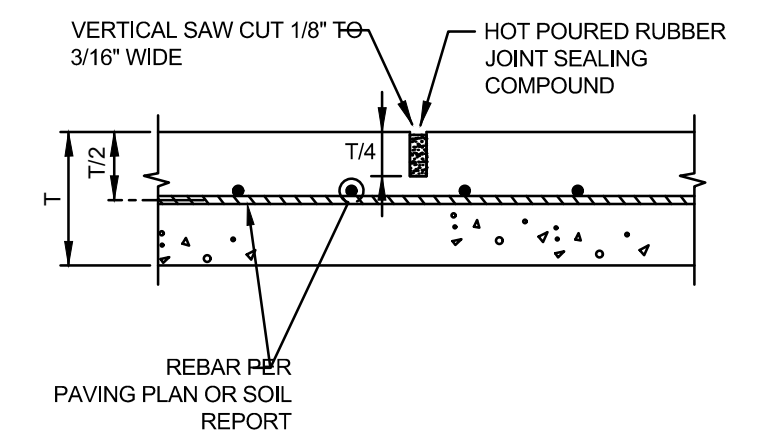
TX. P.E. FIRM #11525



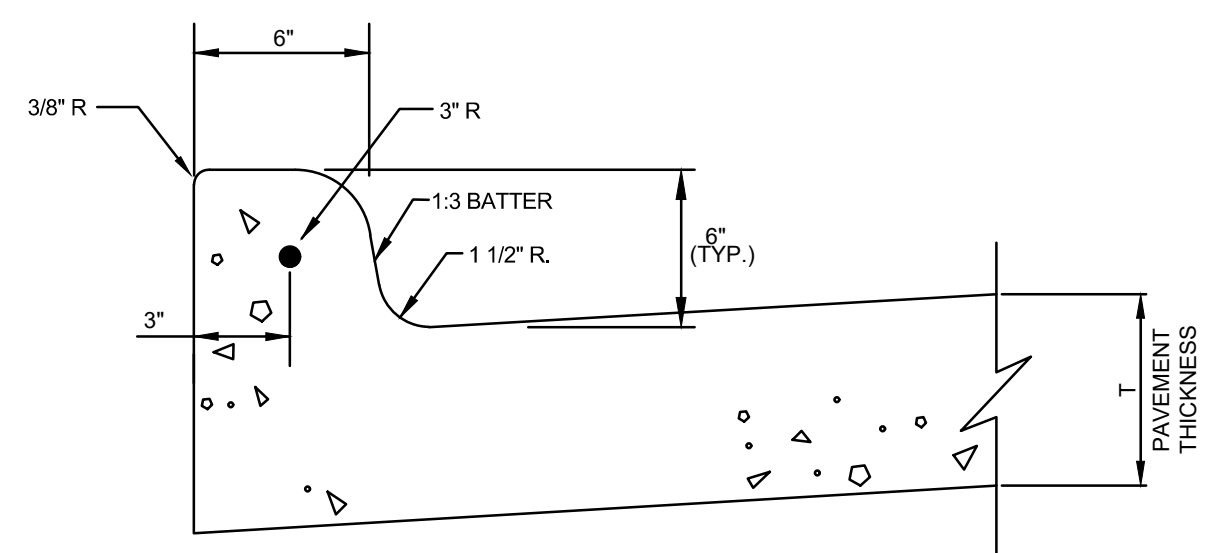
SIDEWALK DETAIL
N.T.S.



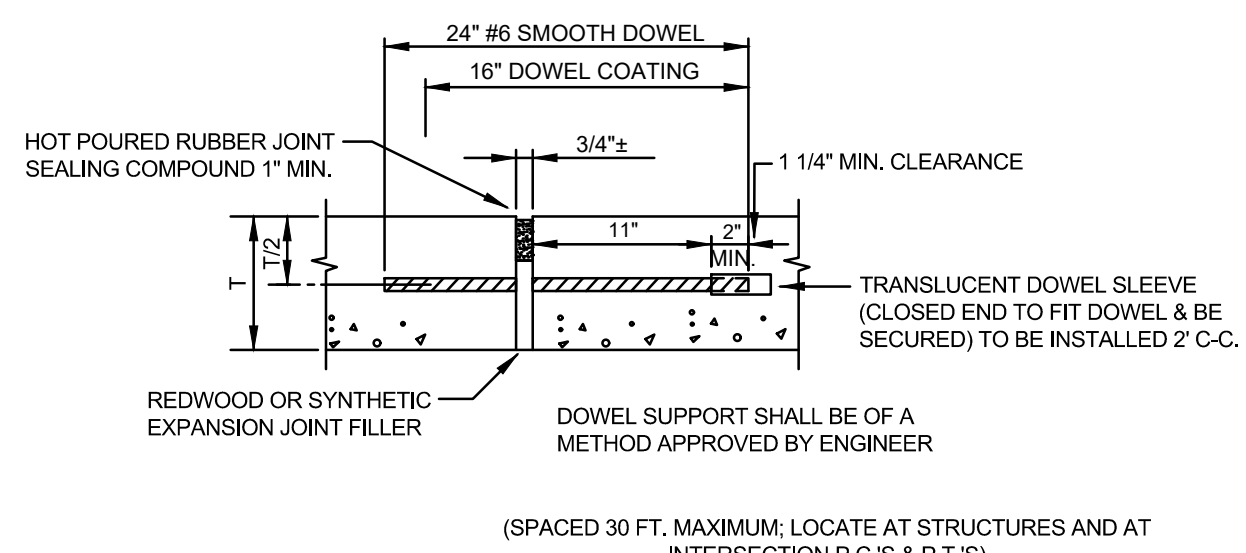
THICKENED EDGE OF PAVING DETAIL
N.T.S.



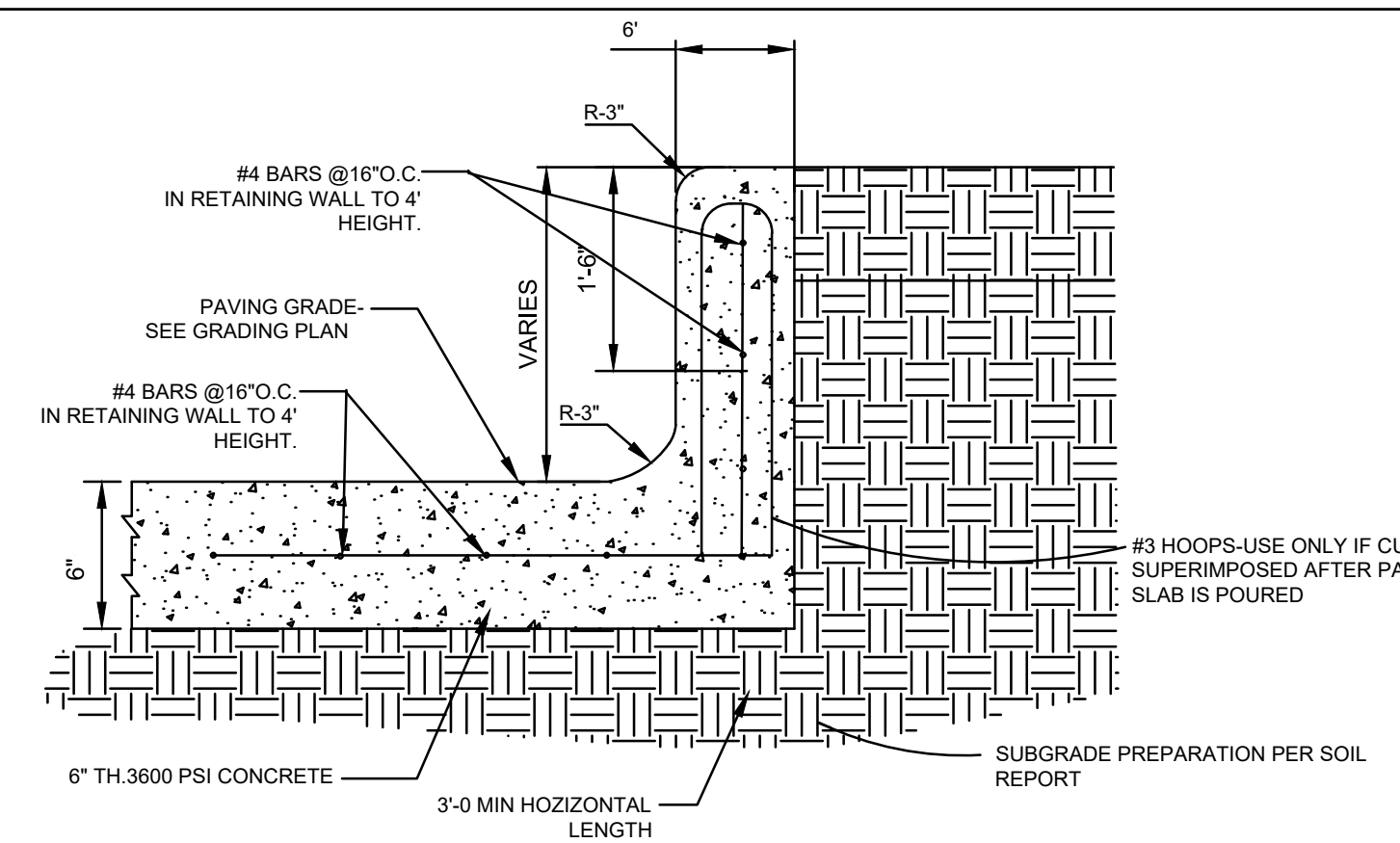
TYPICAL SAW CUT DETAIL
N.T.S.



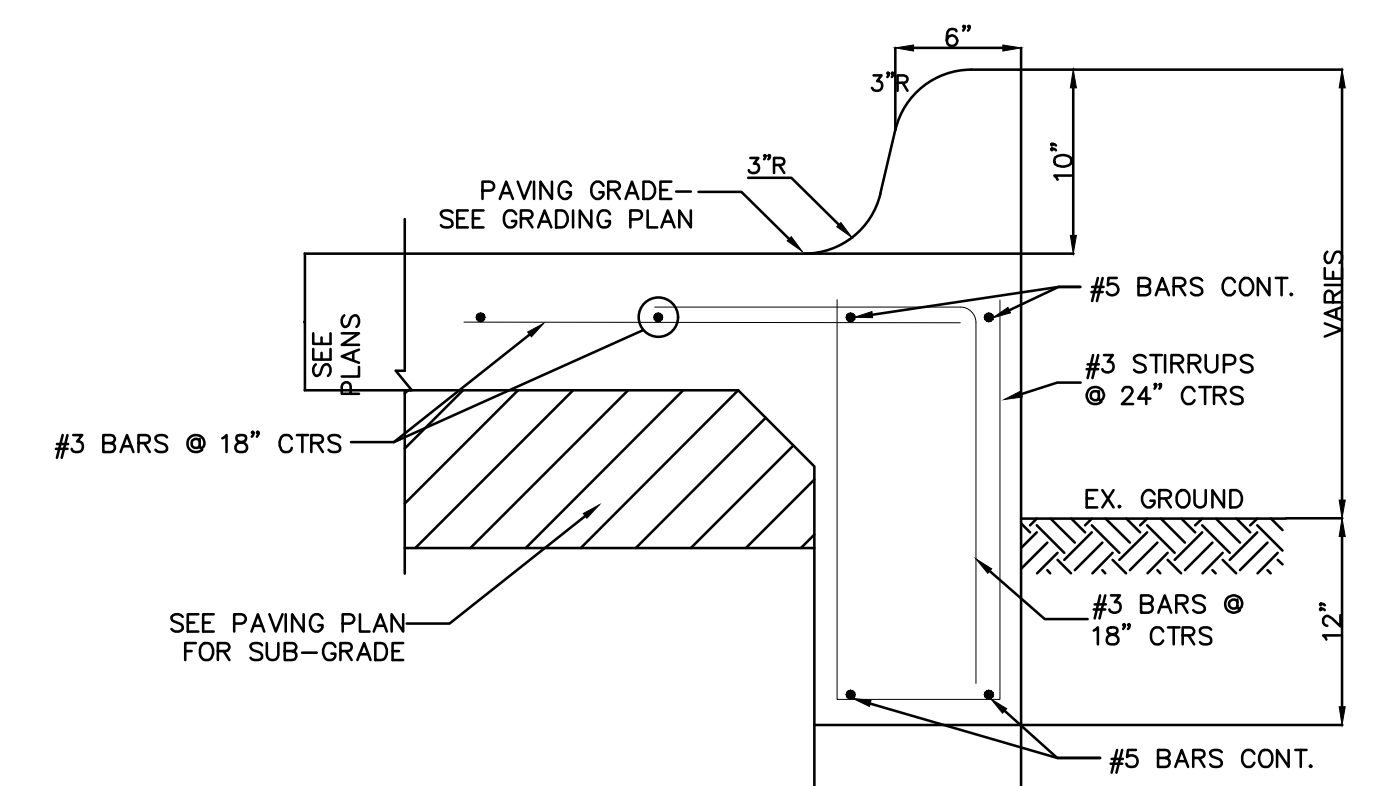
TYPICAL CURB DETAIL
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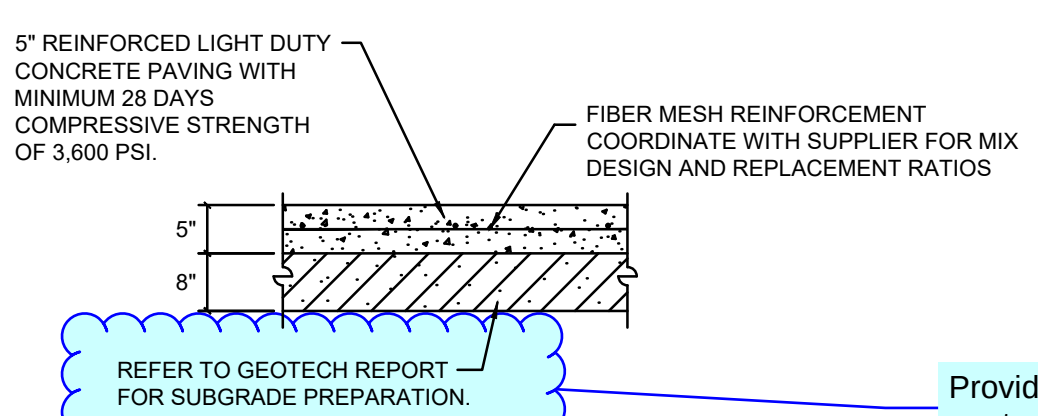
TYPICAL EXPANSION JOINT DETAIL
N.T.S.



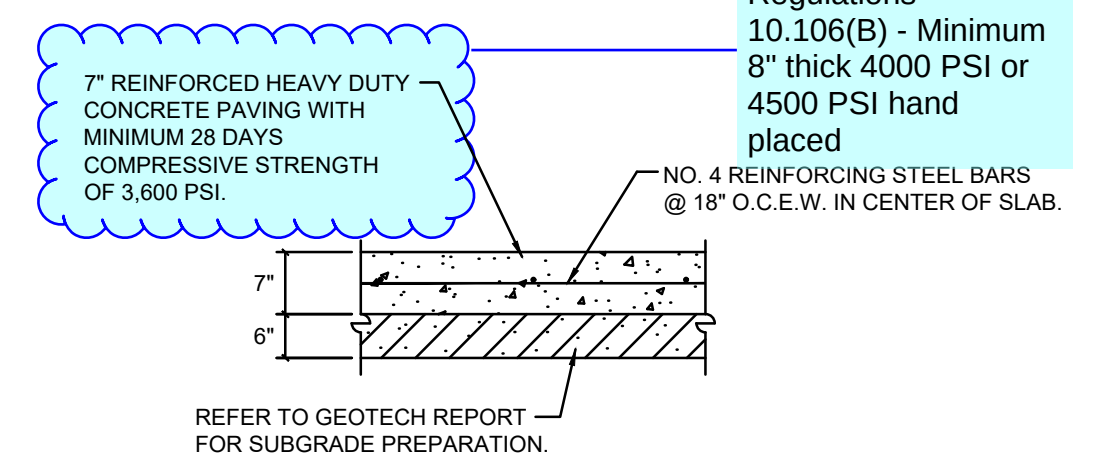
VARIABLE HEIGHT CURB W/RETAINING WALL DETAIL
N.T.S.



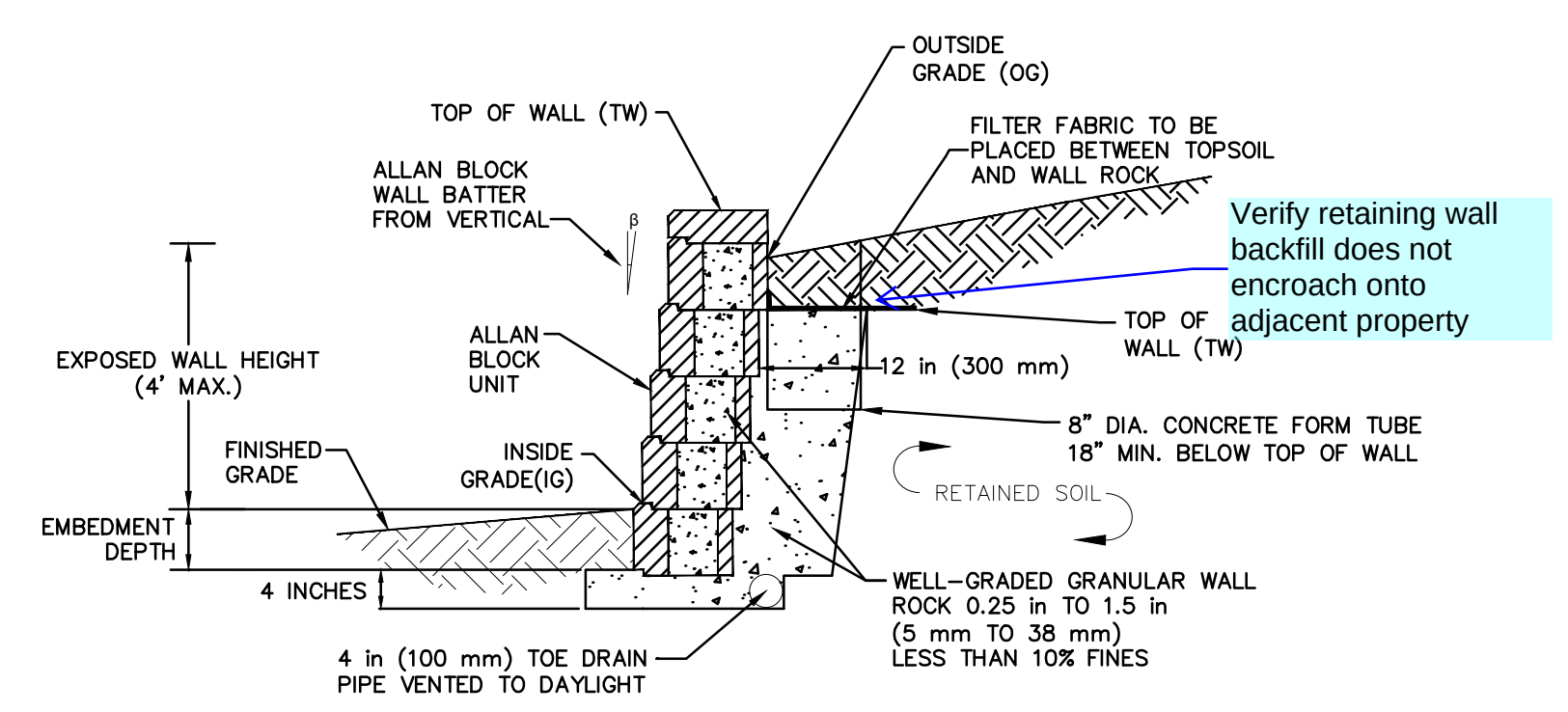
CURB W/RETAINING WALL DETAILS
N.T.S.



5" CONCRETE PAVEMENT
N.T.S.



7" CONCRETE PAVEMENT
N.T.S.



VARIABLE HEIGHT BLOCK RETAINING WALL
N.T.S.

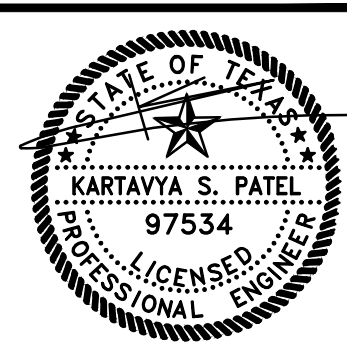
NOTE:
1. CONTRACTOR TO VERIFY WITH CITY REQUIREMENTS. SHOULD THE CITY REQUIREMENTS DIFFER FROM DETAIL, THE CITY REQUIREMENTS WILL SUPERCEDE.
2. CONTRACTOR TO VERIFY REQUIREMENTS FOR INSTALLATION OF PAVEMENT IN FIRE LANE. CONTRACTOR TO INSTALL ACCORDING TO LOCAL, STATE OR GOVERNMENT JURISDICTION.

Provide copy of geotech report

NOTE:
1. CONTRACTOR TO VERIFY WITH CITY REQUIREMENTS. SHOULD THE CITY REQUIREMENTS DIFFER FROM DETAIL, THE CITY REQUIREMENTS WILL SUPERCEDE.
2. CONTRACTOR TO VERIFY REQUIREMENTS FOR INSTALLATION OF PAVEMENT IN FIRE LANE. CONTRACTOR TO INSTALL ACCORDING TO LOCAL, STATE OR GOVERNMENT JURISDICTION.

Verify retaining wall backfill does not encroach onto adjacent property

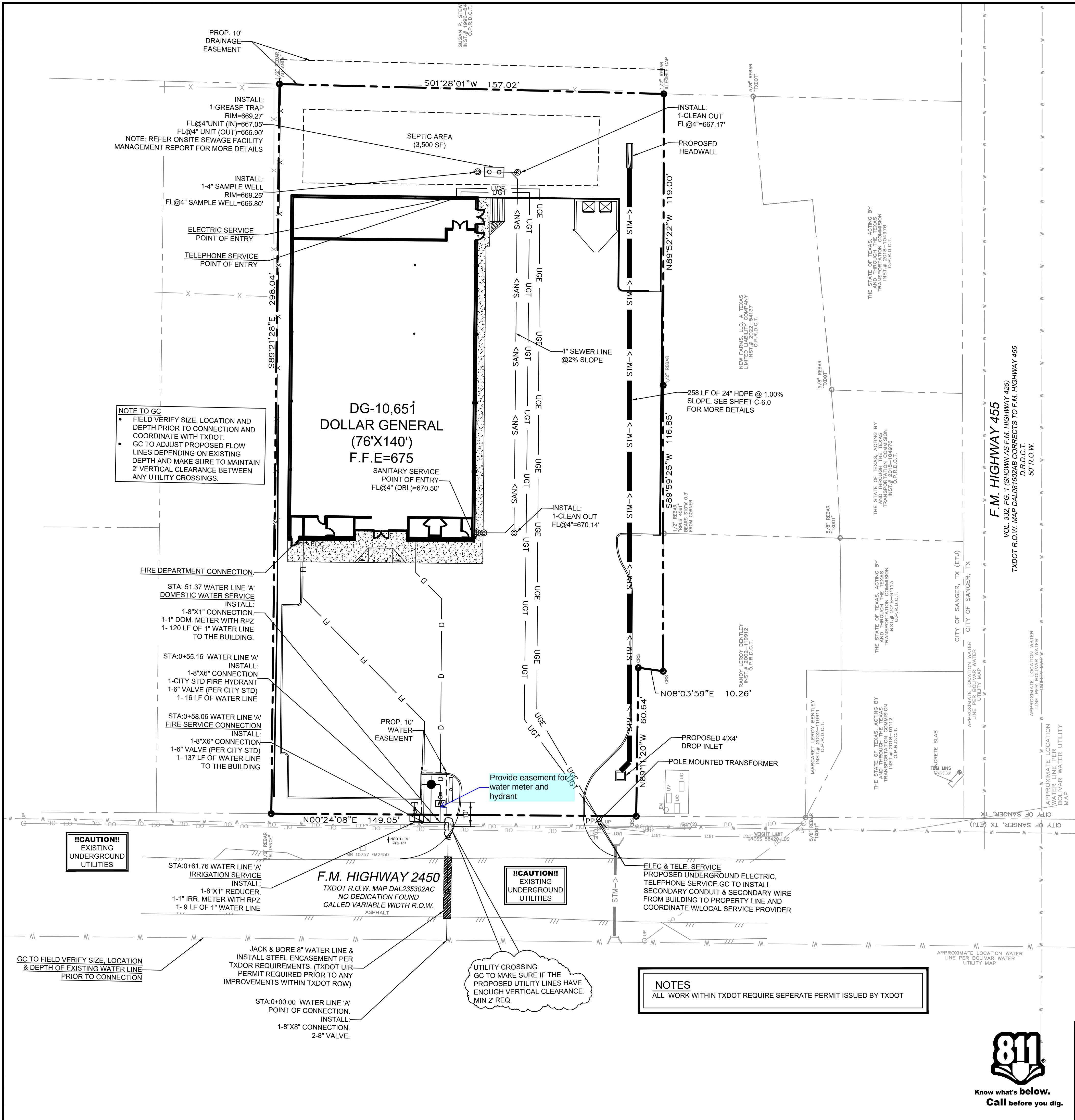
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06/21/2023

PAVING DETAILS
DOLLAR GENERAL
NE QUADRANT OF FM 2450 & CHAPMAN ROAD
CITY OF SANGER ETJ
DENTON COUNTY, TEXAS 76266
JAMES B.P. JANUARY SURVEY ABSTRACT NO #658

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P.E. DES. DATE SCALE PROJECT NO. SHEET NO.
KP AP 06-02-23 SCALE BAR 050-23
C-8.1



EXISTING LEGEND

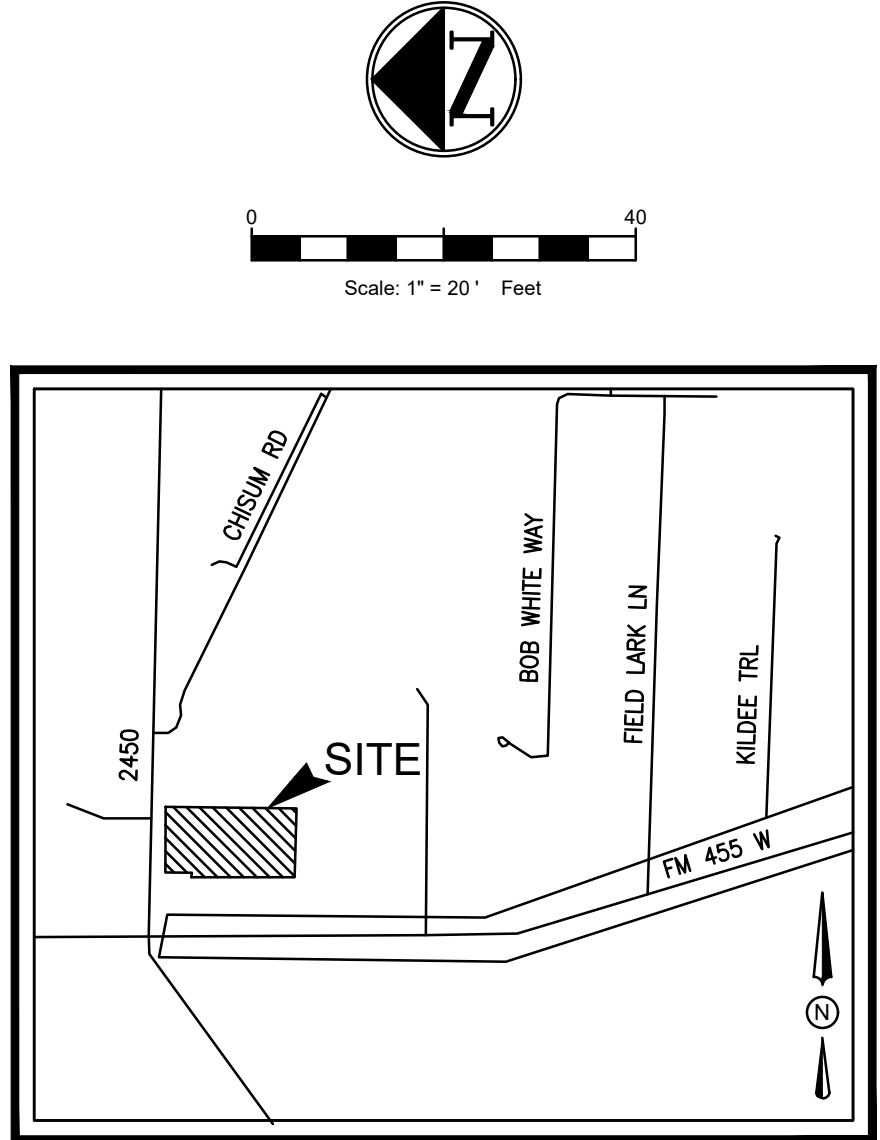
air conditioner	storm water manhole
boiler	storm water pipe
cable tv	telephone manhole
electric meter	tank fill lid
fence or handrail	telephone riser
fire dept. connection	traffic signal pole
fire hydrant	unknown manhole
fire line	utility clean out
guard rail	utility cabinet
grace trap	utility vault
bollard	utility markings (line color)
grate inlet	color of markings
gas meter	utility pole
gas line	utility pole with riser
utility pole anchor	utility sign
irrigation valve	water shutoff
landscape or tree line	water valve
landscape electric box	water manhole
landscape light	water meter
light pole	well
mailbox	water line
monitoring well	one-foot contour lines
overhead utility lines	tree trunk (with canopy)
pool equipment	caliper inches at breast
road sign	height
roof drain	ornamental tree
silt fence	multiple trunks
spot elevation	Google 360 Hyperlink
sanitary sewer manhole	
sanitary sewer pipe	

UTILITY LEGEND

UNDERGROUND TELEPHONE LINE	UGT
UNDERGROUND ELECTRIC LINE	UGE
GAS LINE	G
SANITARY SEWER LINE	SAN>
WATER MAIN	W
DOMESTIC WATER LINE	D
STORM LINE	STM->
STORM SEWER MANHOLE	⊙
STORM SEWER CLEANOUT	⊙
SANITARY SEWER MANHOLE	⊙
SANITARY SEWER CLEANOUT	⊙
SANITARY SEWER DOUBLE CLEANOUT	⊙
SANITARY SEWER SAMPLE PORT	⊙
SEPTIC UNIT	⊙
DOMESTIC WATER METER	⊙
IRRIGATION METER	⊙
GAS METER	⊙
FIRE HYDRANT	⊙
FIRE DEPARTMENT CONNECTION-FDC	⊙
TRANSFORMER	⊙
LIGHT POLE	⊙
POWER POLE	⊙

WATER METER & SANITARY SEWER SCHEDULE

ID	TYPE	SIZE	NO.
D	DOMESTIC	1"	1
I	IRRIGATION	1"	1
	SANITARY SEWER	4"	



- UTILITY GENERAL NOTES**
- ALL CONSTRUCTION SHALL BE IN STRICT ACCORDANCE WITH THE CITY/UTILITY COMPANY STANDARDS.
 - FIELD VERIFY LOCATION OF EXISTING WATER MAIN, SEWER MAIN, GAS, TELEPHONE AND ELECTRICAL LINE. POT HOLE RECOMMENDED PRIOR TO CONSTRUCTION BEGIN. CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE WITH UTILITY SERVICE PROVIDERS.
 - THE LOCATION OF UNDERGROUND UTILITIES INDICATED ON THE PLANS IS TAKEN FROM AS-BUILTS, UTILITY PLANS OR SURVEY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAKE ARRANGEMENTS WITH THE OWNERS OF SUCH UNDERGROUND UTILITIES PRIOR TO WORKING IN THE AREA TO CONFIRM THEIR EXACT LOCATION AND TO DETERMINE WHETHER ANY ADDITIONAL UTILITIES OTHER THAN THOSE SHOWN ON THE PLANS MAY BE PRESENT. THE CONTRACTOR SHALL PRESERVE AND PROTECT ALL UNDERGROUND UTILITIES. IF EXISTING UNDERGROUND UTILITIES ARE DAMAGED, THE CONTRACTOR WILL BE RESPONSIBLE FOR THE COST OF REPAIRING THE UTILITY.
 - WHERE EXISTING UTILITIES OR SERVICE LINES ARE CUT, BROKEN OR DAMAGED, THE CONTRACTOR SHALL REPLACE OR REPAIR THE UTILITIES OR SERVICE LINES WITH THE SAME TYPE OF ORIGINAL MATERIAL AND CONSTRUCTION, OR BETTER, UNLESS OTHERWISE SHOWN OR NOTED ON THE PLANS, AT HIS OWN COST AND EXPENSE. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AT ONCE OF ANY CONFLICTS WITH UTILITIES.
 - ALL EXCAVATIONS, TRENCHING AND SHORING OPERATIONS SHALL COMPLY WITH THE REQUIREMENTS OF THE U. S. DEPARTMENT OF LABOR, OSHA, CONSTRUCTION SAFETY AND HEALTH REGULATIONS AND ANY AMENDMENTS THERETO.
 - THE CONTRACTOR SHALL RESTORE ALL AREAS DISTURBED BY CONSTRUCTION TO ORIGINAL CONDITION OR BETTER. RESTORED AREAS INCLUDE, BUT ARE NOT LIMITED TO TRENCH BACKFILL, SIDE SLOPES, FENCES, CULVERT PIPES, DRAINAGE DITCHES, DRIVEWAYS, PRIVATE YARDS AND ROADWAYS.
 - ANY CHANGES NEEDED AFTER CONSTRUCTION PLANS HAVE BEEN RELEASED, SHALL BE APPROVED BY THE CITY ENGINEER. THESE CHANGES MUST BE RECEIVED IN WRITING.
 - THE CONTRACTOR SHALL PROVIDE "RED LINED" MARKED PRINTS TO THE ENGINEER PRIOR TO FINAL INSPECTION INDICATING ALL CONSTRUCTION WHICH DEVIATED FROM THE PLANS OR WAS CONSTRUCTED IN ADDITION TO THAT INDICATED ON THE PLANS.

UTILITY PLAN
DOLLAR GENERAL
NE QUADRANT OF FM 2450 & CHAPMAN ROAD
CITY OF SANGER ETJ
DENTON COUNTY, TEXAS 76266
JAMES B.P. JANUARY SURVEY ABSTRACT NO # 658

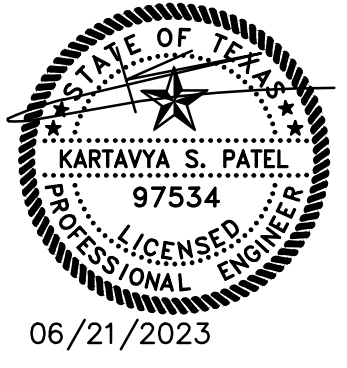
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P.E.	DES.	DATE	SCALE	PROJECT NO.	SHEET NO.
KP	AP	06-02-23	SCALE BAR	050-23	C-9.0

TX. P.E. FIRM #11525

NO.	DATE	DESCRIPTION	BY
1	06-08-23	1st CITY SUBMITTAL	AP
2	06-21-23	REVISED PER CLIENT COMMENT	AP
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MATERIAL LIST:

- A. SERVICE CLAMP REQUIRED.
B. 1" CORPORATION STOP - SERVICE PIPE OUTLET. (SEE NOTE #2)
C. 1" SERVICE PIPE.
D. LOOKING ANGLE METER STOP; SERVICE PIPE INLET X SWIVEL COUPLING NUT OUTLET:
• FOR 5/8" AND 3/4" METERS: 1" X 3/4"
• FOR 1" METERS: 1" X 1"
• SEE NOTE #2
E. PLASTIC RECTANGULAR METER BOX. (SEE TABLE BELOW)
F. PIPE CASING WHERE APPLICABLE. (AS PER DETAIL WT-01)
G. WATER METER, CENTERED IN BOX. (SEE TABLE BELOW)
H. WATER METER COUPLING, MALE I.P.T. X SWIVEL COUPLING NUT:
• FOR 5/8" AND 3/4" METERS: 3/4" X 8 1/2" LONG.
• FOR 1" METERS: LENGTH OF PIPE TO BE DETERMINED BY CONTRACTOR. EXTEND PIPE TO 4"-6" OUTSIDE OF METER BOX.
I. BRONZE GATE VALVE, NON-RISING STEM (3/4" OR 1") FEMALE I.P.T. (PROPERTY OWNERS CUT-OFF OUTSIDE METER BOX IN SEPARATE VALVE CAN WITH LID.
J. 3/4" OR 1" PIPE MEETING CITY CODE REQUIREMENTS.

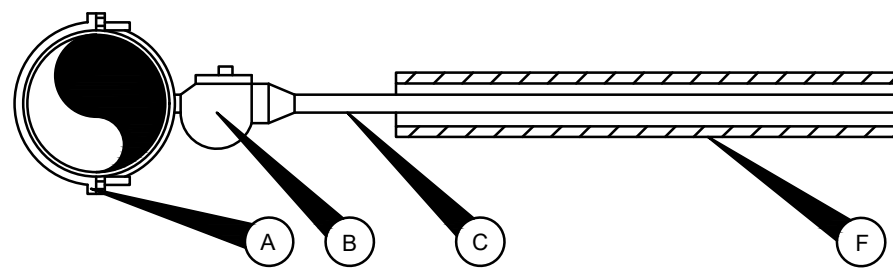
METER SIZE	LENGTH
5/8"	7 1/2"
3/4"	7 1/2"
1"	11"

NOTES:

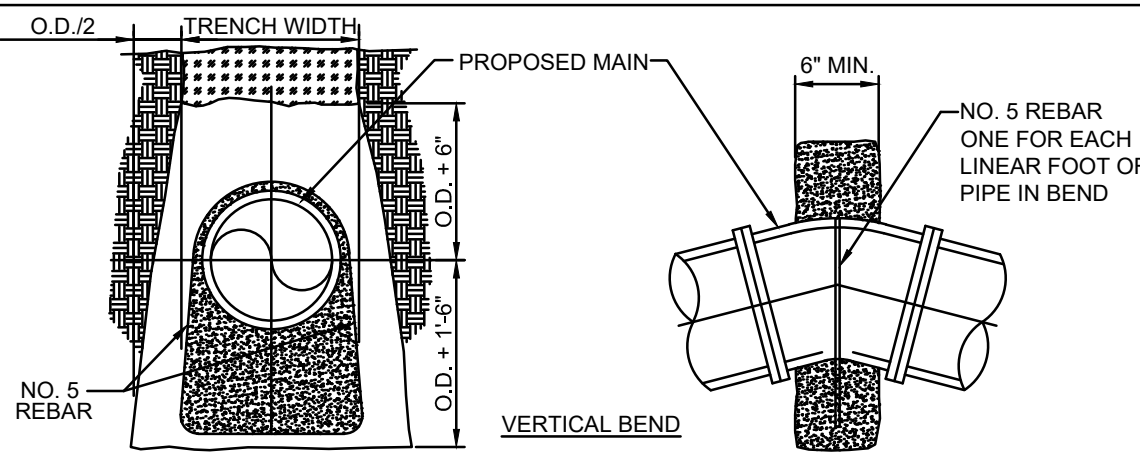
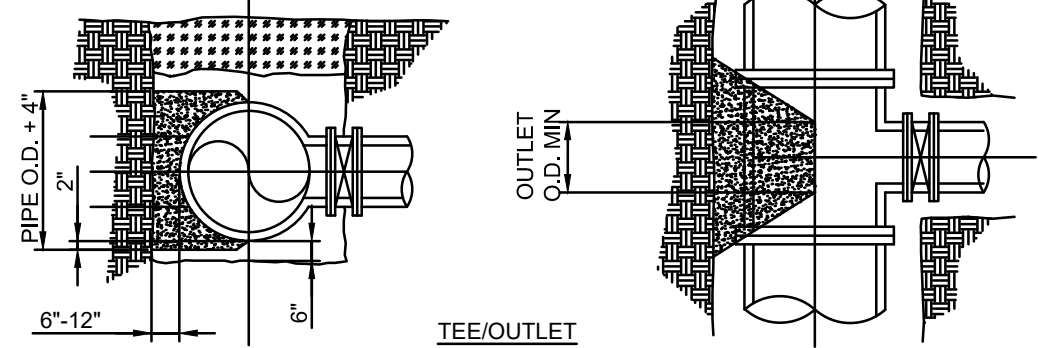
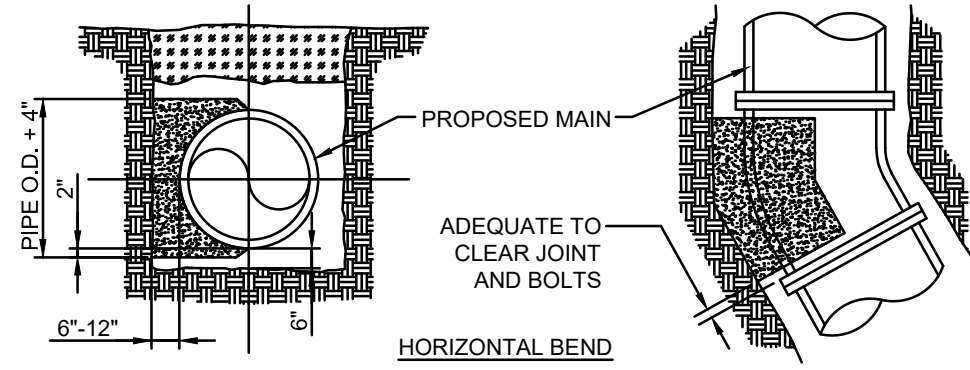
1. SERVICE PIPE SHALL BE COPPER TUBE SIZE. IT MAY BE 150 PSI ANNEALED SEAMLESS TYPE "K" COPPER TUBING OR 200 PSI BLACK COLORED POLYETHYLENE HAVING A DIMENSION RATIO OF 9 (DR9).
2. ALL STAINLESS STEEL INSERTS THAT COME WITH COMPRESSION FITTINGS SHALL NOT BE USED ON ANY CONNECTIONS.
3. SERVICE SADDLES SHALL BE WRAPPED COMPLETELY WITH 8 MIL. POLYETHYLENE FILM.
4. TOP OF BOXES SHALL BE 1" ABOVE FINISHED GRADE.
5. PIPING AND TUBING SHALL BE INSTALLED IN ACCORDANCE WITH SECTION 510.3 OF THE STANDARD SPECIFICATIONS. SPECIAL ATTENTION IS CALLED TO "PIPE BEDDING ENVELOPE" AND "BACKFILLING", SECTIONS 510.3 (14) AND 510.3 (25), RESPECTIVELY.
6. AXIS OF METER ASSEMBLY (LINE THROUGH METER STOP, METER, PIPING AND OWNERS CUTOFF) SHALL BE 10" BELOW TOP OF BOX.
7. SLOTS PROVIDED IN METER BOX TO ACCOMMODATE PIPING INTO AND OUT OF BOX. SHALL NOT BE MODIFIED.
8. LOCATION OF METER BOXES SHALL BE SUBJECT TO THE APPROVAL OF THE C.O.R.R.

PART NUMBER	SERIES	SIZE	HEIGHT	WIDTH	LENGTH
DFW36C-BODY"	36C	STD.	12-1/4"	TOP = 13-3/4"	TOP = 19"
DFW36C-SBSM"	36C	STD.	12-1/4"	BASE = 10"	BASE = 18-1/4"
DFW36C-SBSM-LID"	36C	STD.	1-3/4"	LID = 10"	LID = 15"

* ROTEC BY DFW PLASTICS INCORPORATED OR APPROVED EQUAL.



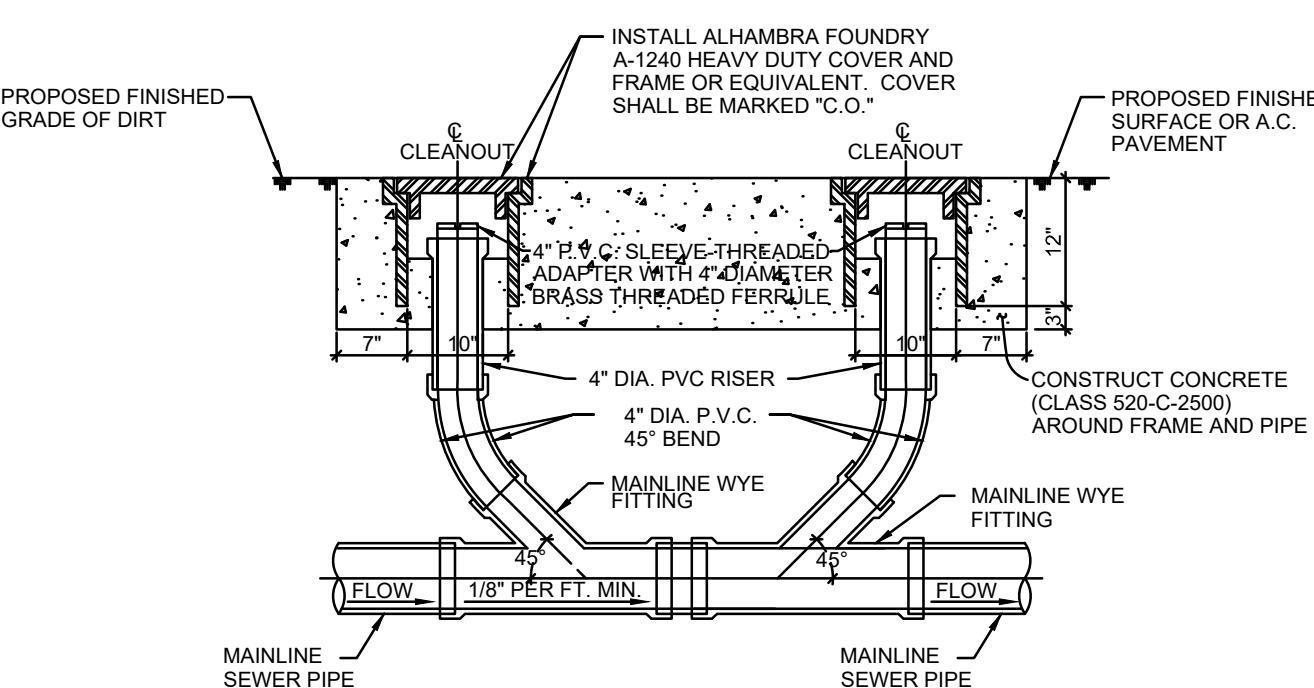
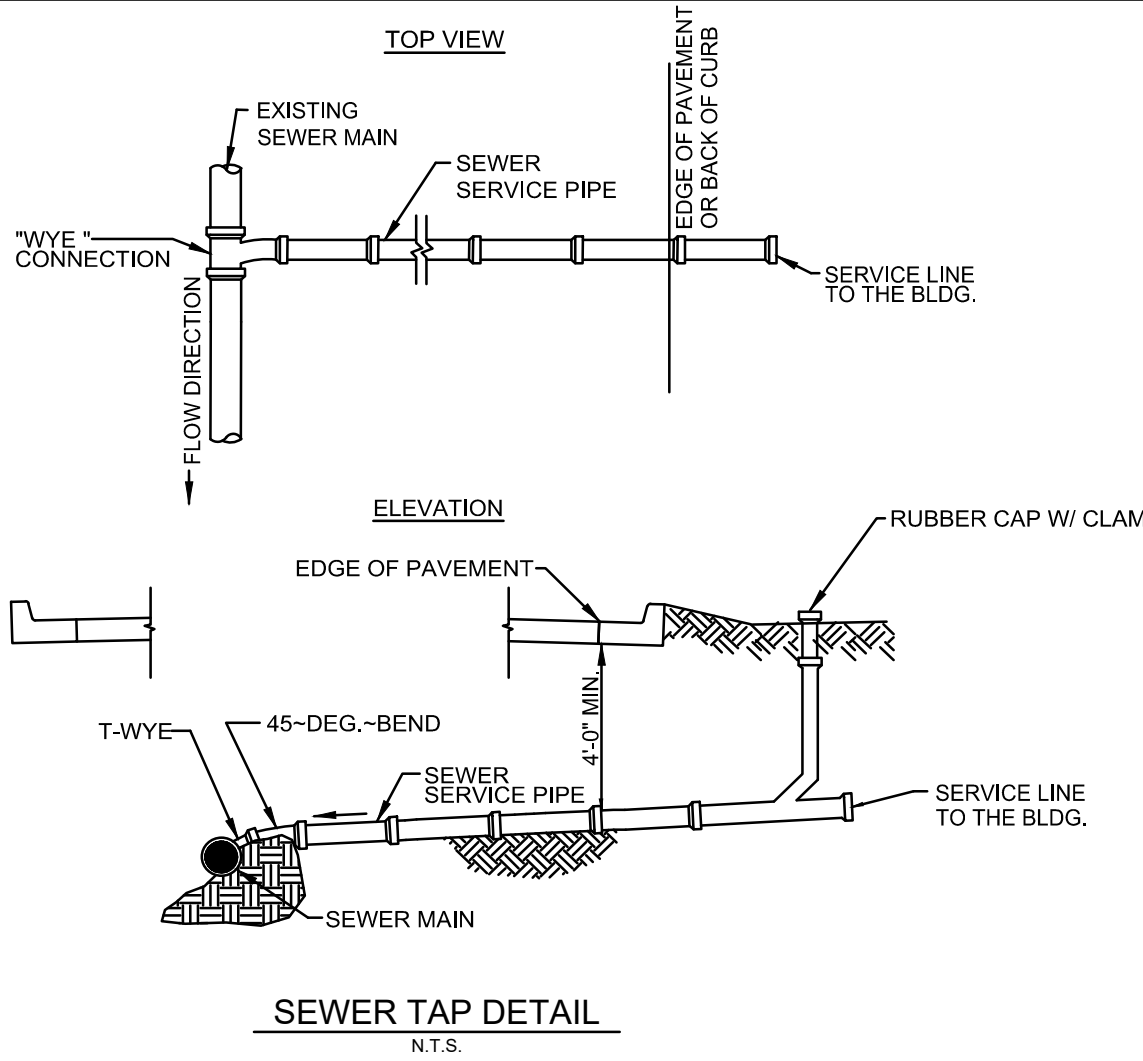
1" & 3/4" WATER METER DETAIL
N.T.S.



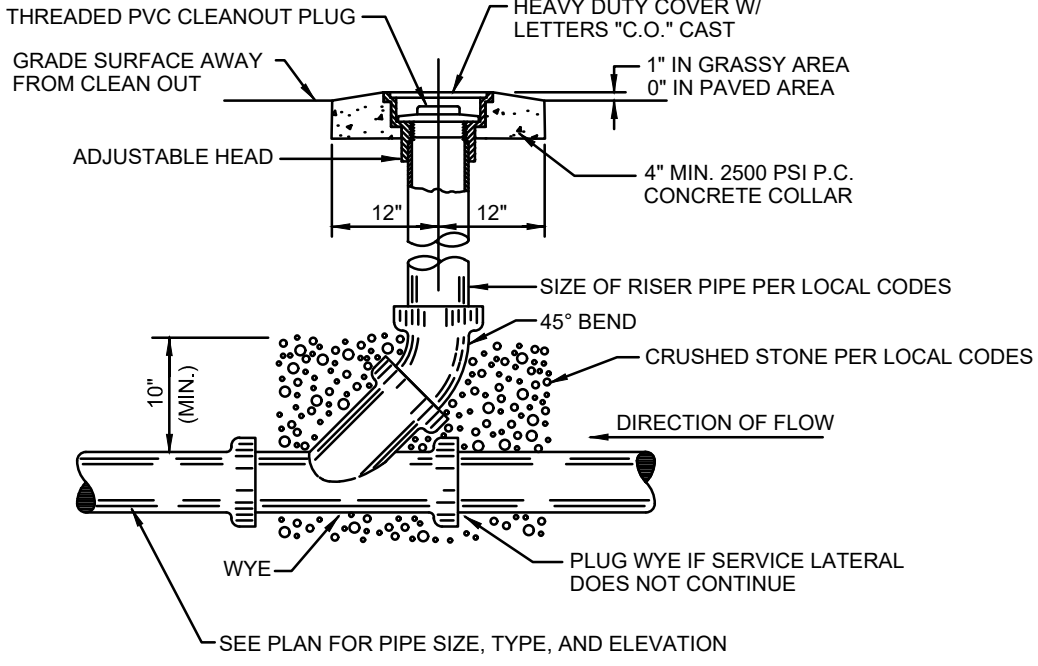
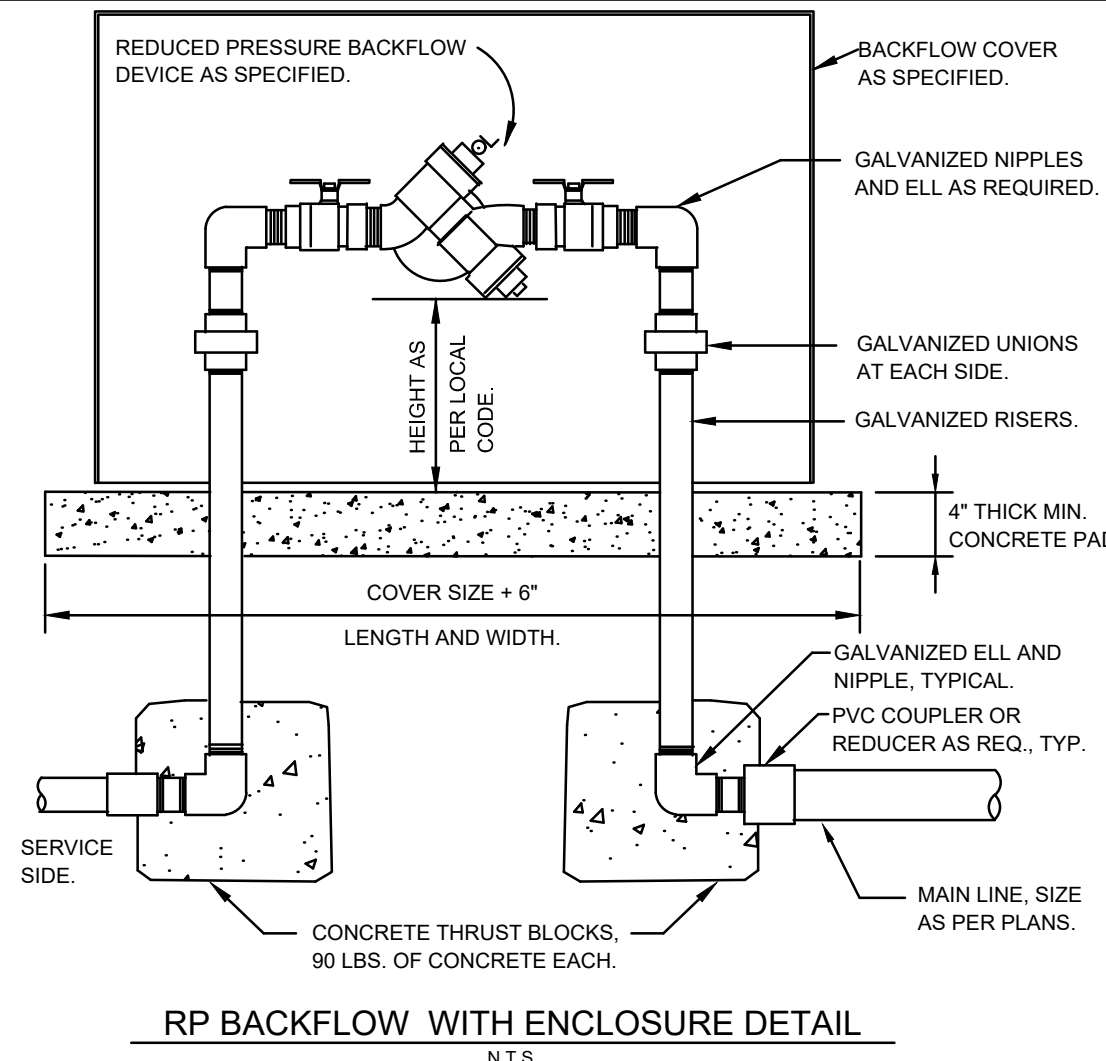
THRUST BLOCK DESIGN AS FOLLOWS:
A. PRESSURE OF 150 P.S.I. (ACTUAL IF HIGHER)
+ 50% SURGE ALLOWANCE
B. MAXIMUM SOIL BEARING:
C. ALL PIPE & FITTING TO BE WRAPPED WITH 40 PLASTIC MIL.

SOIL TYPE	PRESSURE
LIMESTONE	4,000 LBS./SQ. FT.
UNDISTURBED SOIL, CALICHE	2,000 LBS./SQ. FT.
LOOSE OR SPONGY SOIL	1,500 LBS./SQ. FT.

THRUST BLOCK DETAIL
N.T.S.



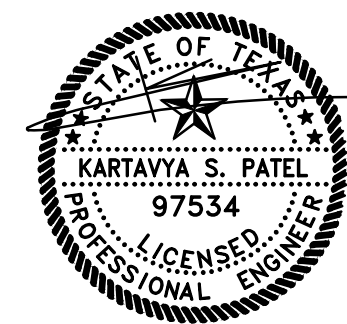
SANITARY SEWER DOUBLE CLEAN-OUT
N.T.S.



NOTE:
SEE APPLICABLE DETAIL FOR
BACKFILL AND BEDDING
INSTRUCTIONS.

SANITARY SEWER CLEAN-OUT
N.T.S.

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06/21/2023

UTILITY DETAILS

DOLLAR GENERAL

NE QUADRANT OF FM 2450 & CHAPMAN ROAD

CITY OF SANGER ETJ

DENTON COUNTY, TEXAS 76266

JAMES B.P. JANUARY SURVEY ABSTRACT NO #658



TRIANGLE
ENGINEERING LLC

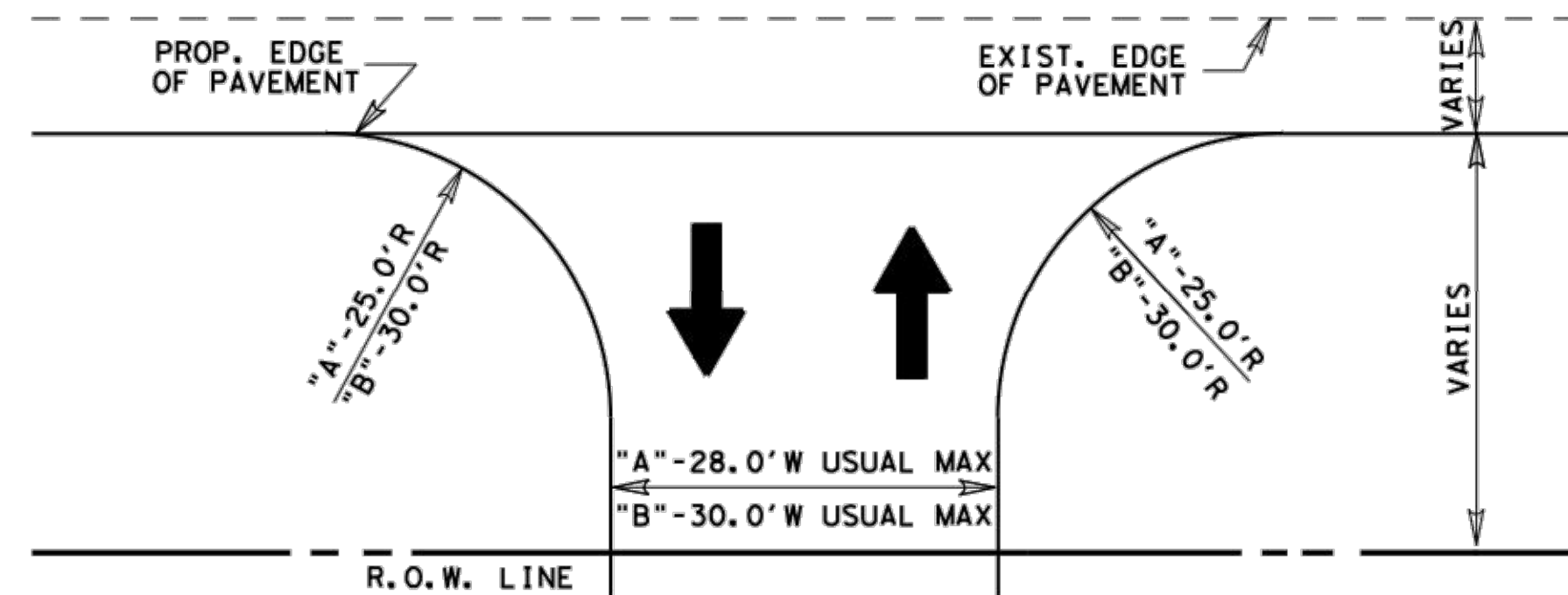
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TX. P.E. FIRM #11525

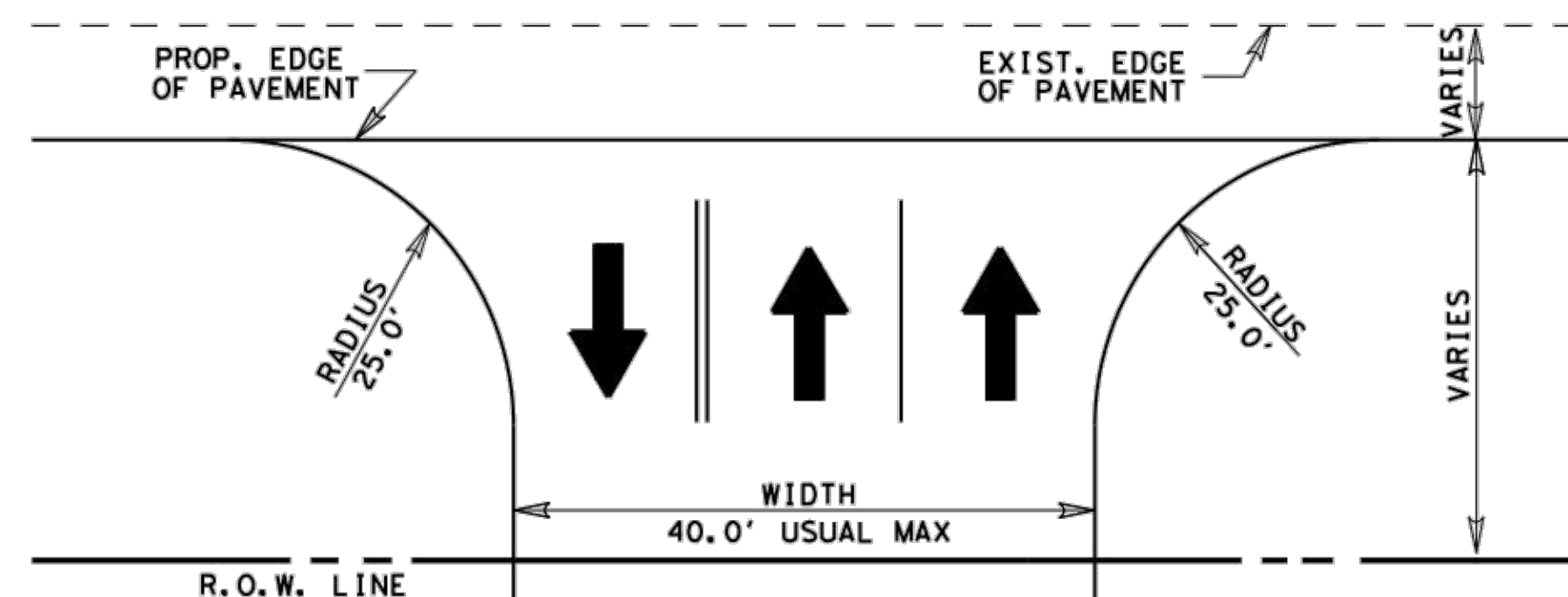
DESIGNS FOR TWO-WAY COMMERCIAL DRIVEWAYS



"A"- ONE ENTRY LANE AND ONE EXIT LANE, FEWER THAN 4 LARGE VEHICLES PER HOUR

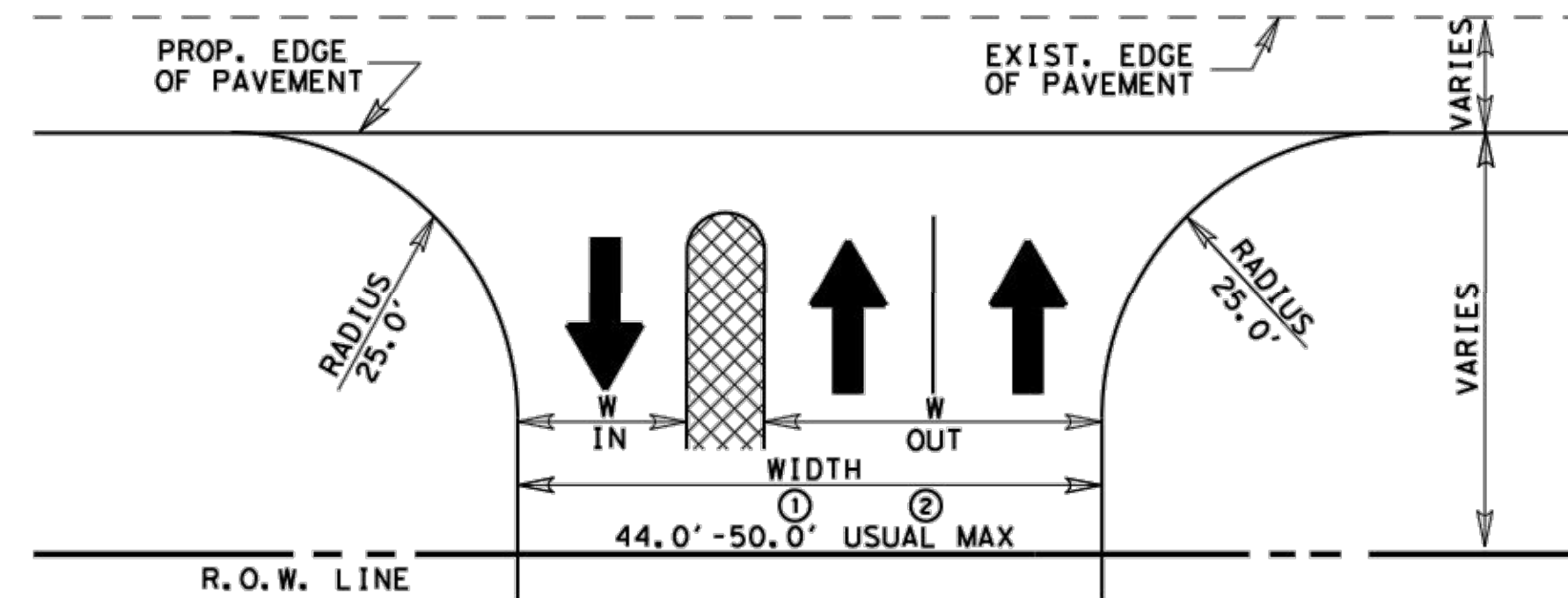
"B"- ONE ENTRY LANE AND ONE EXIT LANE, 4 OR MORE SINGLE UNIT VEHICLES^① PER HOUR

① - DRIVEWAY DESIGNS FOR LARGER VEHICLES WILL BE CONSIDERED ON A CASE BY CASE BASIS



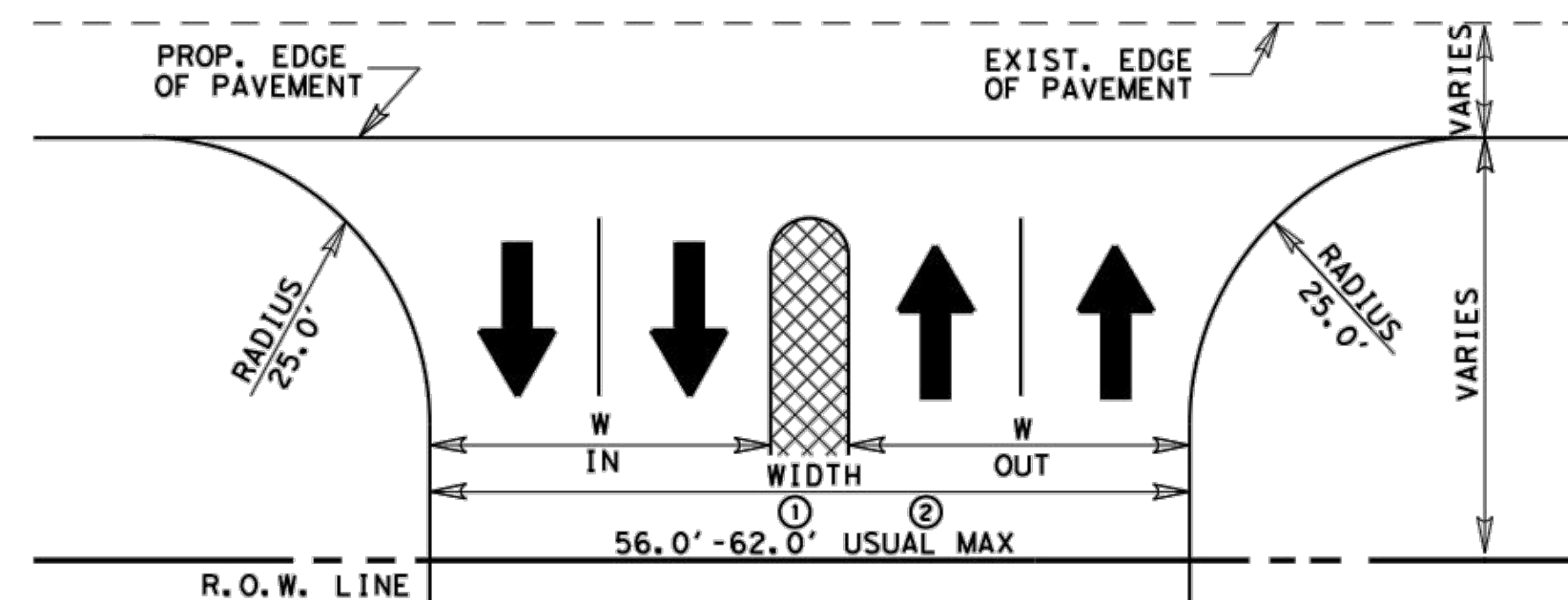
ONE ENTRY LANE AND TWO EXIT LANES (WITHOUT DIVIDERS)

DESIGNS FOR TWO-WAY COMMERCIAL DRIVEWAYS



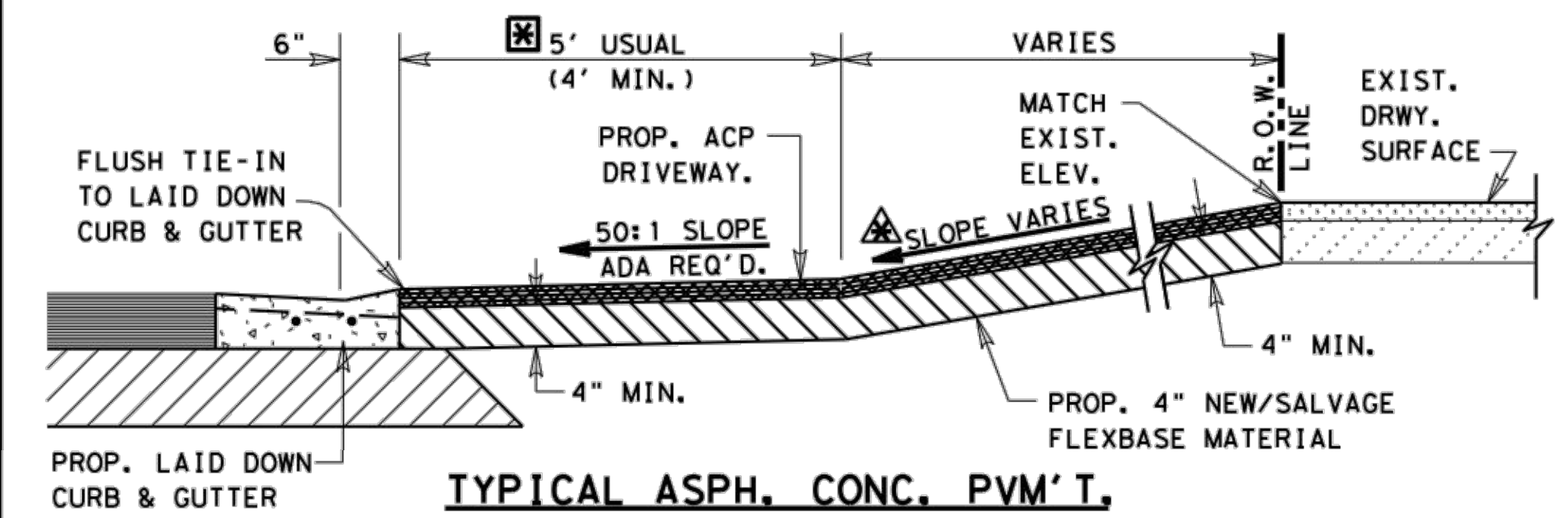
- ① - 4.0' WIDE DIVIDER, FACE-TO-FACE CURBS
② - 10.0' WIDE DIVIDER, FACE-TO-FACE CURBS

ONE ENTRY LANE AND TWO EXIT LANES (WITH A DIVIDER)

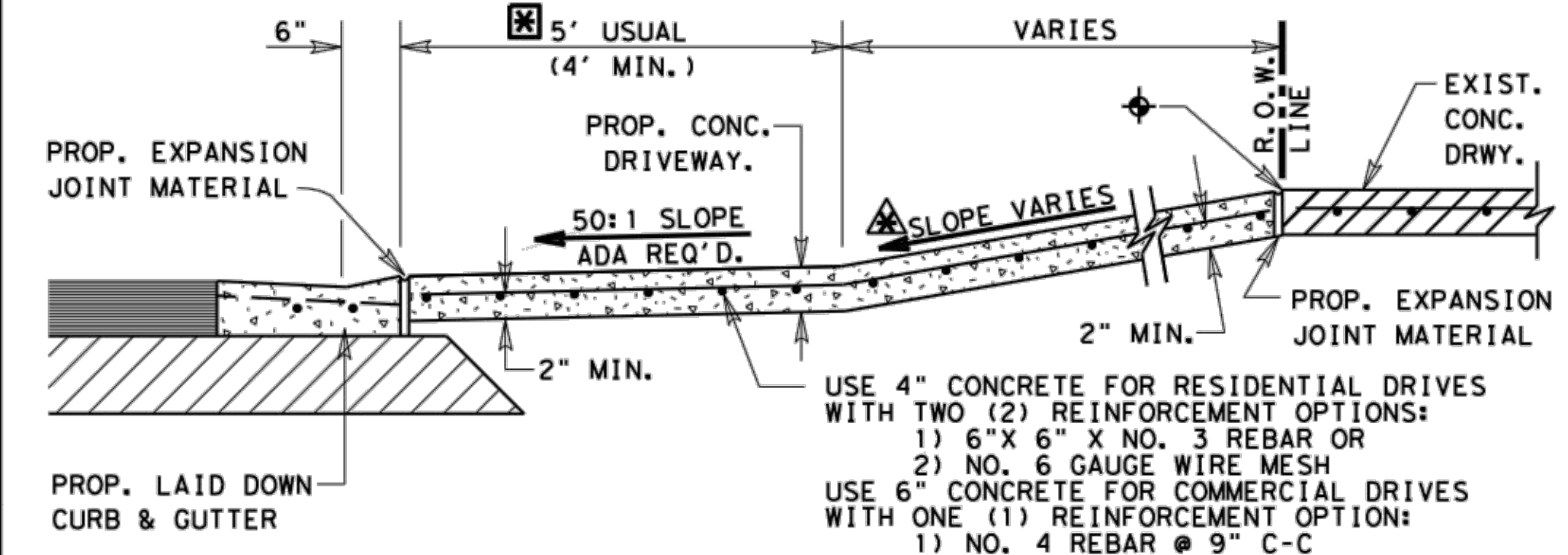


- ① - 4.0' WIDE DIVIDER, FACE-TO-FACE CURBS
② - 10.0' WIDE DIVIDER, FACE-TO-FACE CURBS

TWO ENTRY LANES AND TWO EXIT LANES (WITH A DIVIDER)



TYPICAL ASPH. CONC. PVM'T.
DRIVEWAY SECTION
N.T.S.



TYPICAL CONCRETE
DRIVEWAY SECTION
N.T.S.

CONCRETE SHALL BE SAW CUT TO THE LIMITS OF REMOVAL WHERE APPLICABLE.

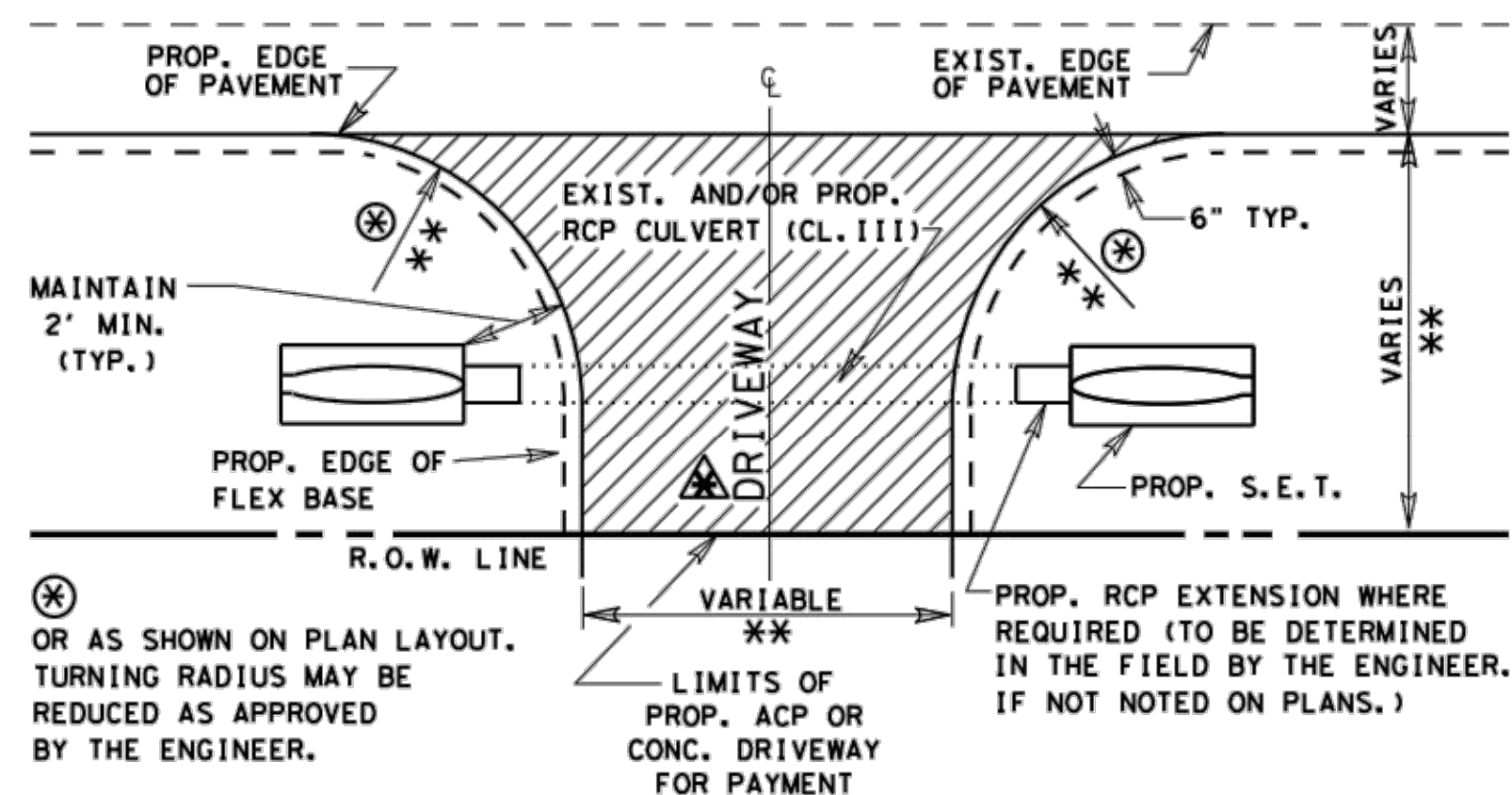
PROF./FUTURE SIDEWALK CROSSING LOCATION UNLESS SHOWN ELSEWHERE ON P&P SHEETS. SEE P&P SHEETS FOR PROF. SIDEWALK LOCATION IF SIDEWALKS ARE INCLUDED AS PART OF PROJECT. REFER TO STATE STANDARDS - PEDESTRIAN FACILITIES - FOR ADDITIONAL REQUIREMENTS.

ENTRANCE'S BASE AND SURFACING MAY BE EXTENDED BEYOND R.O.W. LINE AS REQUIRED TO MEET EXISTING GRADE IN A SATISFACTORY MANNER OF WHICH NO STEEPER THAN 12:1 FOR COMMERCIAL DRIVEWAY AND 8:1 FOR RESIDENTIAL DRIVEWAY SLOPE WILL BE CONSTRUCTED.

PROP. DWY ALGEBRAIC DIFFERENCE TABLE	
COMMERCIAL DRIVEWAYS @ A = 6% MAX.	
RESIDENTIAL DRIVEWAYS @ A = 8% MAX.	

PROPOSED DRIVEWAY SLOPE TABLE	
COMMERCIAL DRIVEWAYS @ 12:1 MAX.	
RESIDENTIAL DRIVEWAYS @ 8:1 MAX.	

PRIVATE AND COMMERCIAL DRIVES WITHOUT CURB & GUTTER

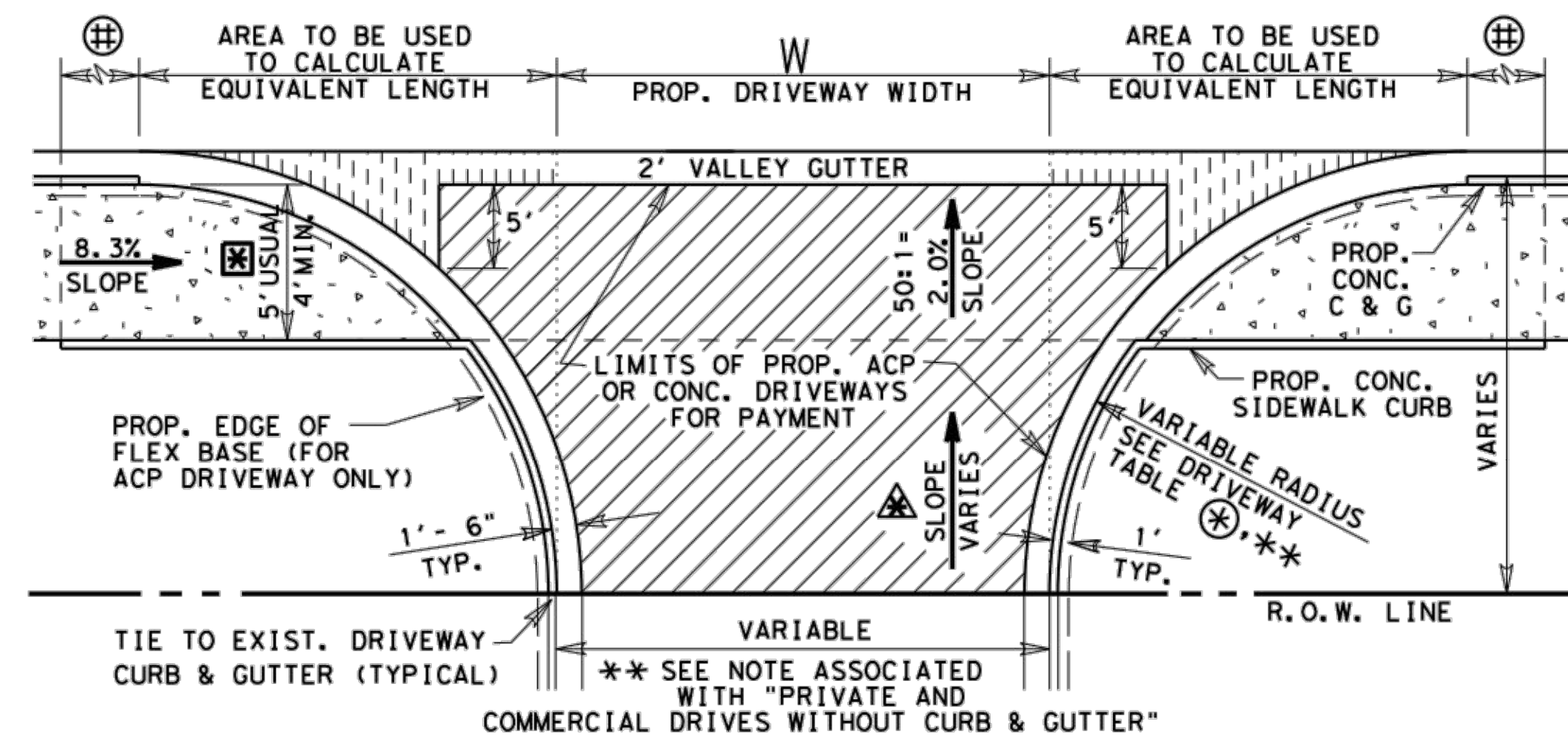


PLAN OF PRIVATE AND COMMERCIAL DRIVES

** FOR PRIVATE RESIDENTIAL DRIVES, TRY TO MATCH EXISTING WITH A MINIMUM WIDTH OF 12 FT. AND A MAXIMUM WIDTH OF 24 FT. WITH 15 FT. USUAL RADIUS. FOR COMMERCIAL DRIVES, USE ABOVE COMMERCIAL DRIVEWAY DETAILS.

SEE TYPICAL DRIVEWAY SECTIONS NOTES FOR DRIVEWAY SLOPE CRITERIA.

PRIVATE AND COMMERCIAL DRIVES WITH CURB & GUTTER



PLAN OF PRIVATE AND COMMERCIAL DRIVES

SEE P&P SHEETS FOR LOCATIONS OF DRIVES
N.T.S.

PROF./FUTURE CONC. SIDEWALK LOCATION UNLESS SHOWN ELSEWHERE ON P&P SHEETS. REFER TO STATE STANDARDS - PEDESTRIAN FACILITIES - FOR ADDITIONAL REQUIREMENTS.

LIMITS OF SLOPE FOR PROP. CONC. CURB BASED ON 8.3% SLOPE FOR SIDEWALK.

SEE TYPICAL DRIVEWAY SECTIONS NOTES FOR DRIVEWAY SLOPE CRITERIA.

LF EQUIVALENT TABLE FOR PAYMENT LIMITS OF 2' VALLEY GUTTER

LF OF VALLEY GUTTER = W + X1 + X2		
WHERE X1 AND X2 MAY VARY DEPENDING ON RADIUS		
Prop. Driveway Radius	X1 or X2 (Sq Ft Area / 2')	Equivalent LF Length
5'	1	
8'	2	
10'	4	
12'	6	
15'	9	
18'	12	
20'	15	
22'	18	
25'	24	
28'	30	
30'	34	

SEE DRIVEWAY TABLE FOR LIMITS OF LAID DOWN CURB TO BE PAID FOR AS CURB AND GUTTER

DRIVEWAY TYPES

TY PB-1
EXIST. PRIVATE OR COMMERCIAL DRIVEWAYS TO BE CONSTRUCTED AS SHOWN WITH 4" NEW AND/OR SALVAGE FLEX. BASE, PRIMED AND SURFACED WITH 114#/SY ACP.

CONCRETE (RESIDENTIAL)
EXIST. PRIVATE DRIVEWAYS TO BE CONSTRUCTED AS SHOWN WITH 4" CONCRETE. TO BE PAID FOR BY THE SQ. YD.

CONCRETE (COMMERCIAL)
EXIST. BUSINESS DRIVEWAYS TO BE CONSTRUCTED AS SHOWN WITH 6" CONCRETE. TO BE PAID FOR BY THE SQ. YD.

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PHARR DISTRICT STANDARD

TEXAS DEPARTMENT OF TRANSPORTATION
DRIVEWAY DETAILS
PRIVATE
(RESIDENTIAL-COMMERCIAL)

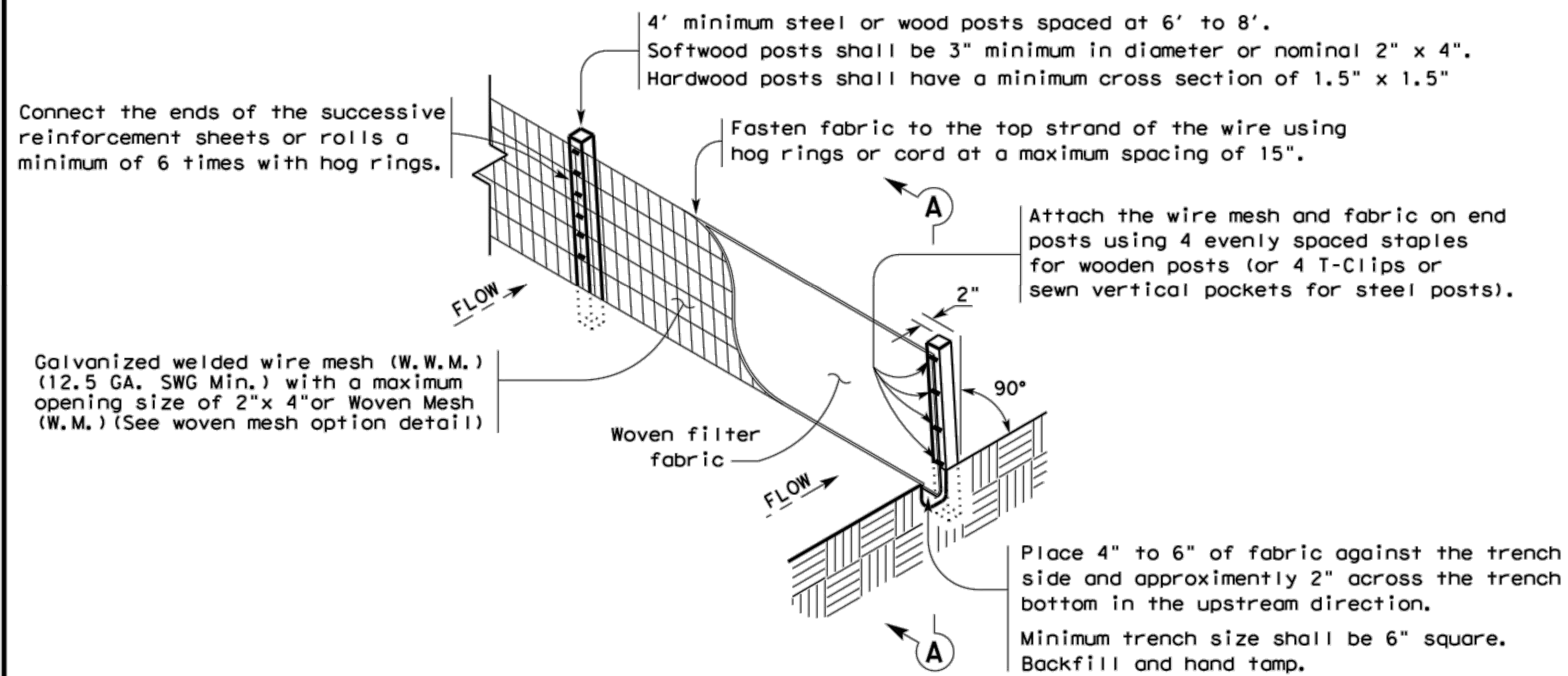
REV. 01/17

DRIVEWAY2.DGN

FED. RD. DIV. NO.	PROJECT NO.	FILE NO.	SHEET NO.
6			17 OF 32
STATE	STATE DIST. NO.	COUNTY	CONT. SECT. JOB HIGHWAY NO.
TEXAS	21		

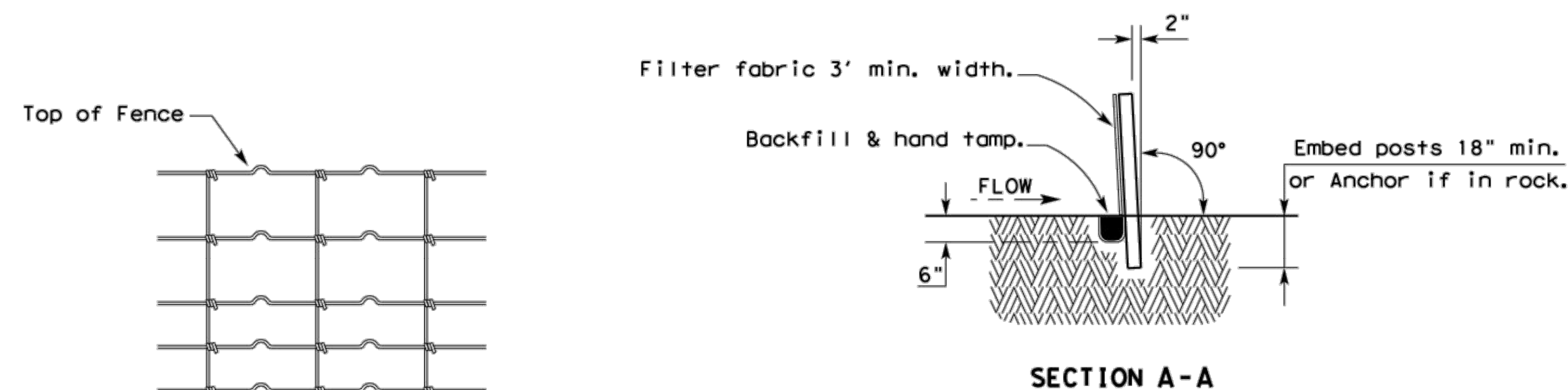
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DATE
FILE



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.

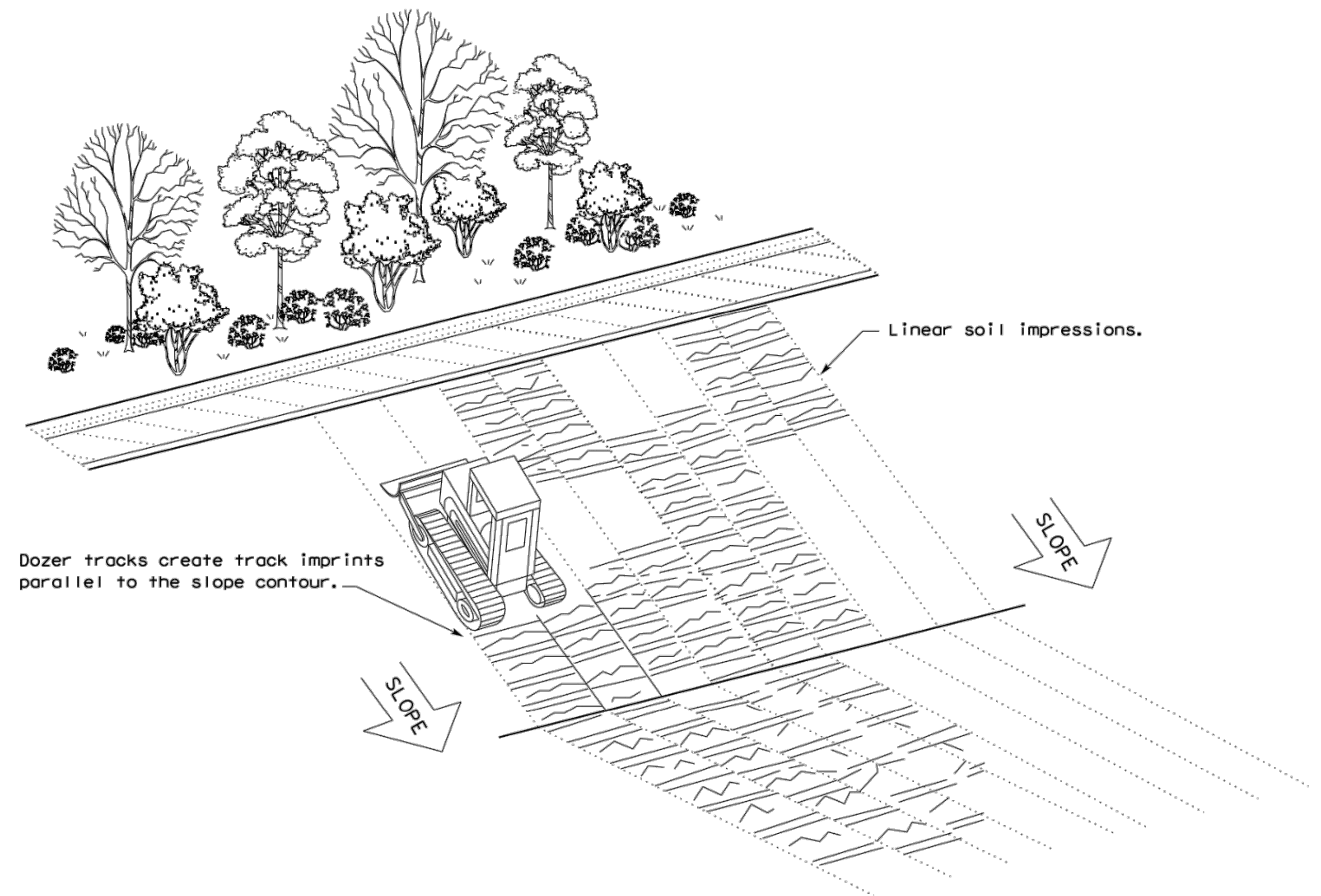
LEGEND

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.

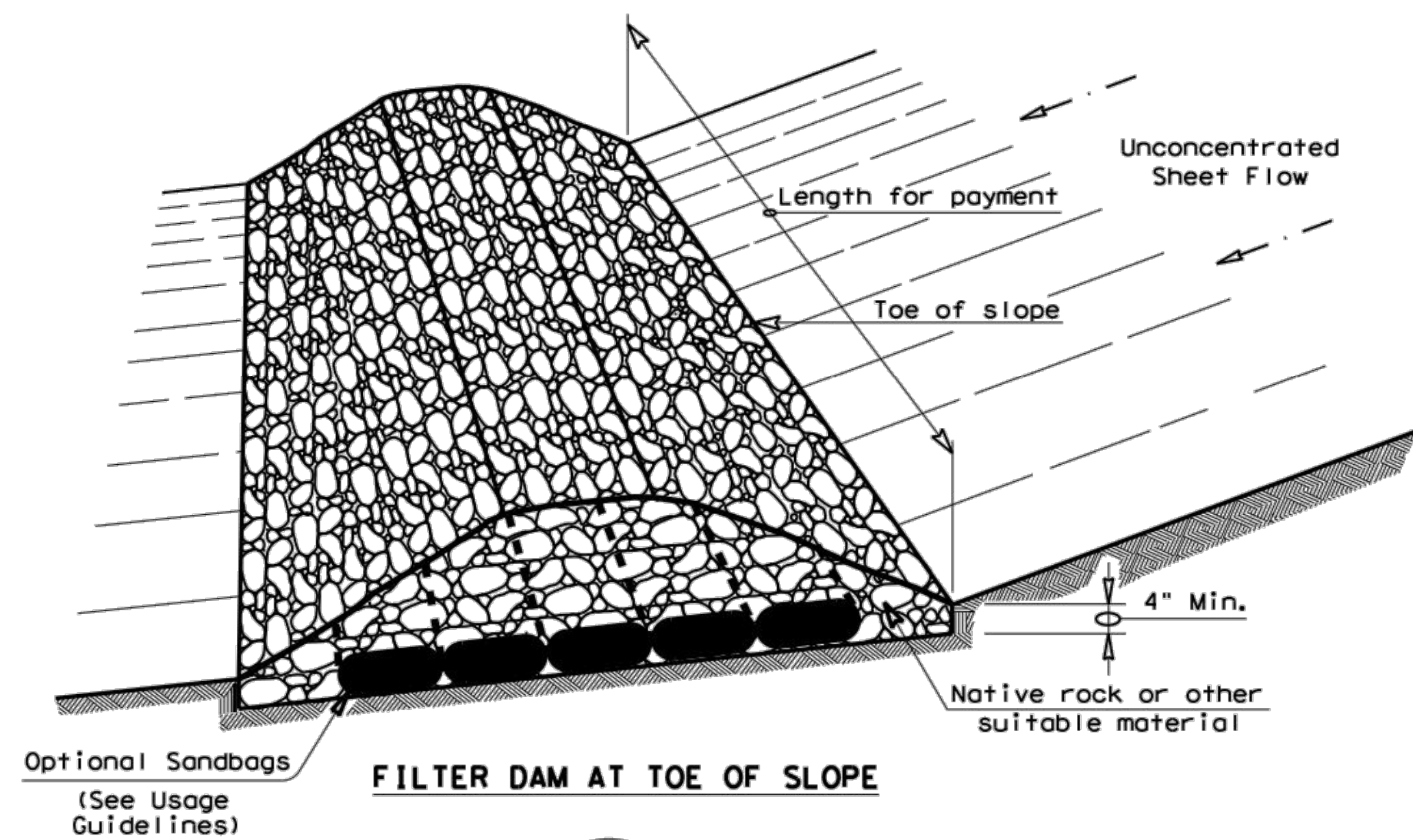


VERTICAL TRACKING

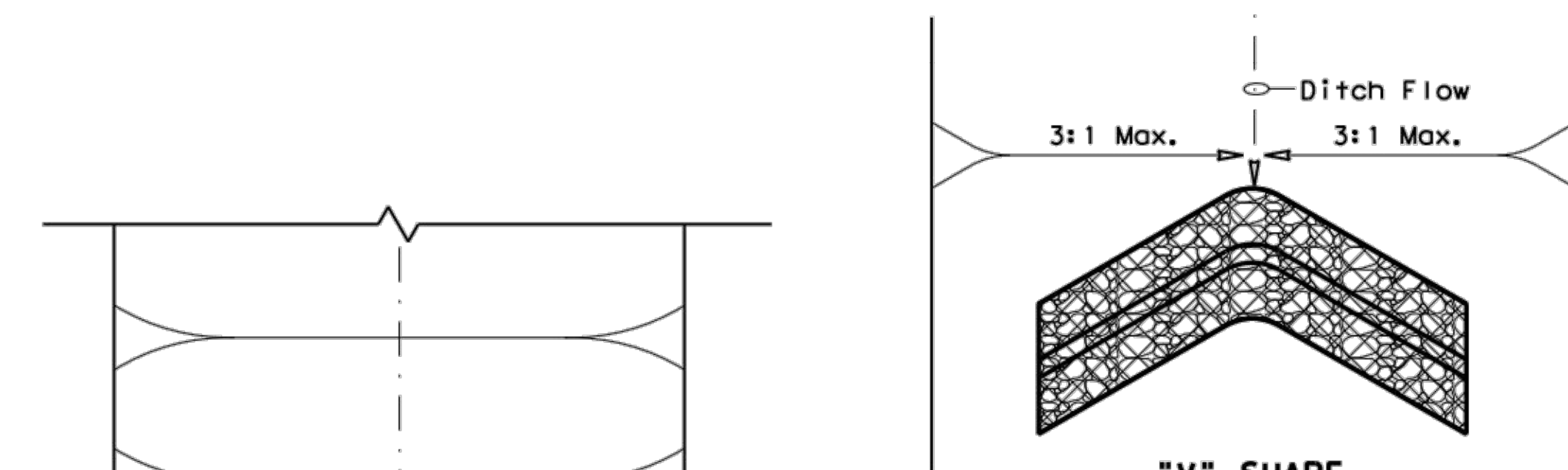
 Texas Department of Transportation				Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES FENCE & VERTICAL TRACKING EC(1) - 16					
FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS		DIST	COUNTY	SHEET NO.	
				D-24	

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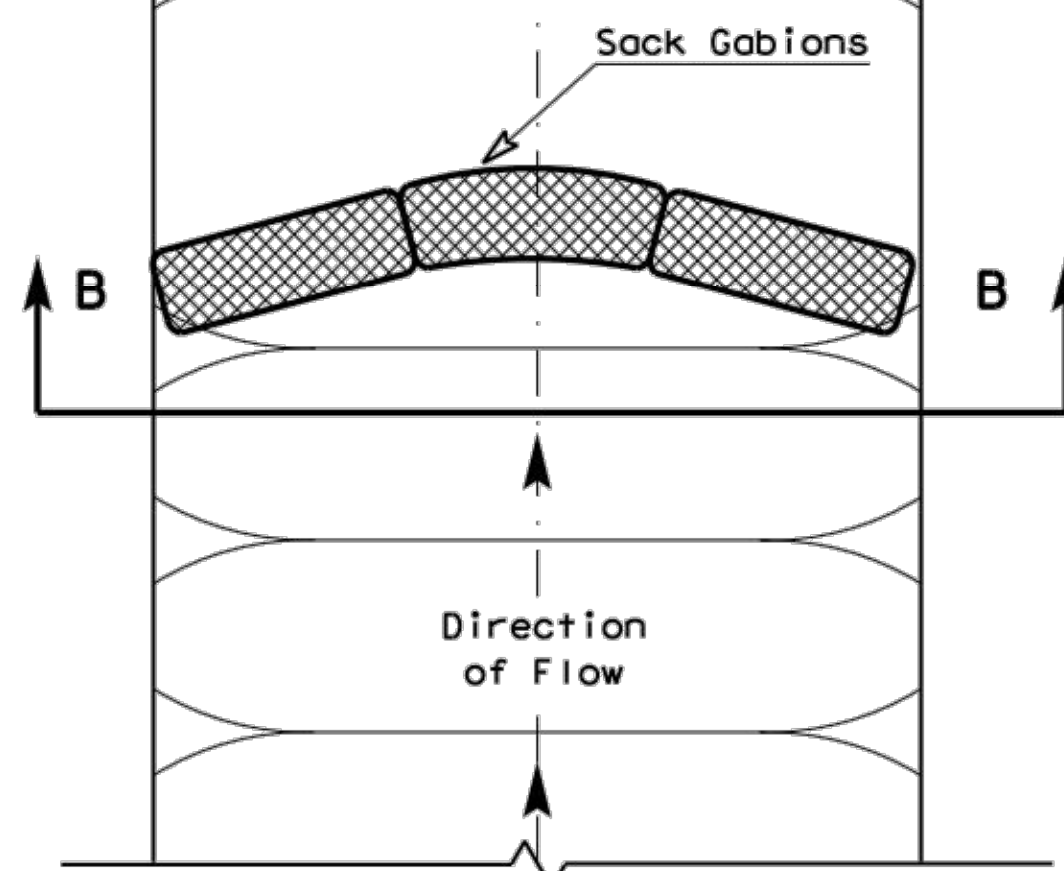
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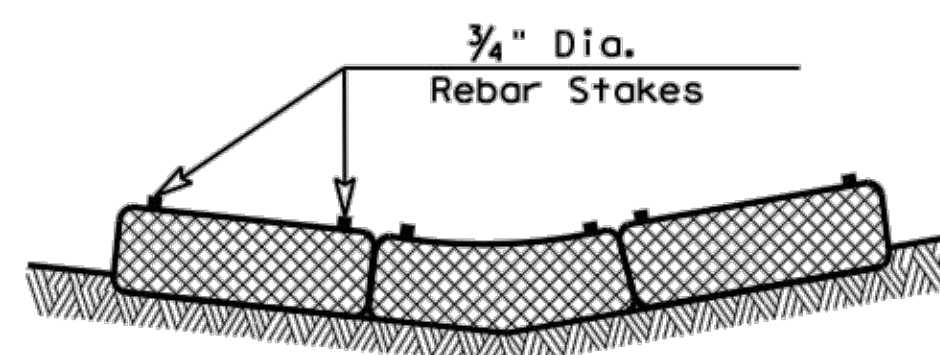
—(RFD1)—



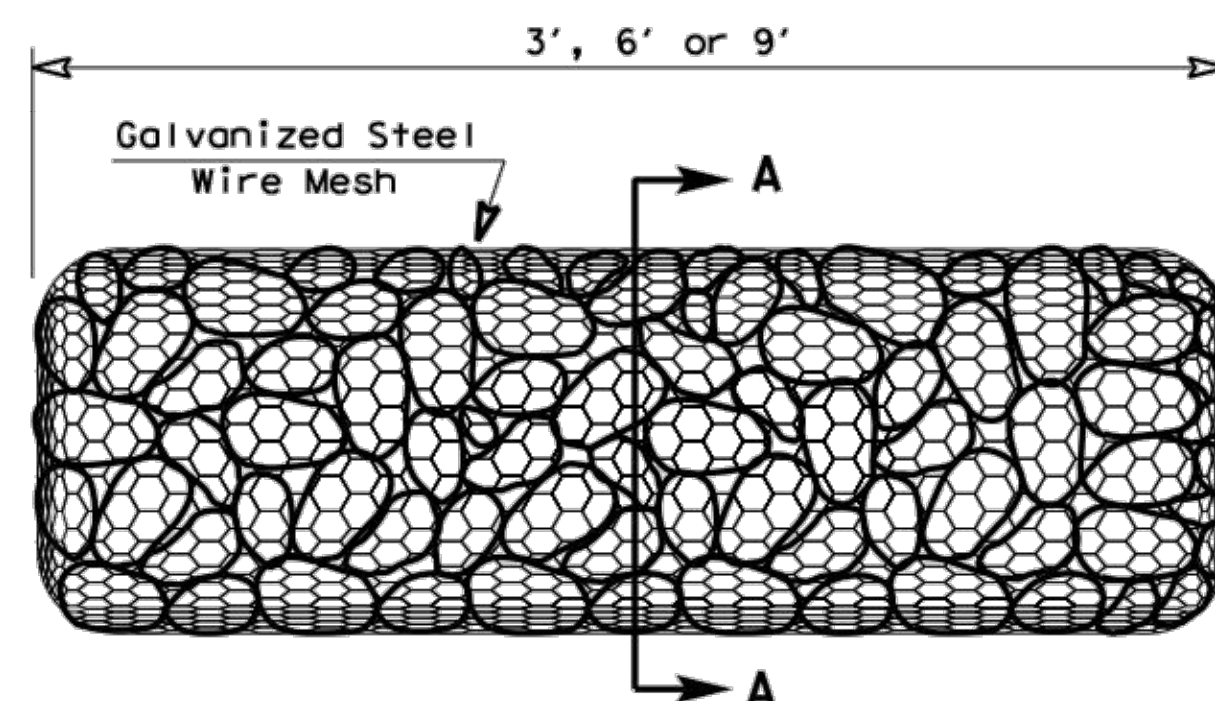
"V" SHAPE
PLAN VIEW



PLAN VIEW

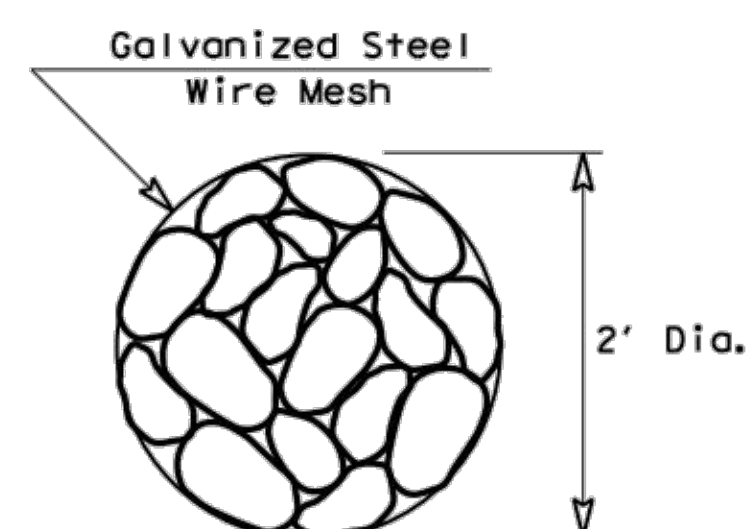


SECTION B-B

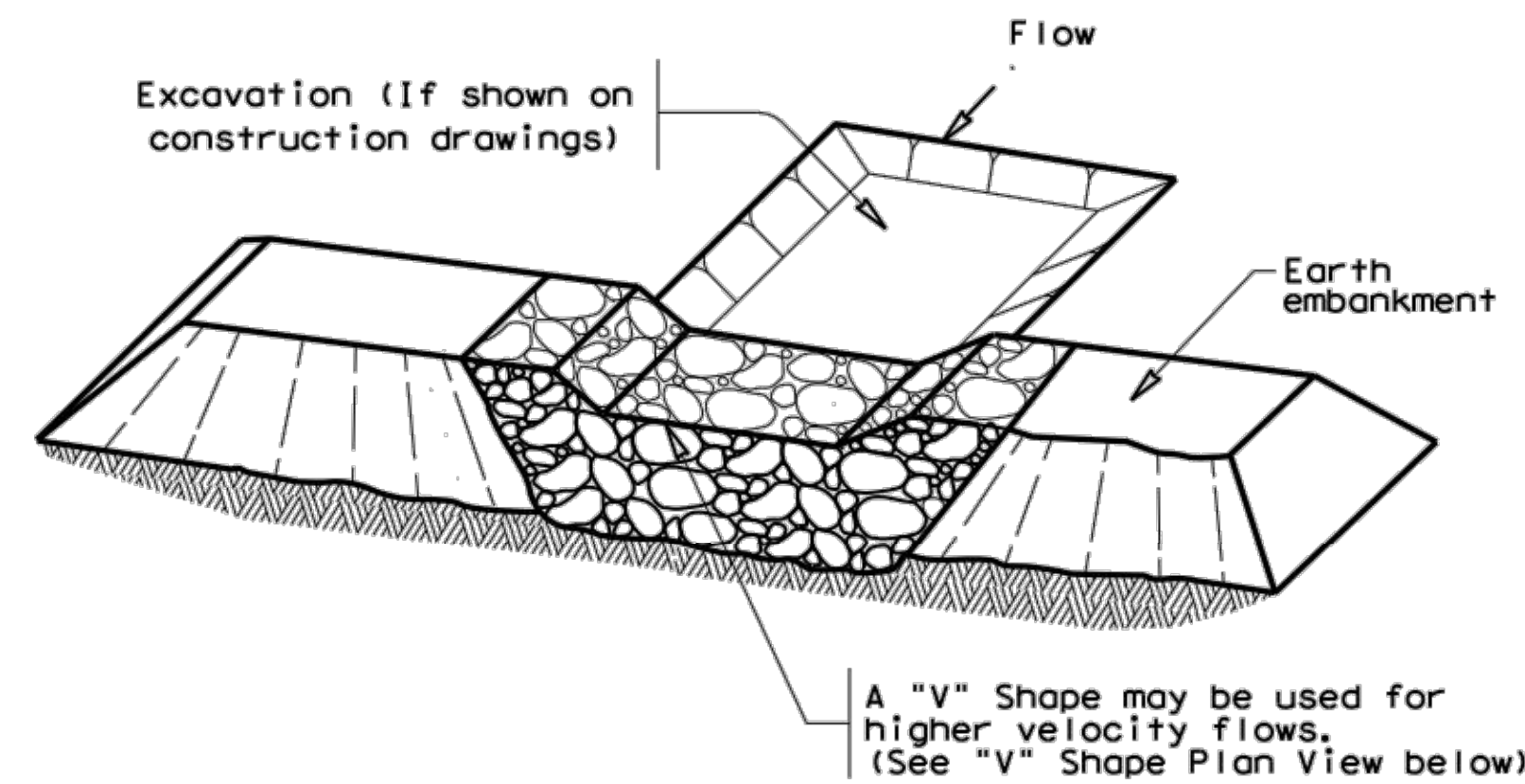


TYPE 4 (SACK GABIONS)

—(RFD4)—

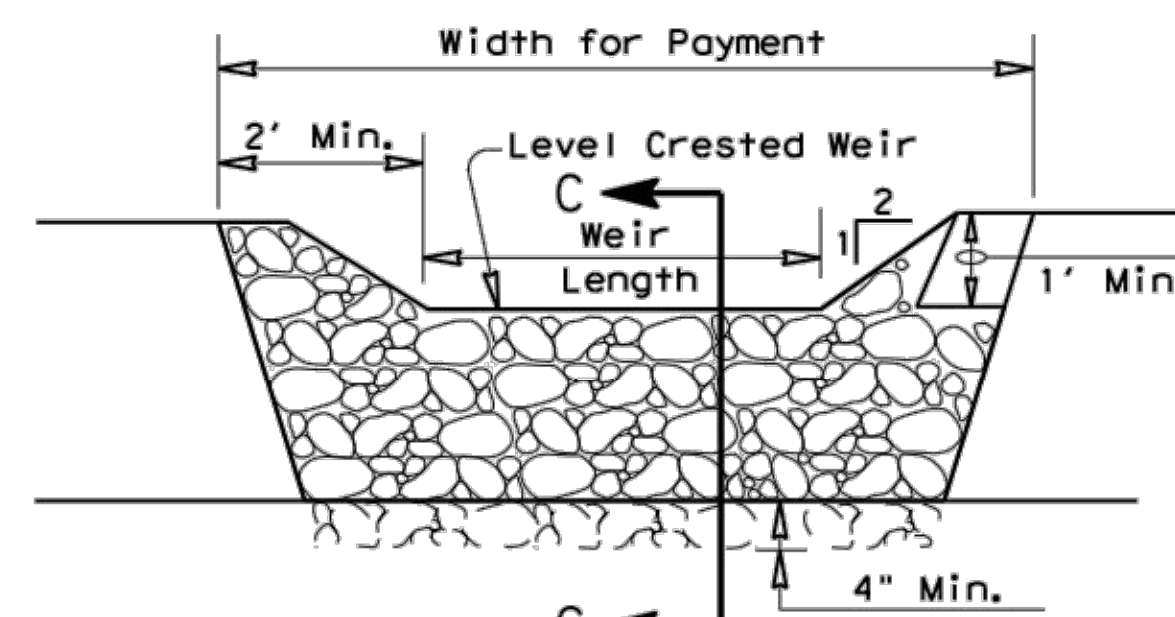


SECTION A-A

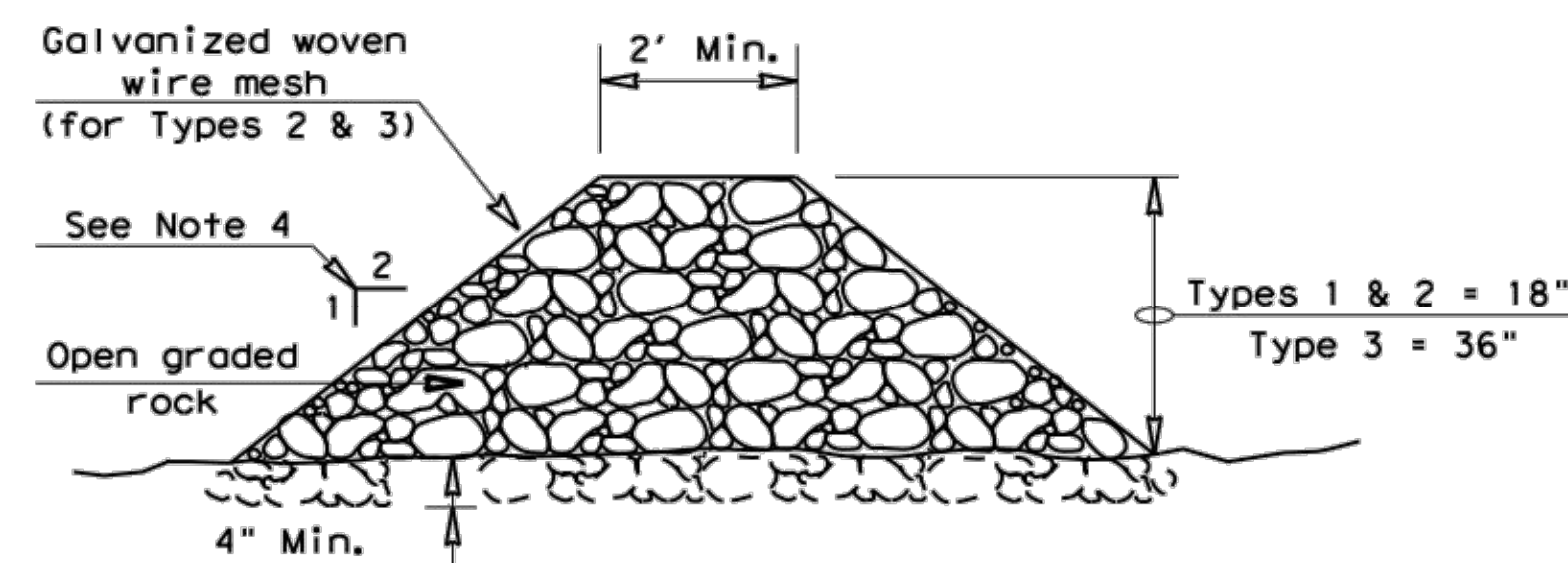


FILTER DAM AT SEDIMENT TRAP

—(RFD1)— OR —(RFD2)—



PROFILE



SECTION C-C

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.

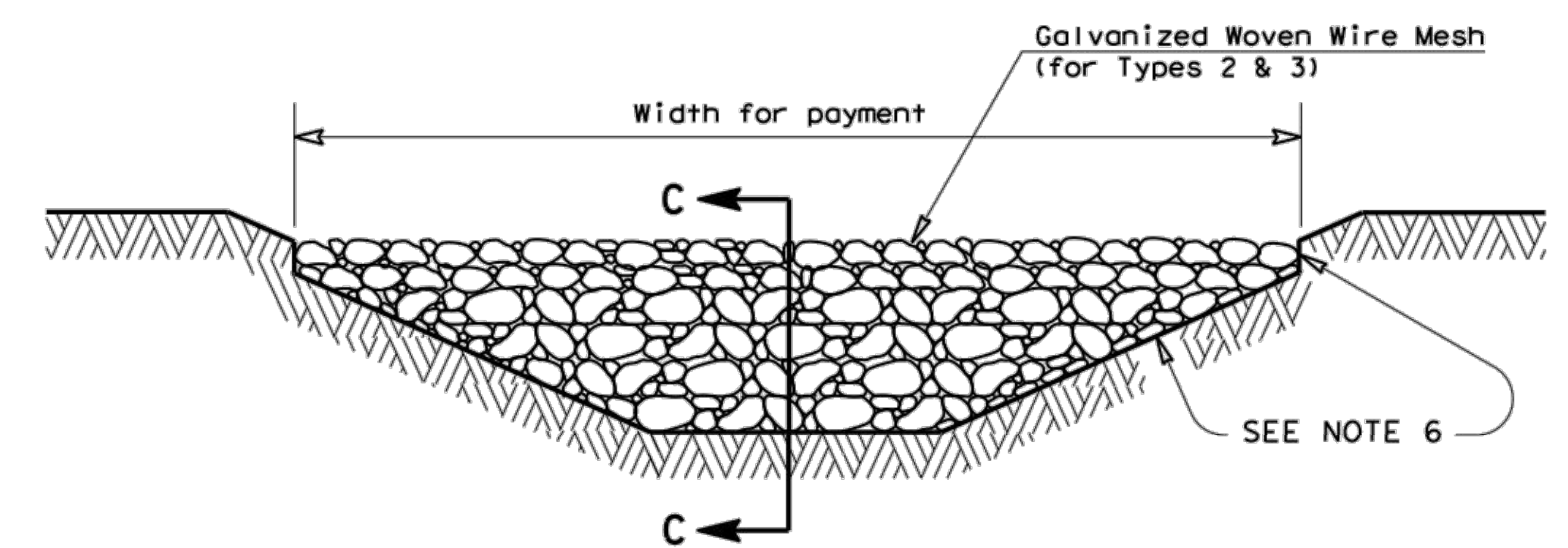
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity 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

—(RFD1)— OR —(RFD2)— OR —(RFD3)—

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.

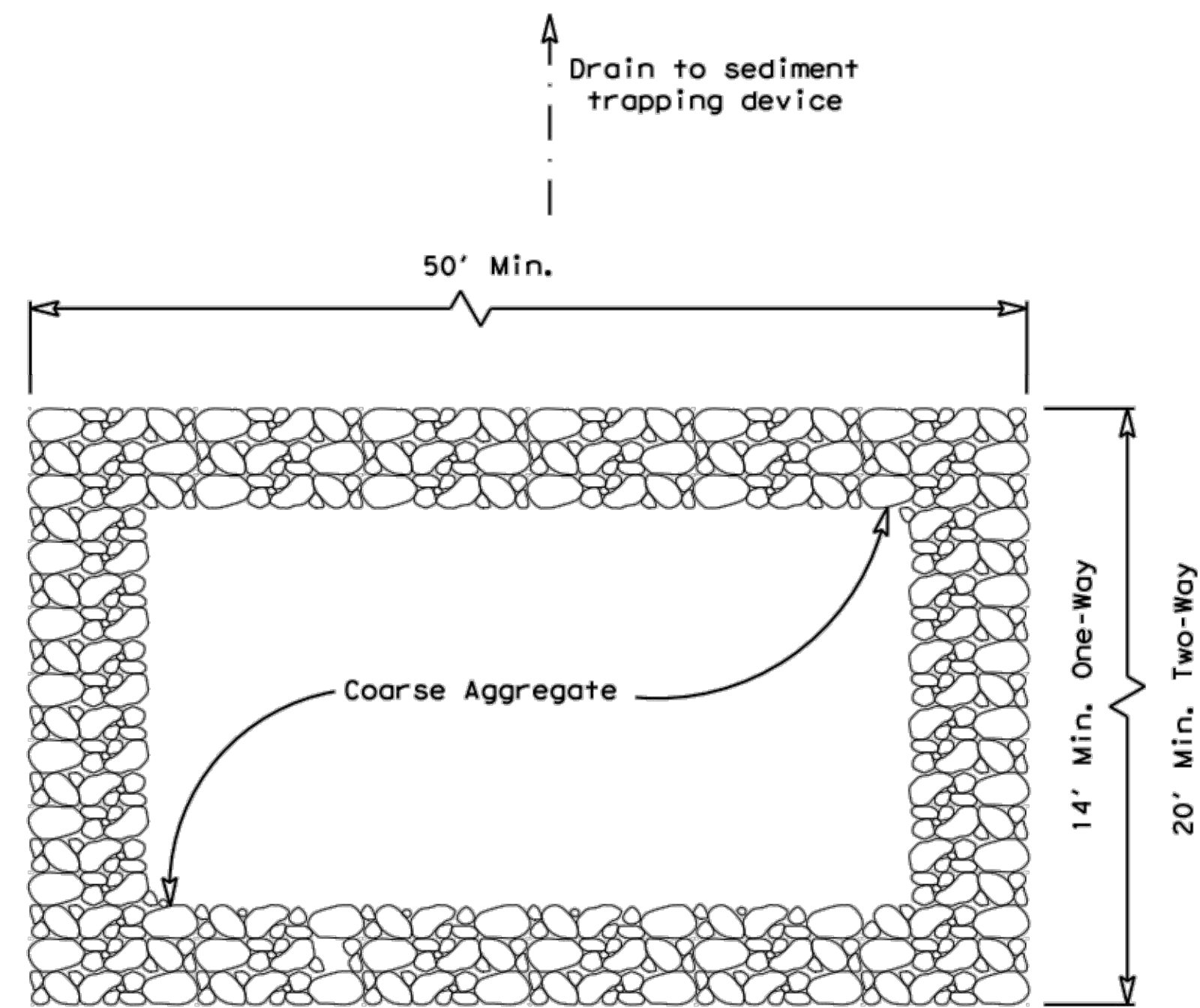
PLAN SHEET LEGEND

- Type 1 Rock Filter Dam —(RFD1)—
Type 2 Rock Filter Dam —(RFD2)—
Type 3 Rock Filter Dam —(RFD3)—
Type 4 Rock Filter Dam —(RFD4)—

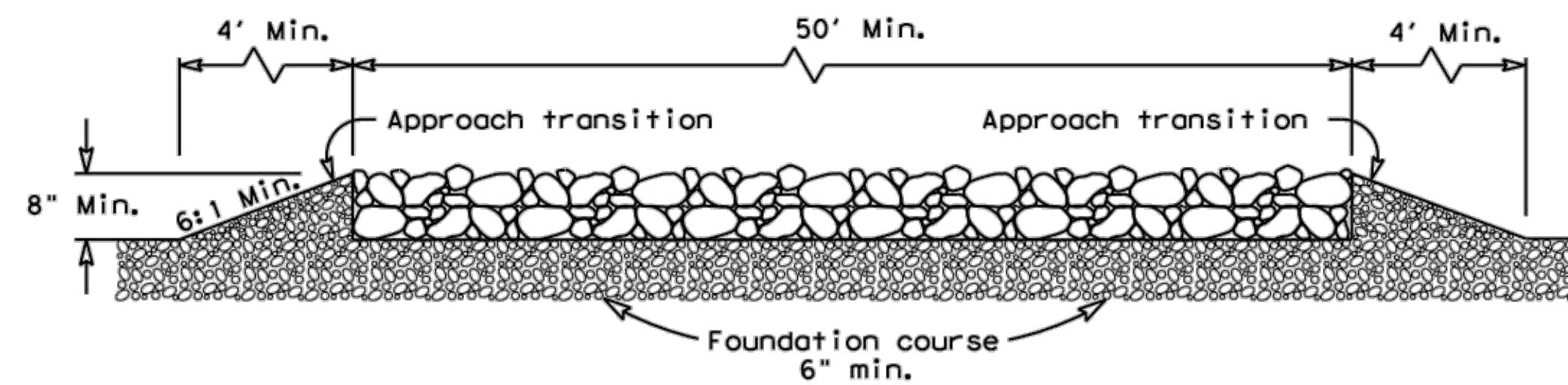
Texas Department of Transportation		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES			
ROCK FILTER DAMS			
EC(2) - 16			
FILE: ec216	DN: TxDOT	CK: KM	DW: VP
© TxDOT: JULY 2016	CONT	SECT	JOB
REVISIONS	DIST	COUNTY	SHEET NO.
			D-25

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DATE: \$DATES\$
FILE: \$FILES\$



PLAN VIEW

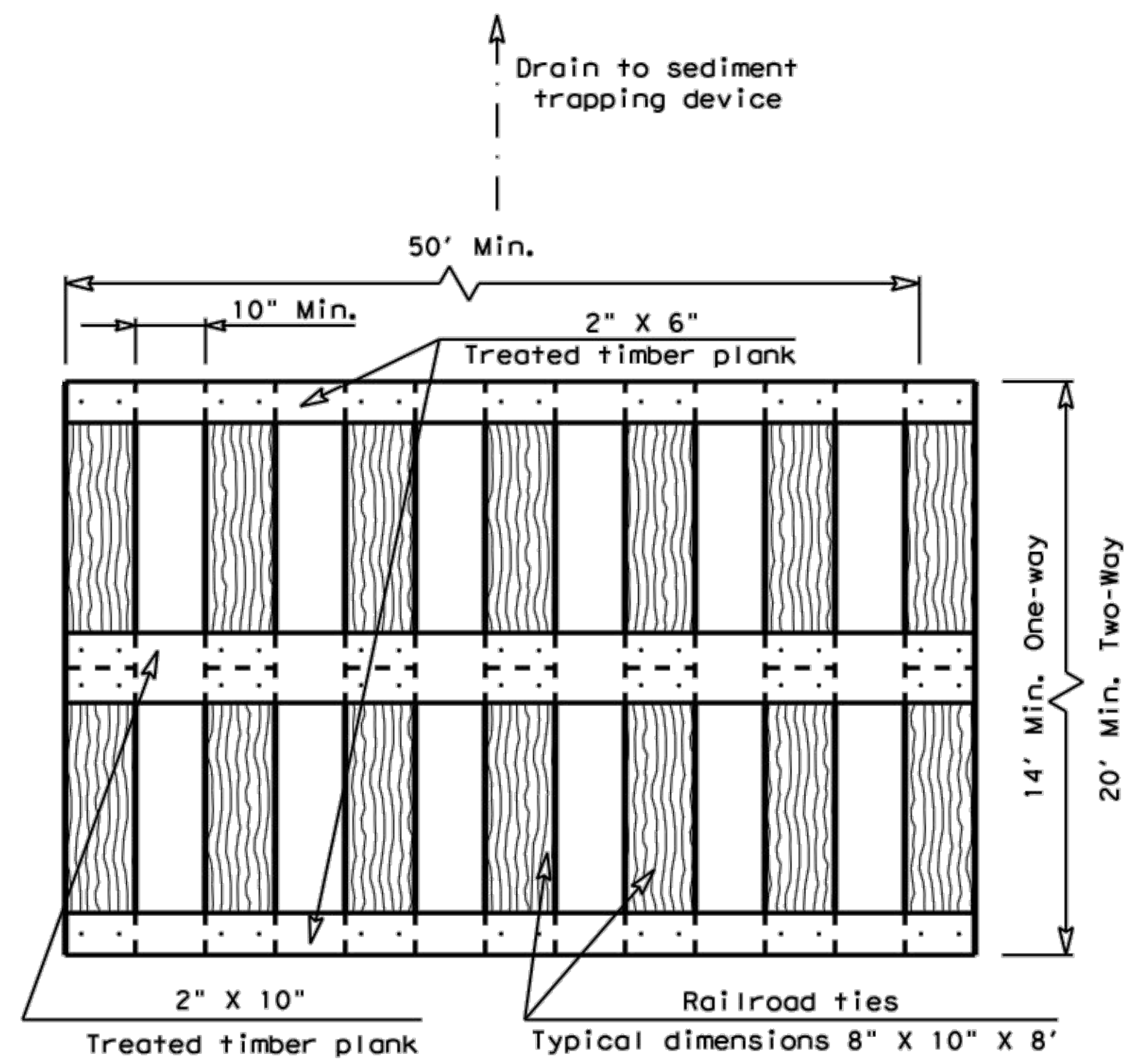


ELEVATION VIEW

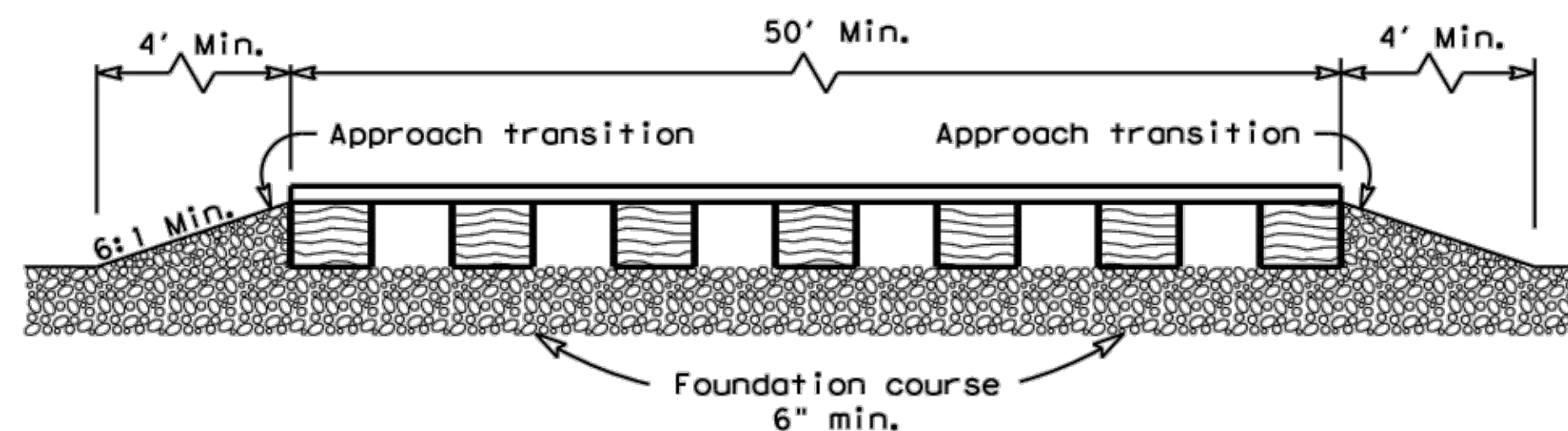
CONSTRUCTION EXIT (TYPE 1)
ROCK CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materials approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



PLAN VIEW

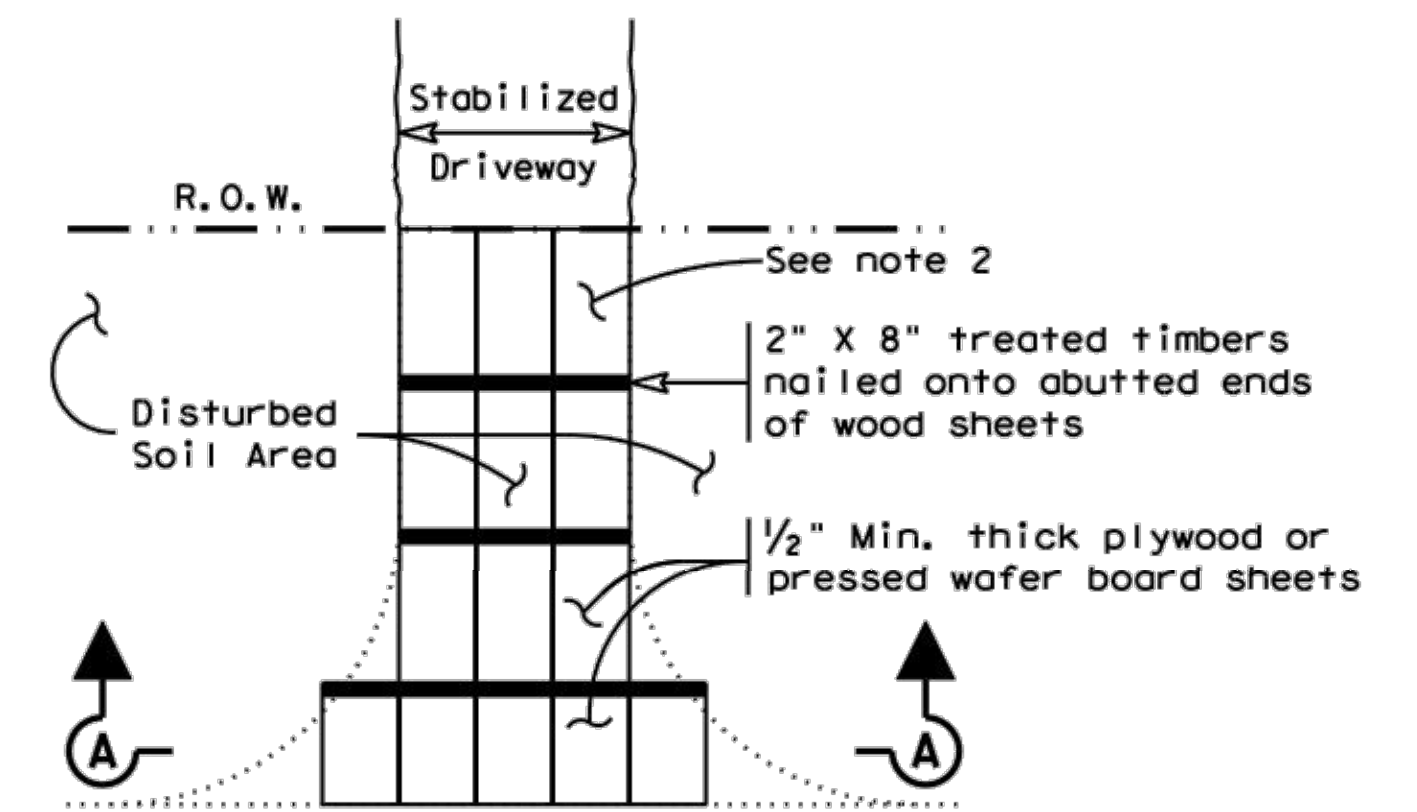


ELEVATION VIEW

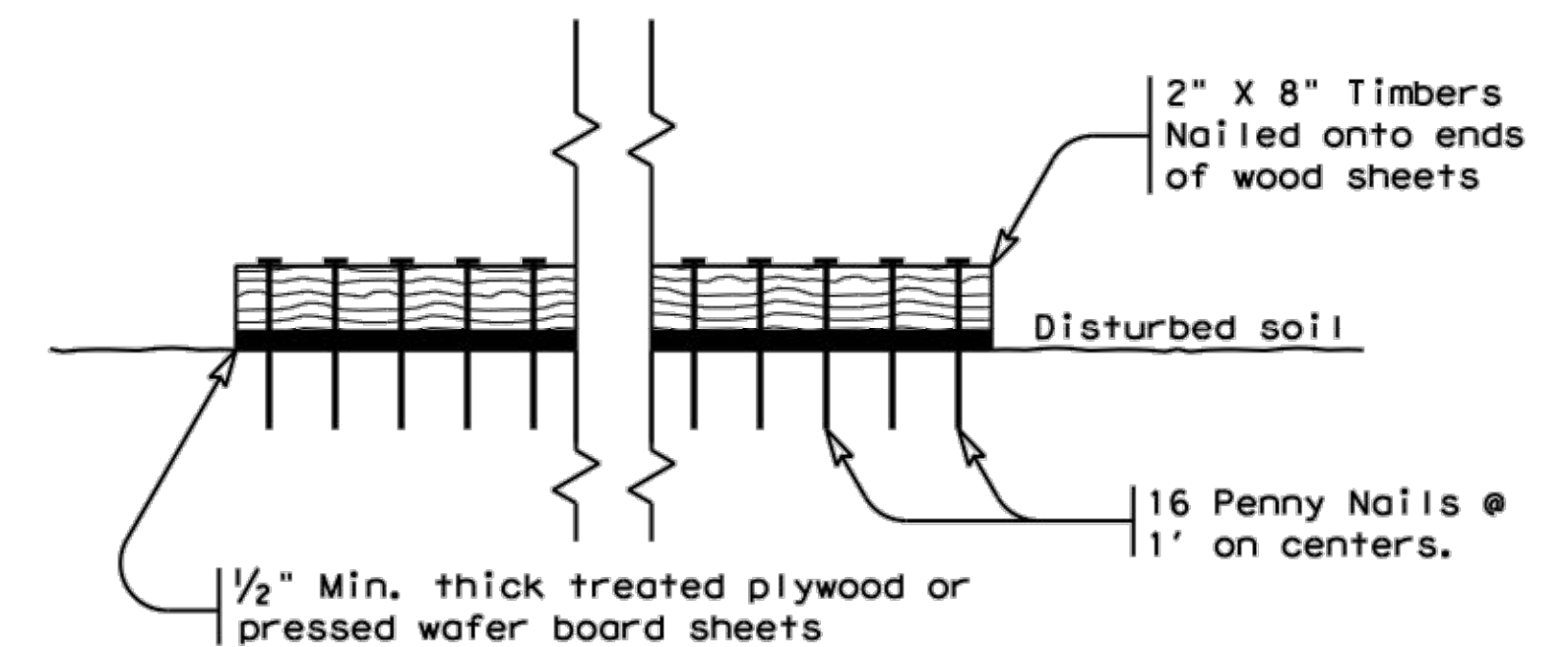
CONSTRUCTION EXIT (TYPE 2)
TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with 1/2" X 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



PLAN VIEW



SECTION A-A
CONSTRUCTION EXIT (TYPE 3)
SHORT TERM

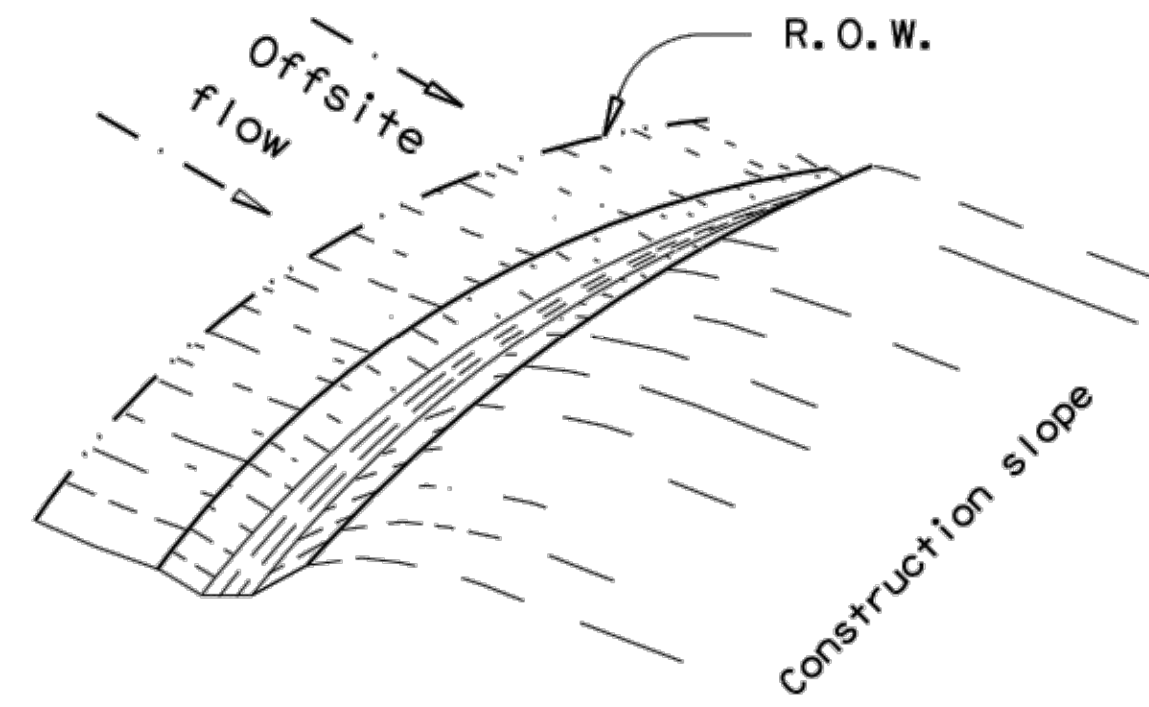
GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

				Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES CONSTRUCTION EXITS EC(3)-16					
FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	\$CS\$	\$SS\$	\$JS\$	\$HWYS\$	
DIST	COUNTY	SHEET NO.			
\$DST\$	\$CTYS\$	\$SEC\$	\$JUL\$	\$JUL\$	\$JUL\$

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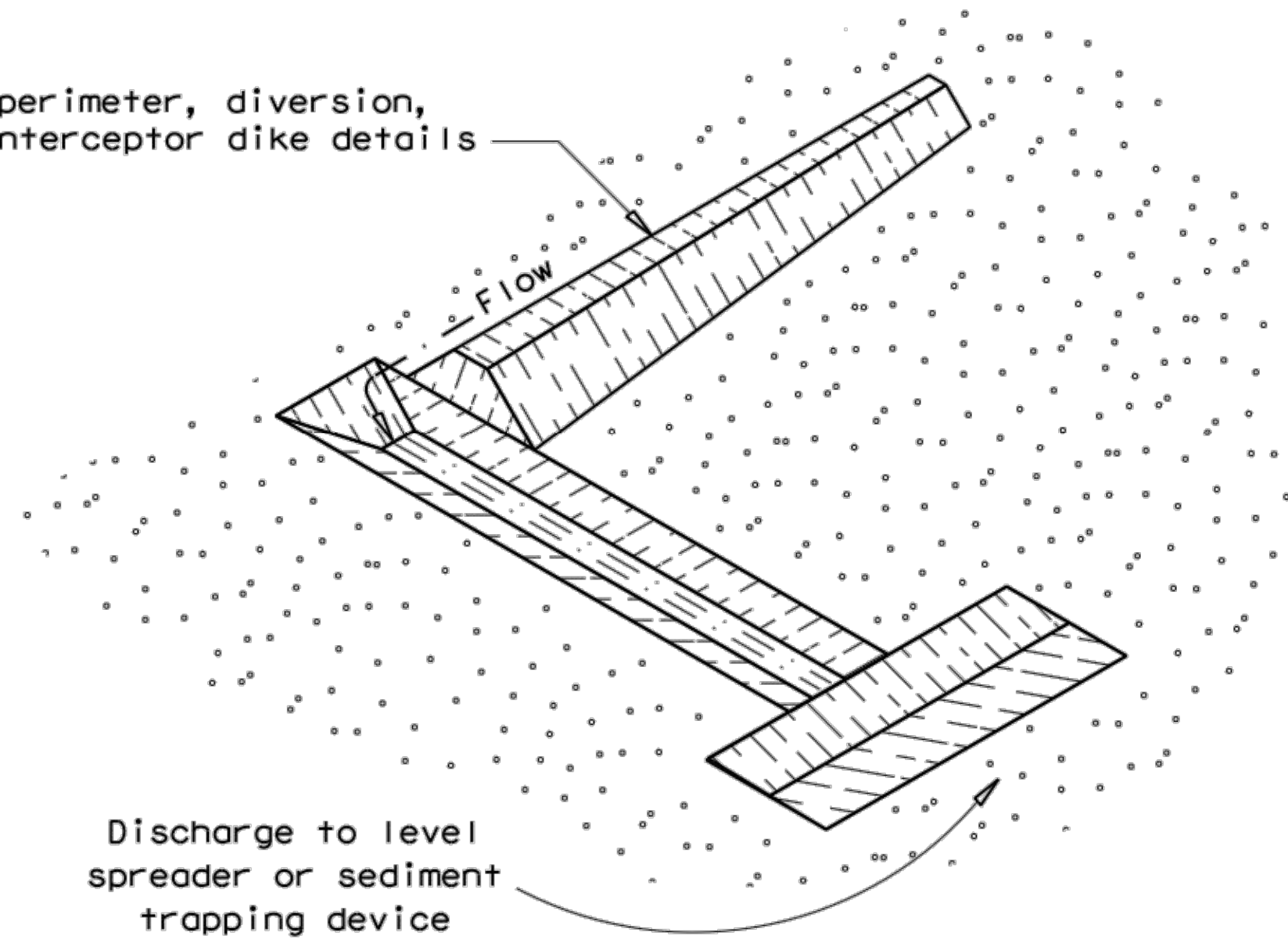
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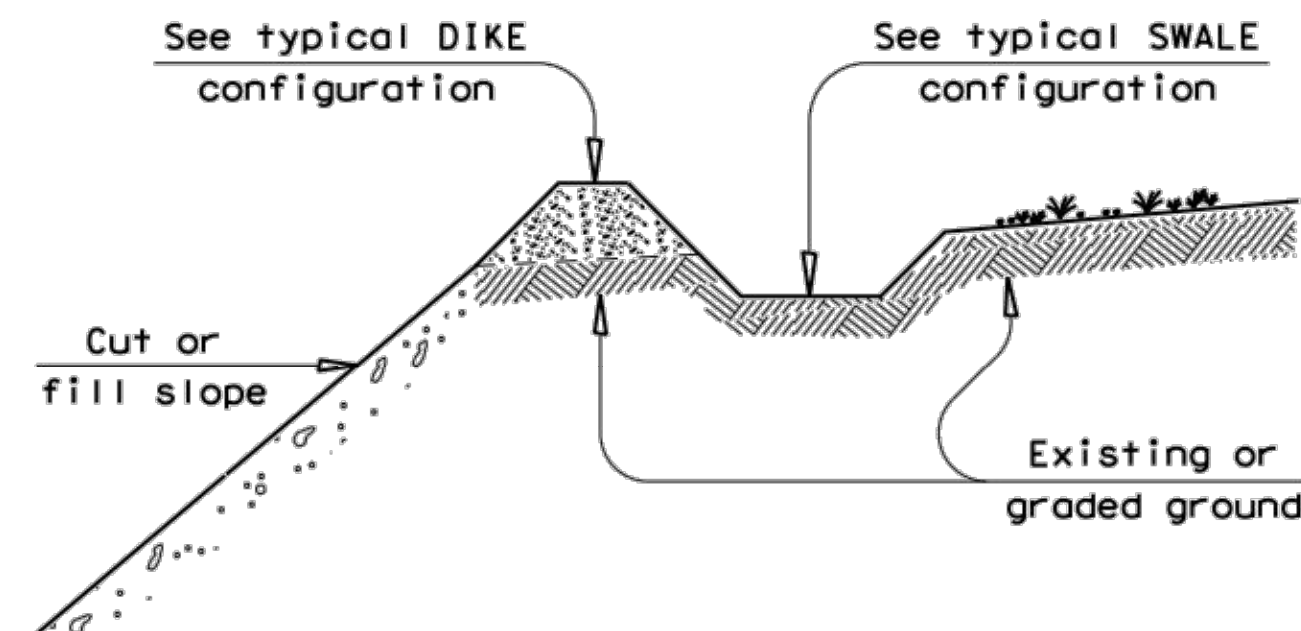
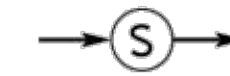
PERIMETER SWALE



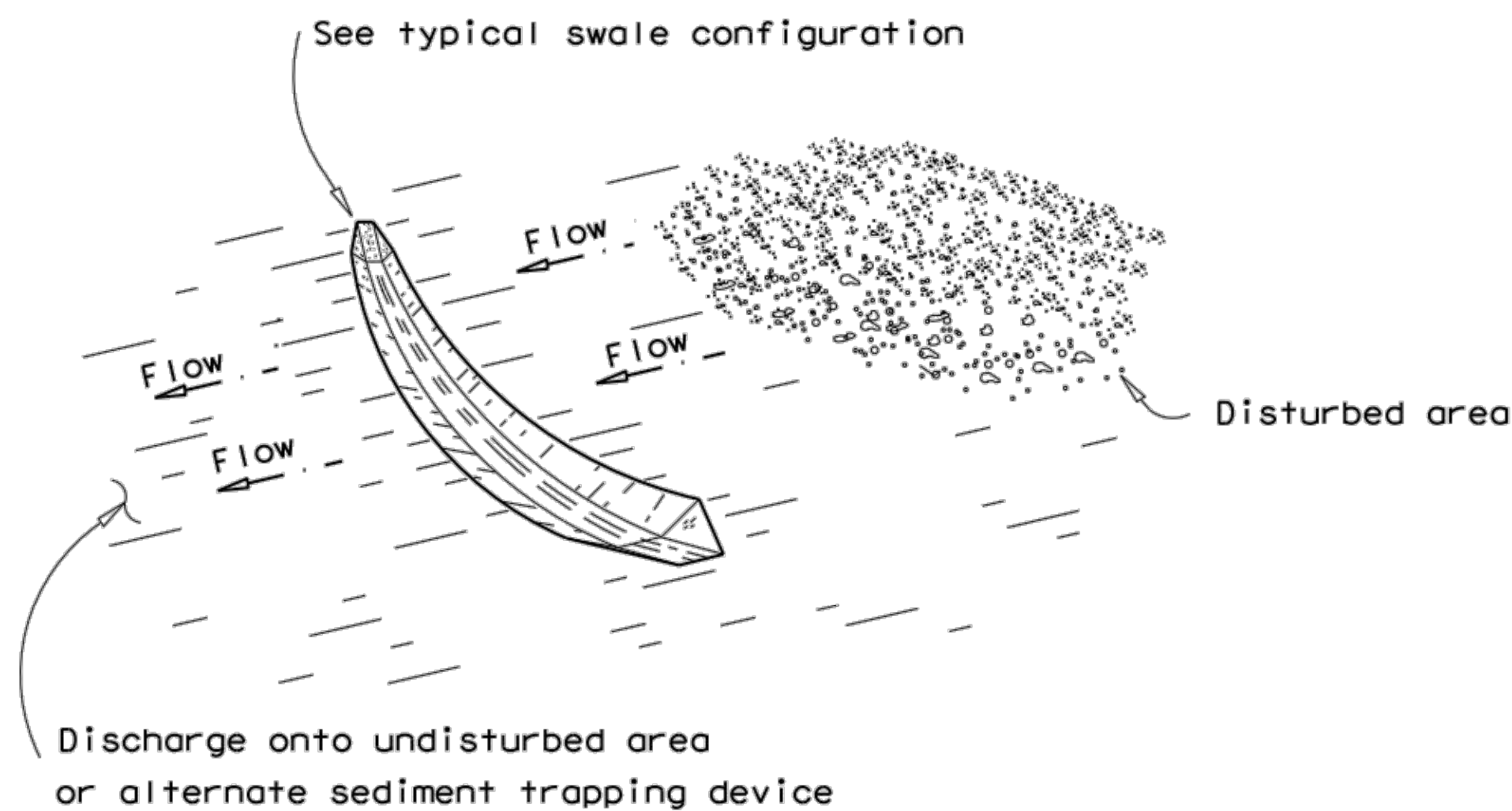
See perimeter, diversion,
or interceptor dike details



DIVERSION SWALE



DIVERSION DIKE WITH SWALE



INTERCEPTOR SWALE



GENERAL NOTE

1. Dimensions of swale may be modified with prior approval of the Engineer.
2. Side slopes within the safety clear zone of a roadway shall be 6:1 or flatter.
3. Grading shall be shown elsewhere on the plans or as directed by the Engineer.
4. The Engineer reserves the right to modify the dimensions shown for the swale dependent on runoff volume characteristics.
5. Swales that are in place for more than 14 calendar days should be stabilized through seeding or other measures to control sediment runoff.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Remove sediment and debris when accumulation affects the performance of the devices, after a rain and when directed by the Engineer.

SWALE AND DIKE/SWALE USAGE GUIDELINES

A swale or dike/swale may be used to intercept runoff and divert it around unstabilized areas or to divert sediment laden runoff to an erosion control device (sediment basin or trap, rock filter dam, etc.).

The drainage area contributing runoff to a swale or dike/swale should not exceed 5 acres. The spacing of swales and dike/swales should be as follows:

Slope of disturbed areas above dike	greater than 10%	5 - 10%	less than 5%
Maximum distance between dikes	100'	200'	300'

Intercepted runoff flowing in a swale or dike/swale should outlet to a stabilized area (vegetation, rock, etc.).

PLAN SHEET LEGEND

SWALE → (S) →

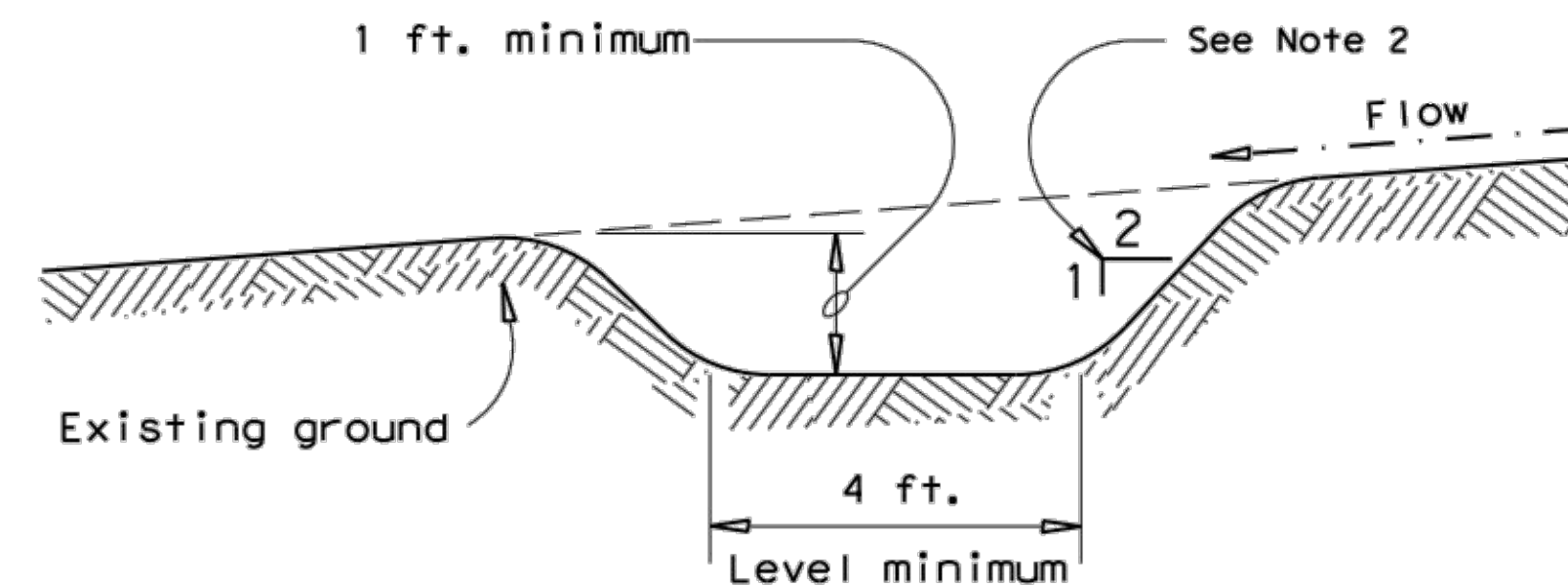
DIKE → (D) →



TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES SWALES (EARTHWORK FOR EROSION CONTROL) EC (5) - 16

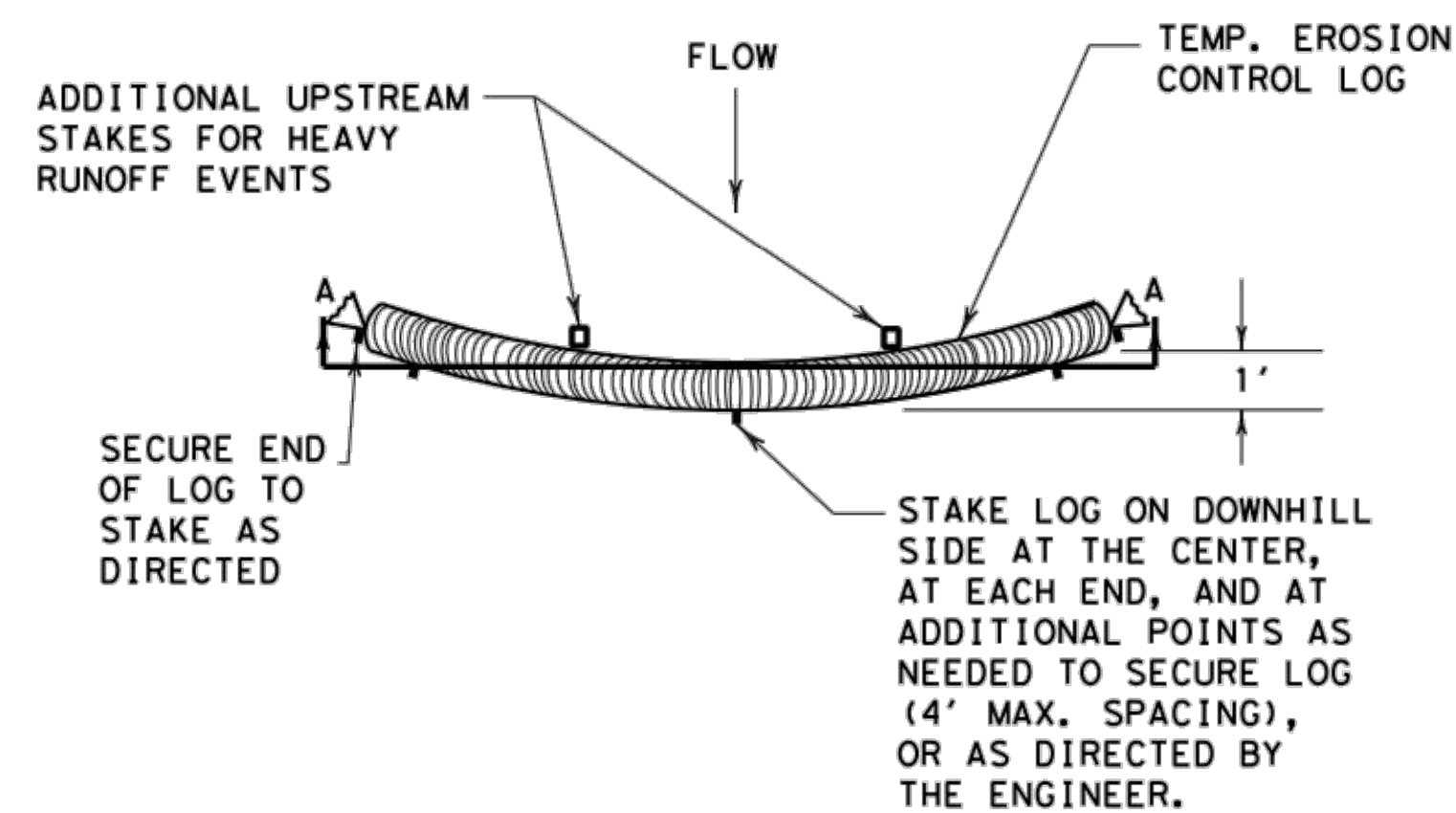
FILE: ec516	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY	SHEET NO.	

TYPICAL SWALE CONFIGURATION

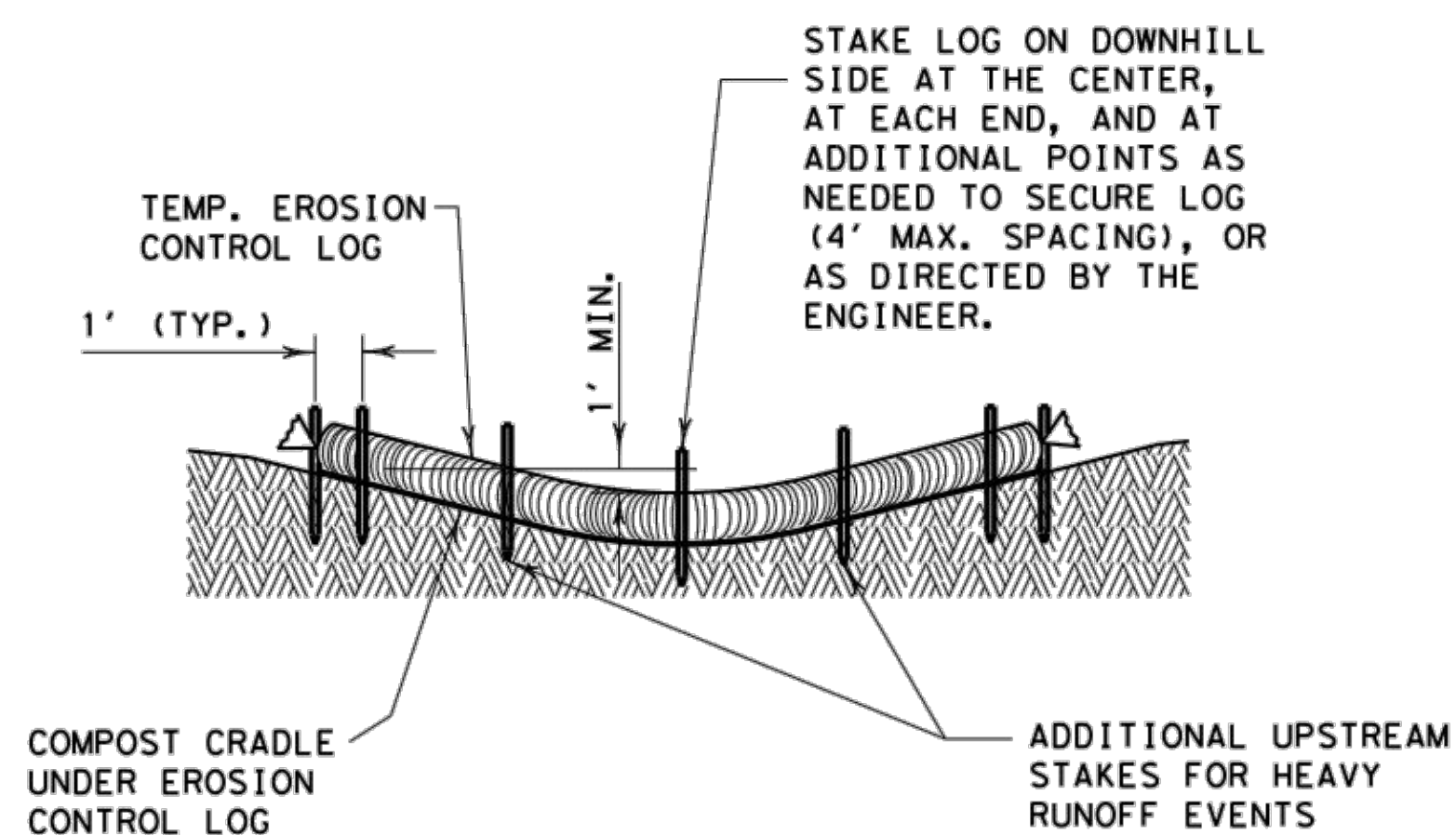


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DATE: FILE:



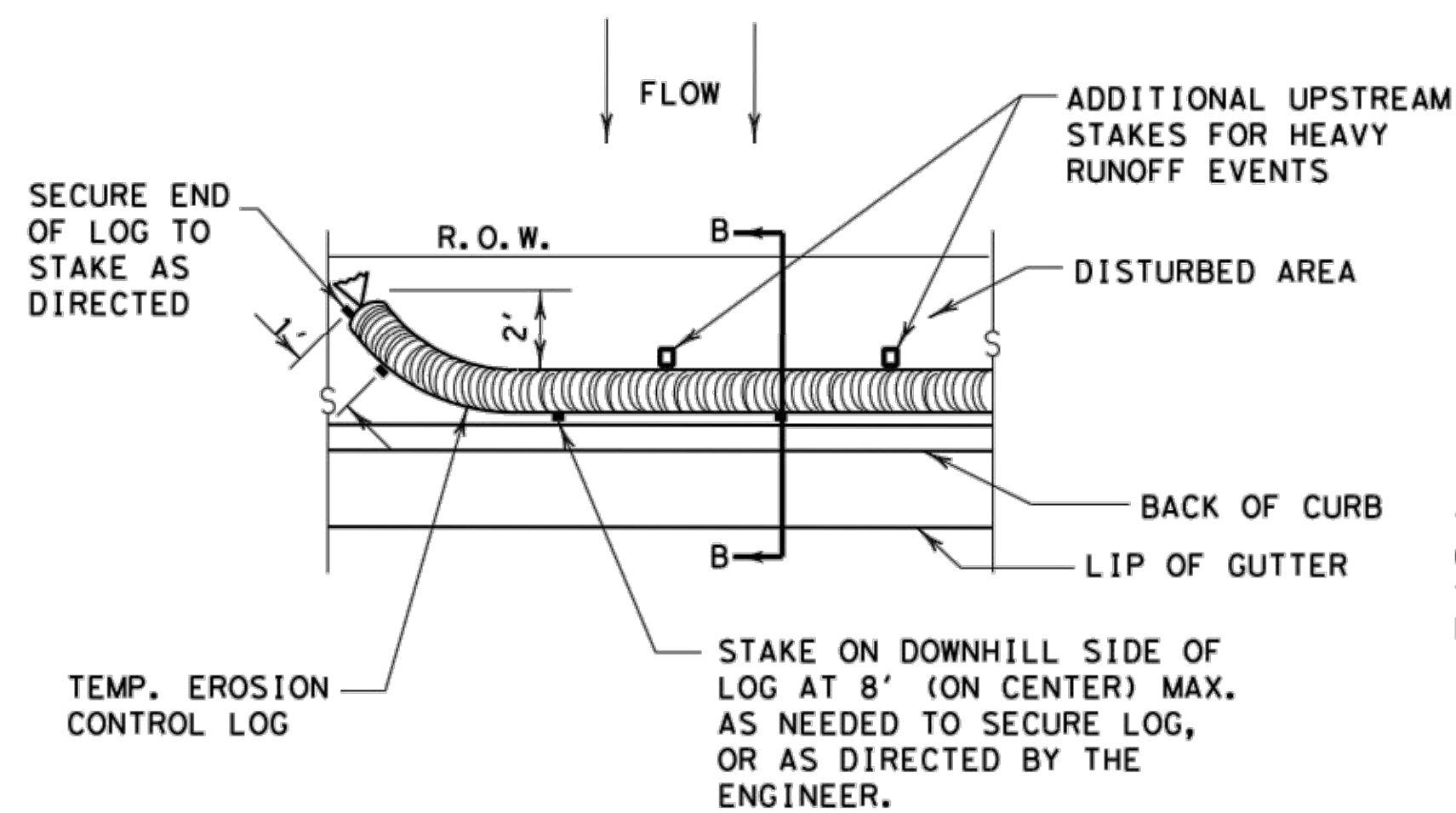
PLAN VIEW



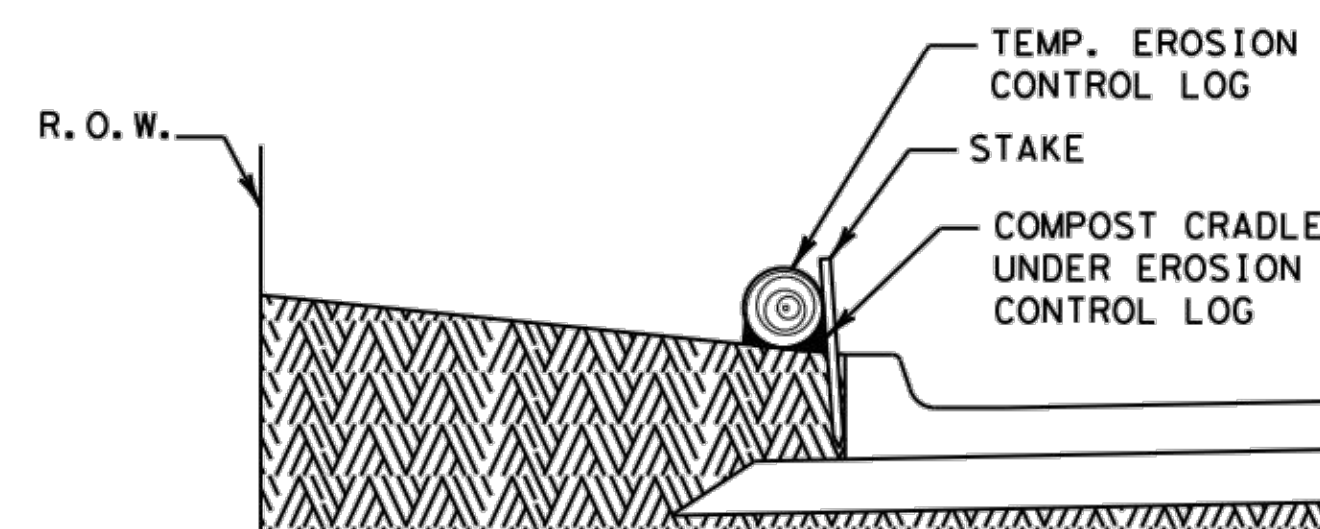
SECTION A-A

EROSION CONTROL LOG DAM

CL-D



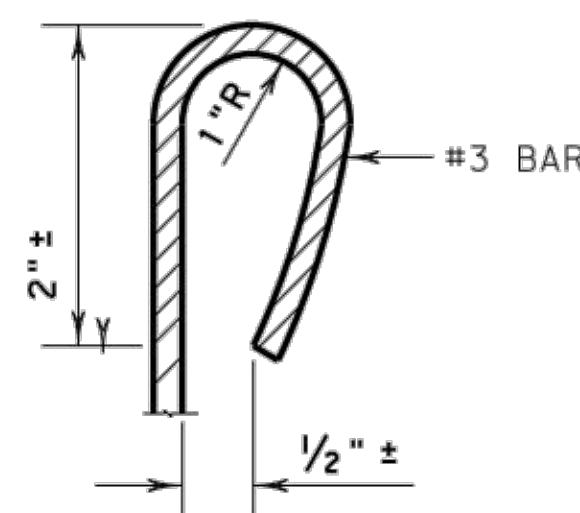
PLAN VIEW



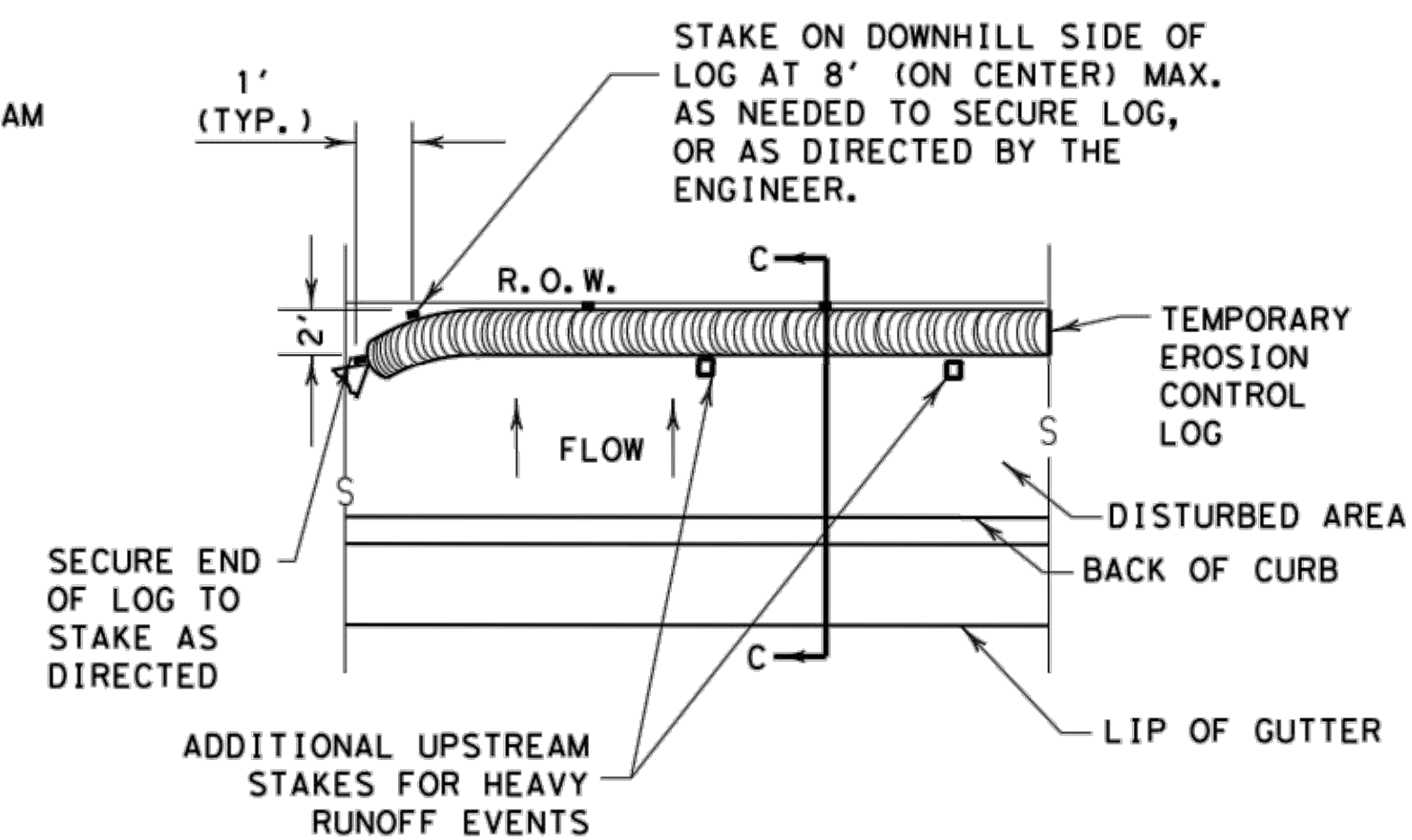
SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

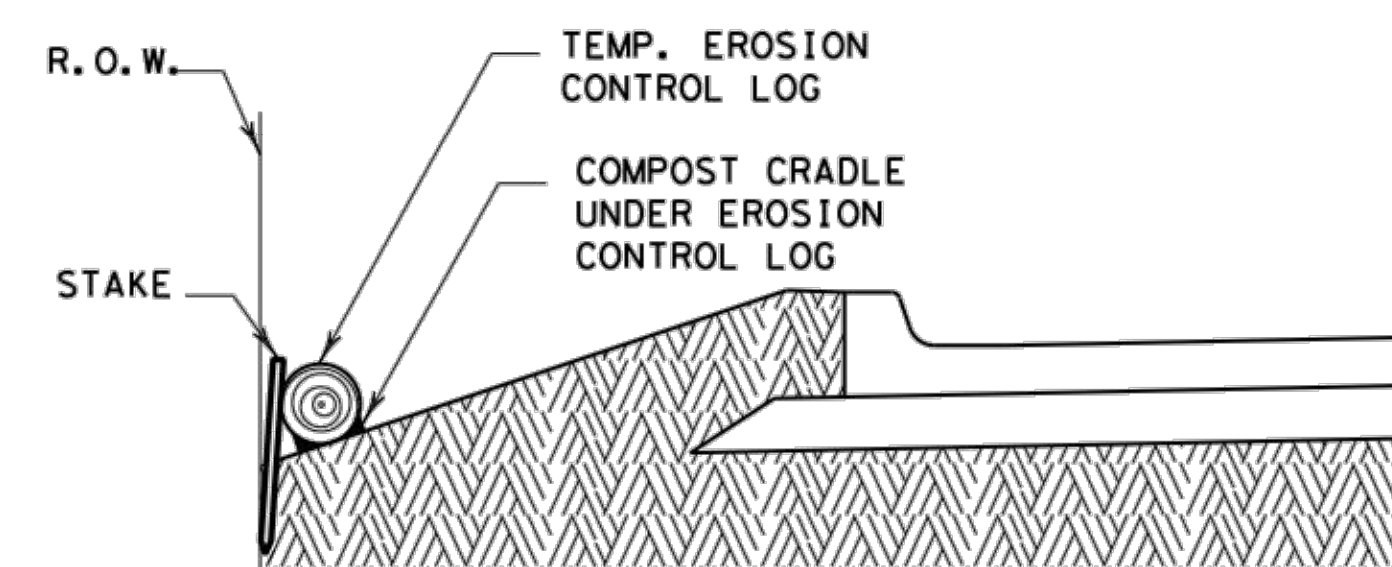
CL-BOC



REBAR STAKE DETAIL



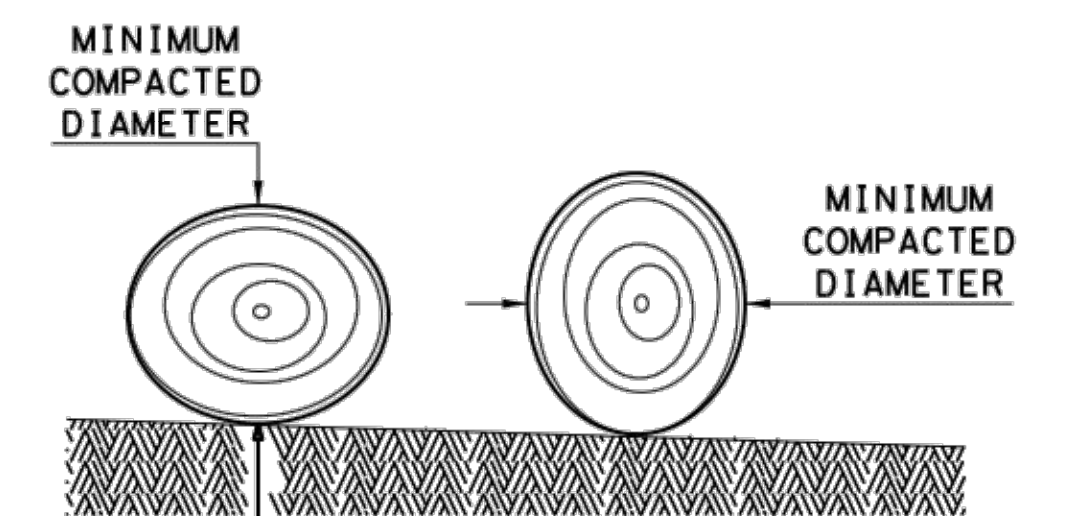
PLAN VIEW



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.

SHEET 1 OF 3

		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES			
EROSION CONTROL LOG			
EC(9) - 16			
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT
© TxDOT: JULY 2016	CONT	SECT	JOB
REVISIONS	DIST	COUNTY	SHEET NO.

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:

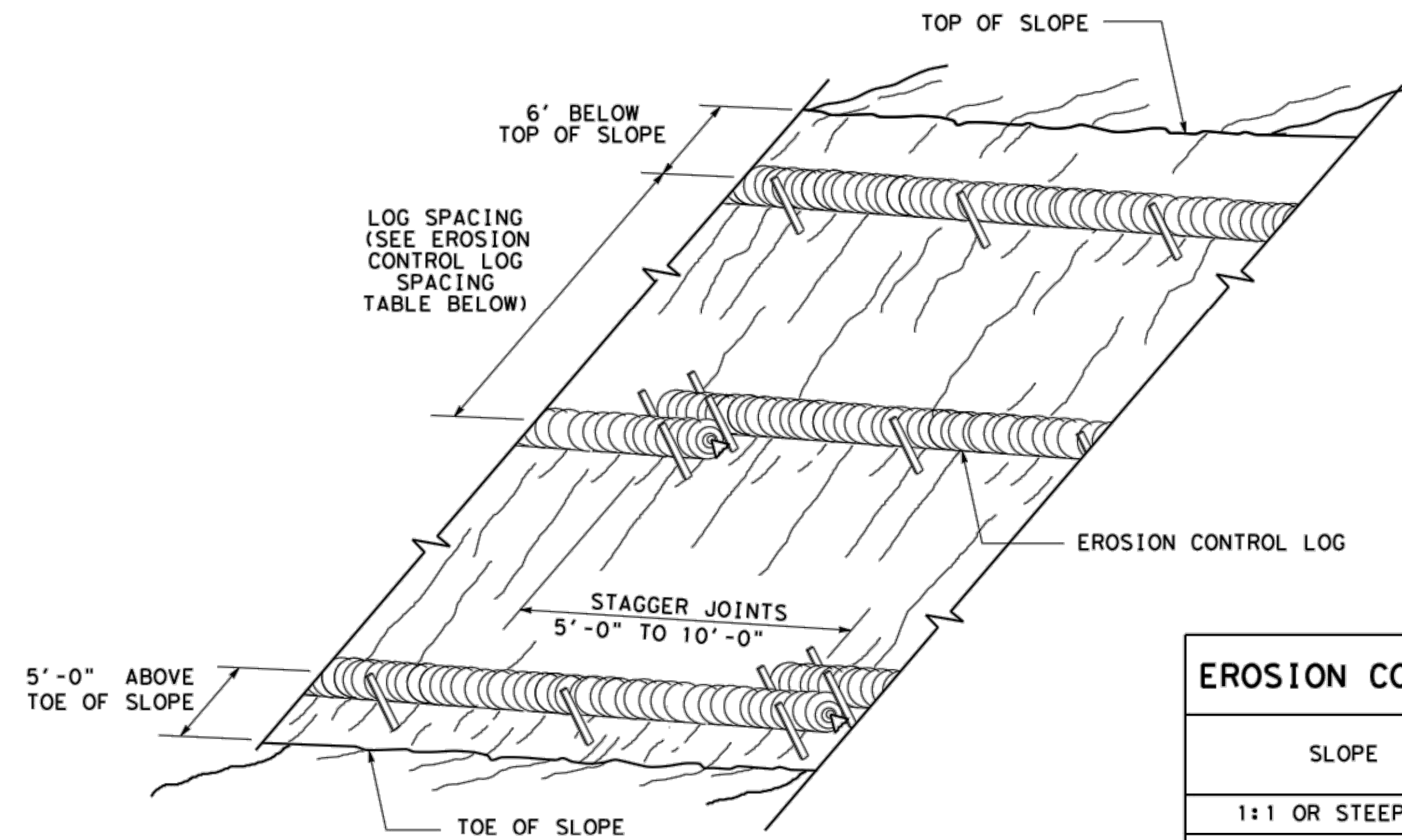
1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows 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.

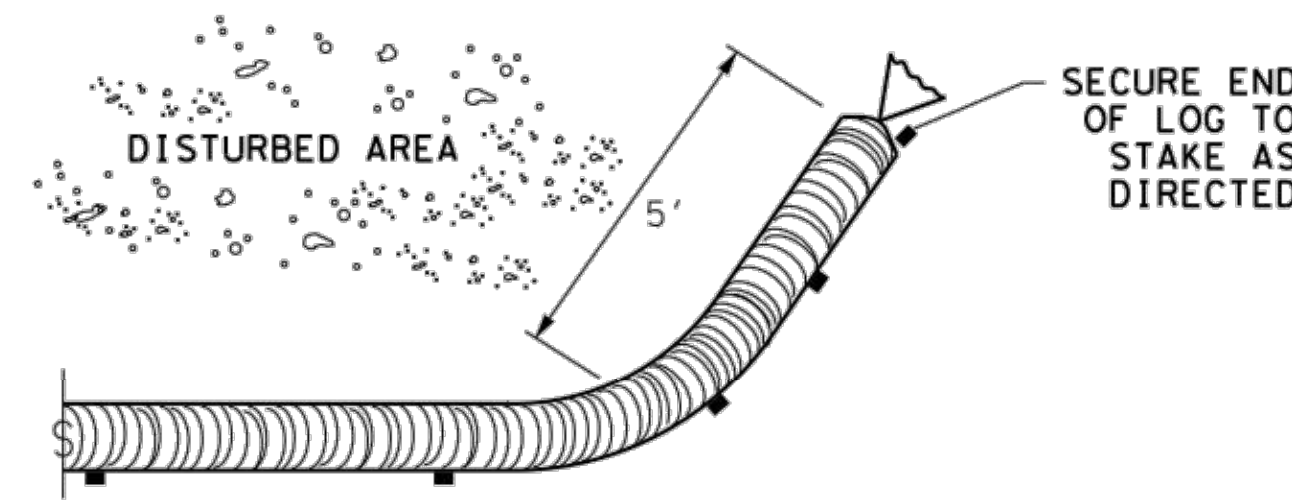
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EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

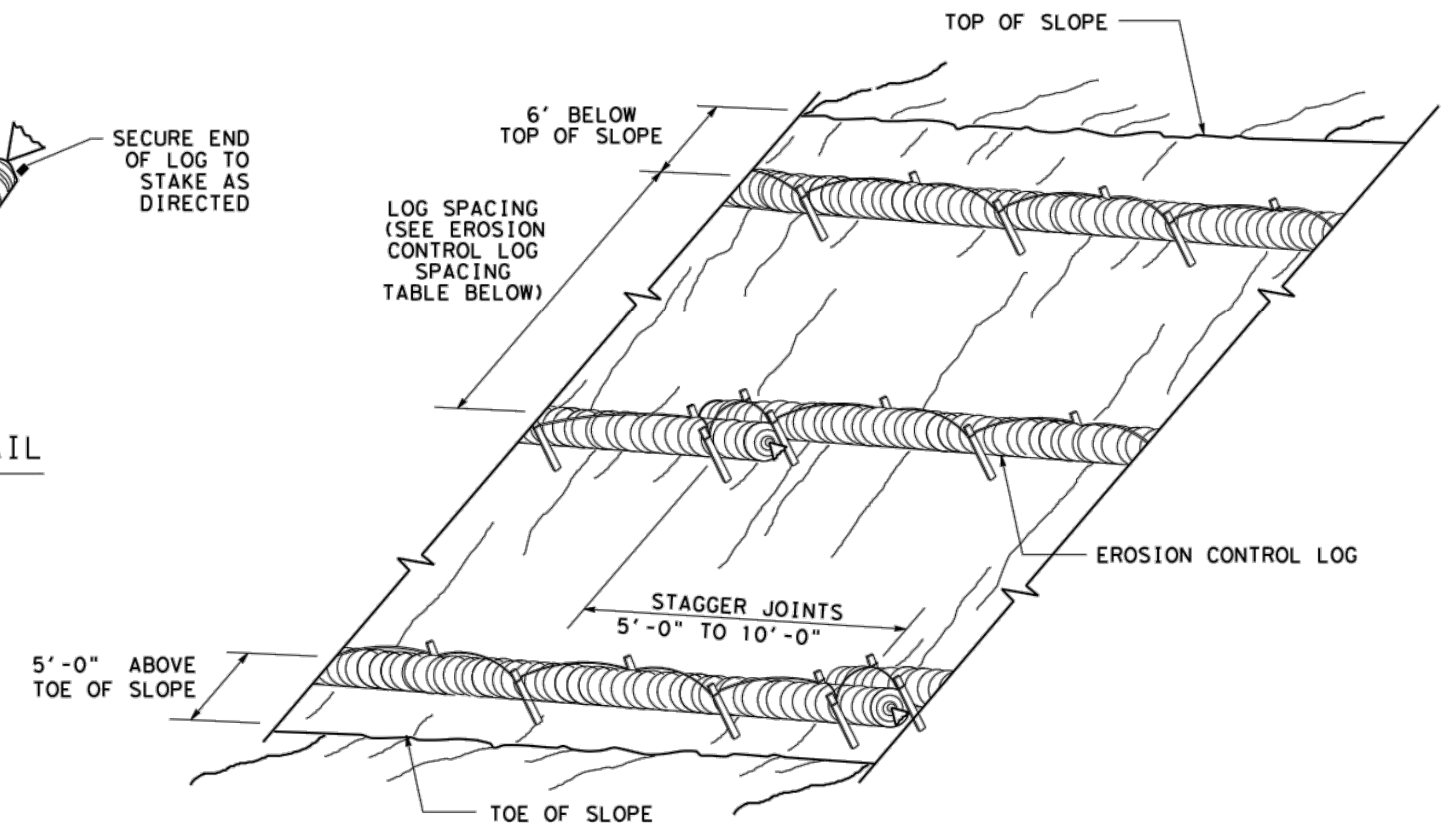
CL-SST



END SECTION RAP DETAIL

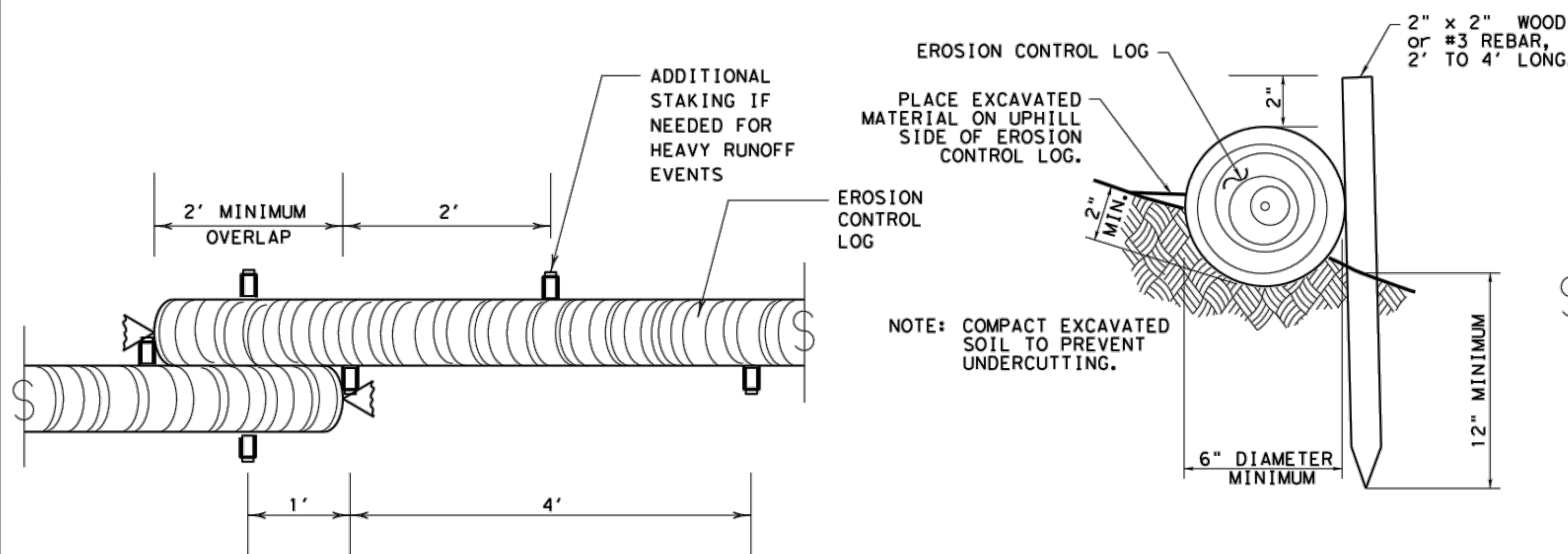
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



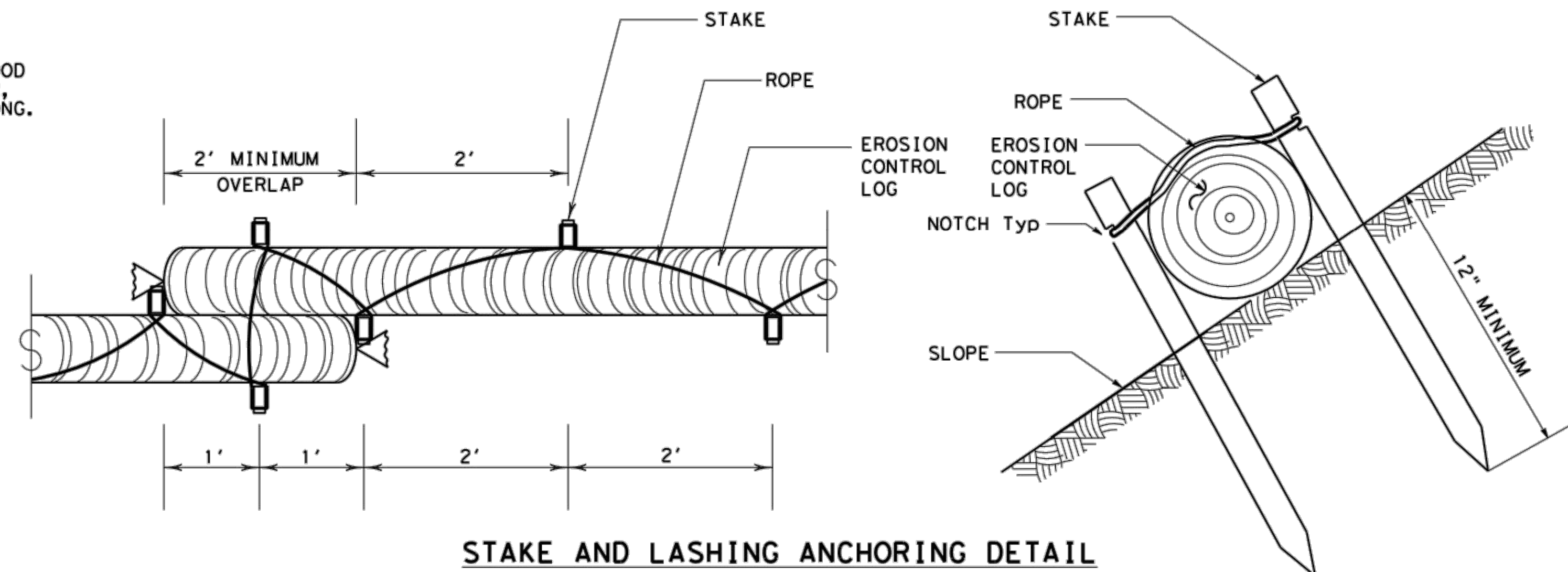
EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL



STAKE AND TRENCHING ANCHORING DETAIL

CL-SST



STAKE AND LASHING ANCHORING DETAIL

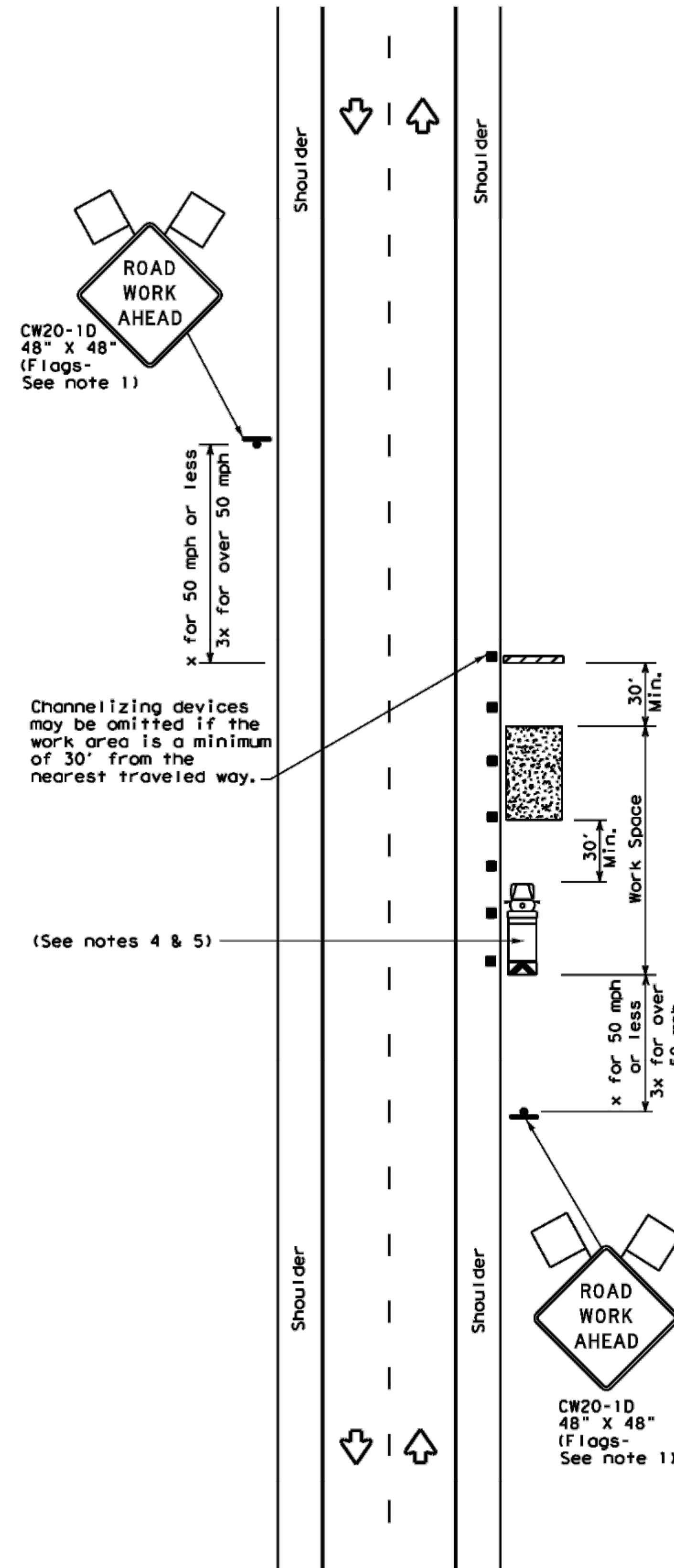
CL-SSL

SHEET 2 OF 3

		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES			
EROSION CONTROL LOG			
EC(9) - 16			
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT
© TxDOT: JULY 2016	CONT	SECT	JOB
REVISIONS		DIST	COUNTY
		SHEET NO.	

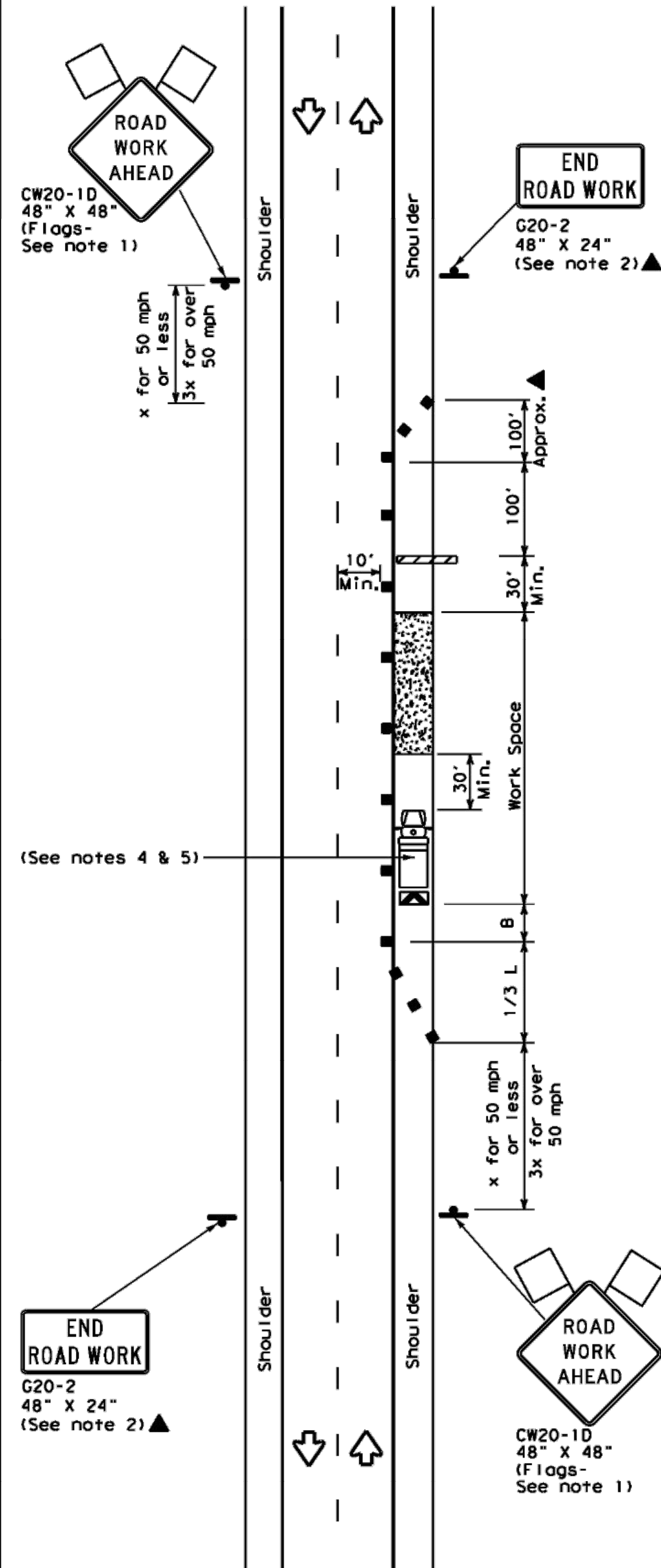
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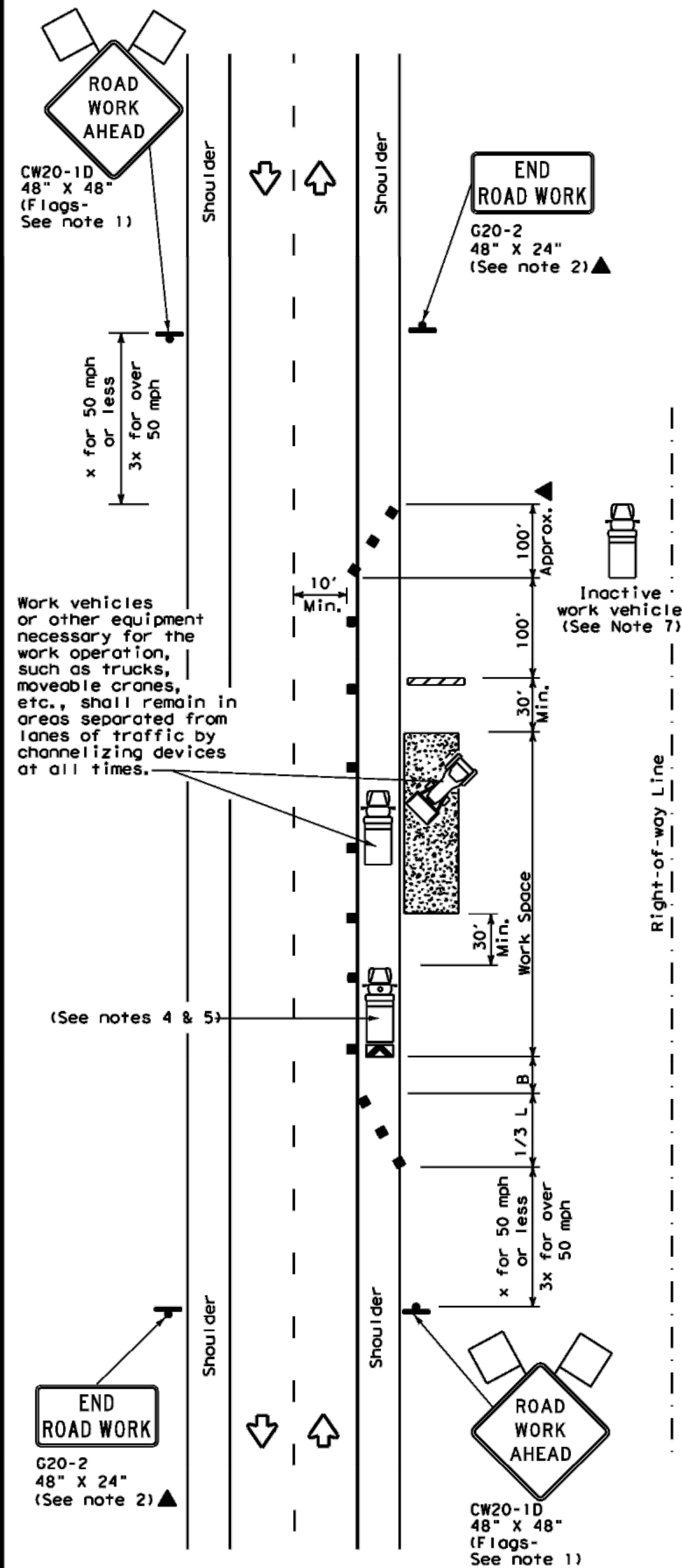
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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	$L = \frac{WS^2}{60}$	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

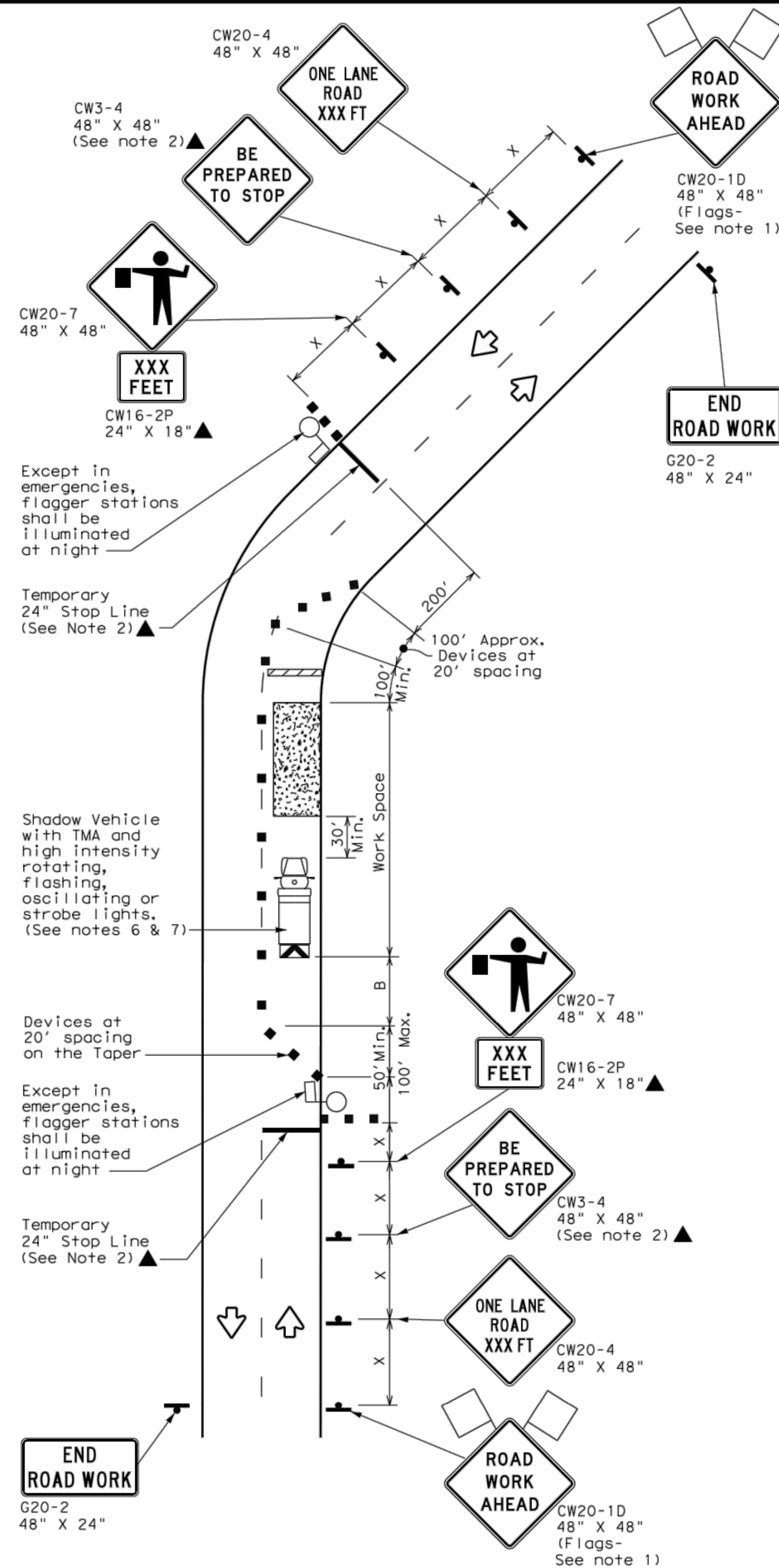
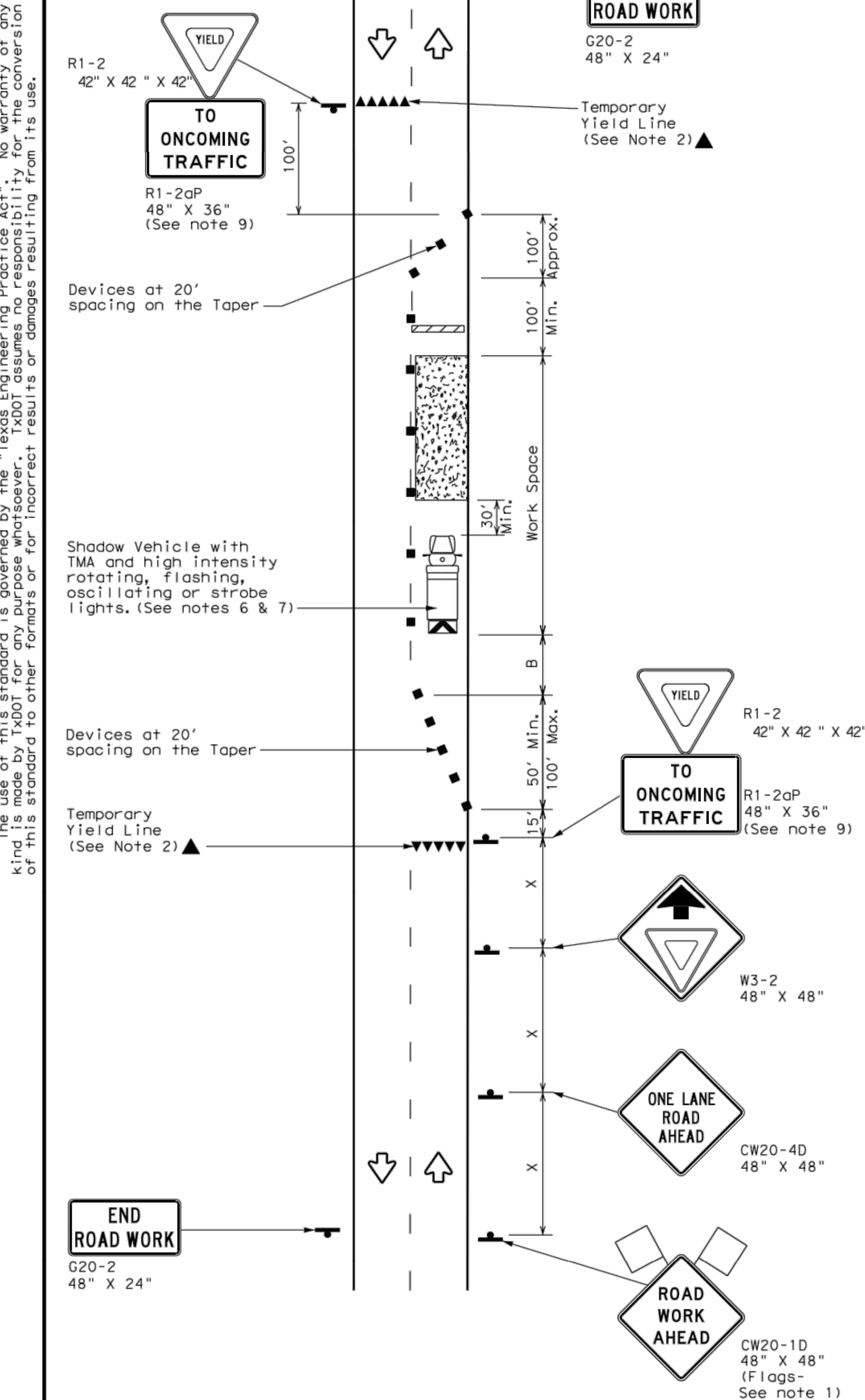
- Flags attached to signs where shown, are REQUIRED.
- All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
- Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
- 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 off the paved surface, next to those shown in order to protect a wider work space.
- See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
- Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
- CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

**TRAFFIC CONTROL PLAN
CONVENTIONAL ROAD
SHOULDER WORK**

TCP (2-1) - 18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS				
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8-95 2-12				
1-97 2-18				
DIST COUNTY				SHEET NO.
				D-17

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

* Conventional Roads Only

** Taper lengths have been rounded off.

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

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

GENERAL NOTES

- 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 CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
- Flaggers should use two-way radios or other methods of communication to control traffic.
- Length of work space should be based on the ability of flaggers to communicate.
- 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 a wider work space.

TCP (2-2a)

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

TCP (2-2b)

- Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
- If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
- Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

		Traffic Operations Division Standard			
TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL					
TCP (2-2) - 18					
FILE: tcp2-2-18.dgn	DN:	CK:	DW:		
© TxDOT December 1985	CONT	SECT	JOB		
8-95 3-03	DIST	COUNTY	SHEET NO.		
1-97 2-12					
4-98 2-18					

DATE: FILE:

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
2. The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.
4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.
5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.
6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.
7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.
9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.
10. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.
11. Traffic control devices should be in place only while work is actually in progress or a definite need exists.
12. The Engineer has the final decision on the location of all traffic control devices.
13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY NOTES:

1. Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel," 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.
2. Except in emergency situations, flagger stations shall be illuminated when flagging is used at night.

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.
2. Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

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



Texas Department of Transportation

**Traffic
Safety
Division
Standard**

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

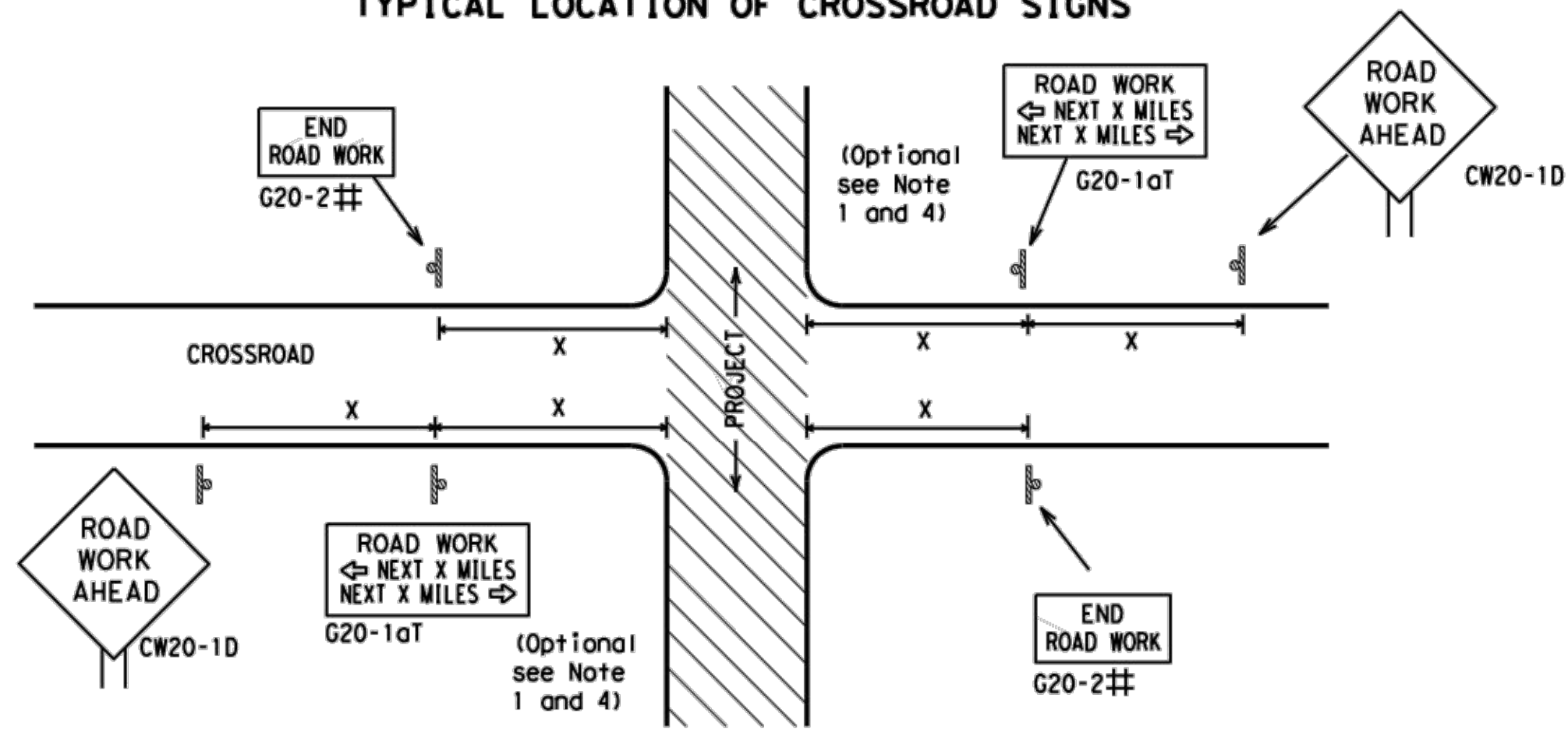
BC (1) -21

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REVISIONS					
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9-07	8-14	DIST	COUNTY		SHEET NO.
5-10	5-21				D-5

D-5

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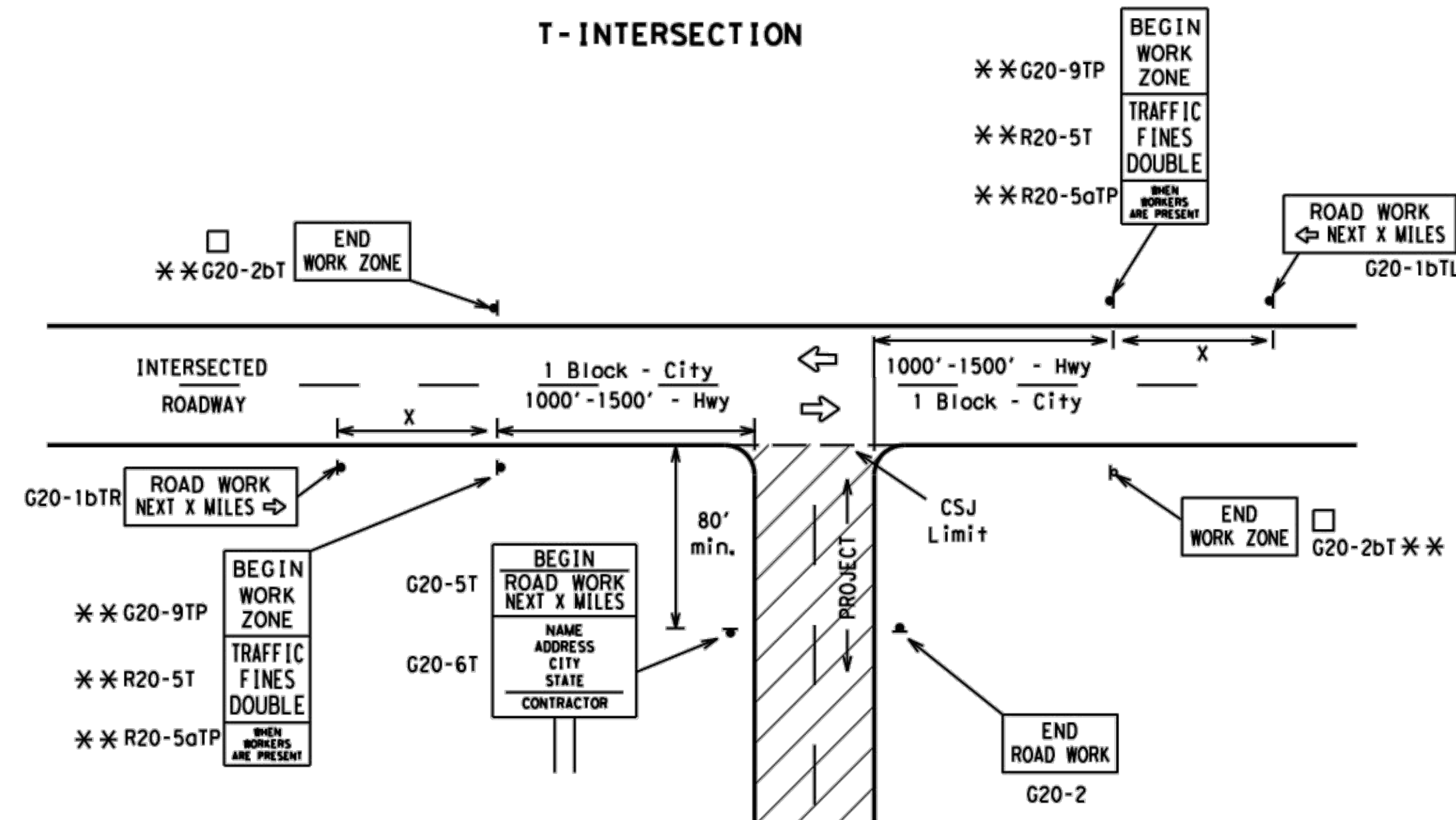
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

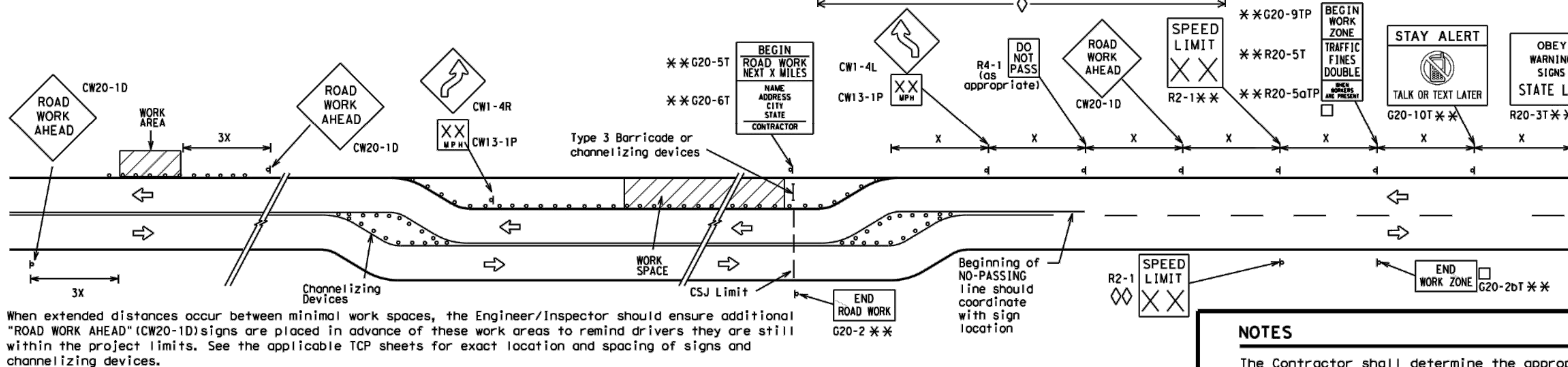
T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

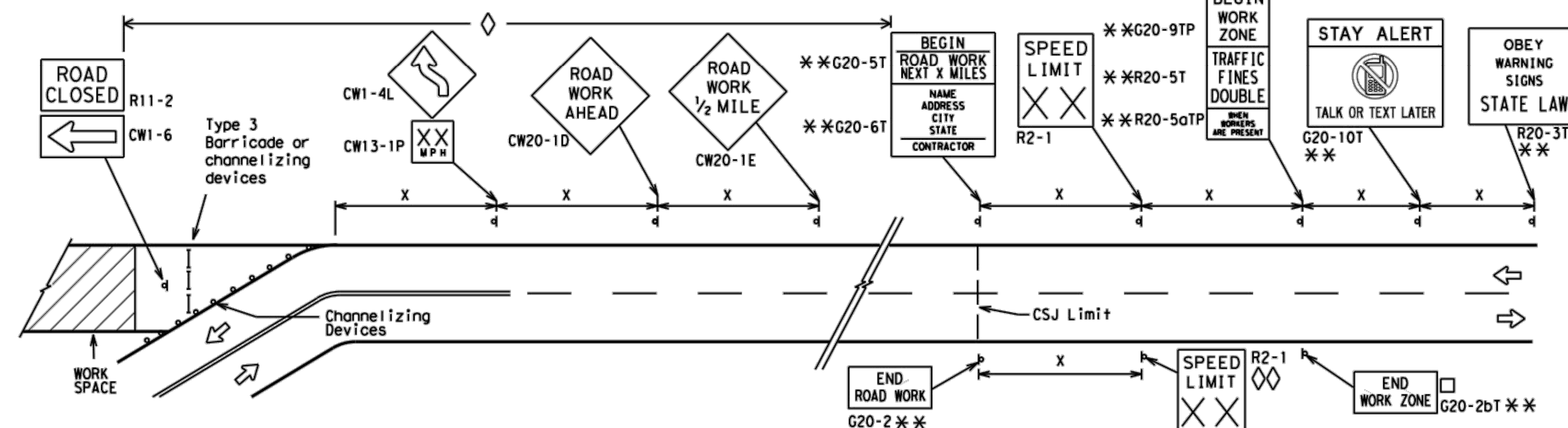
1. The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
2. If construction closes the road at a T-intersection, the Contractor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

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.

** CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.

- ◇ 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.

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

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

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

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



BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC (2) - 21

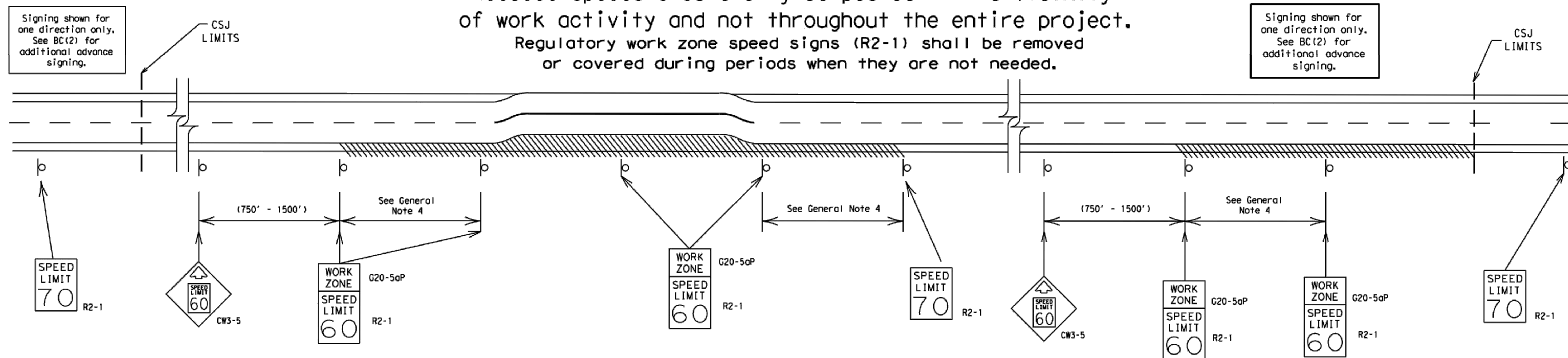
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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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7-13 5-21				
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TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

- 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 traveled 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



BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC (3) - 21

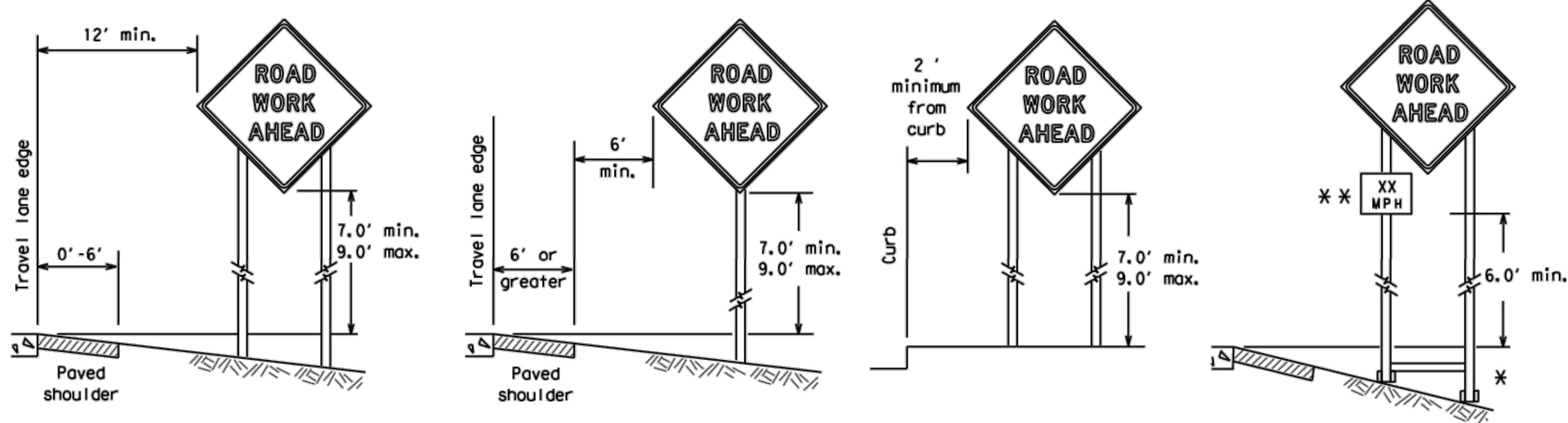
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© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
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9-07	8-14								
7-13	5-21								
		DIST	COUNTY					SHEET NO.	D-7

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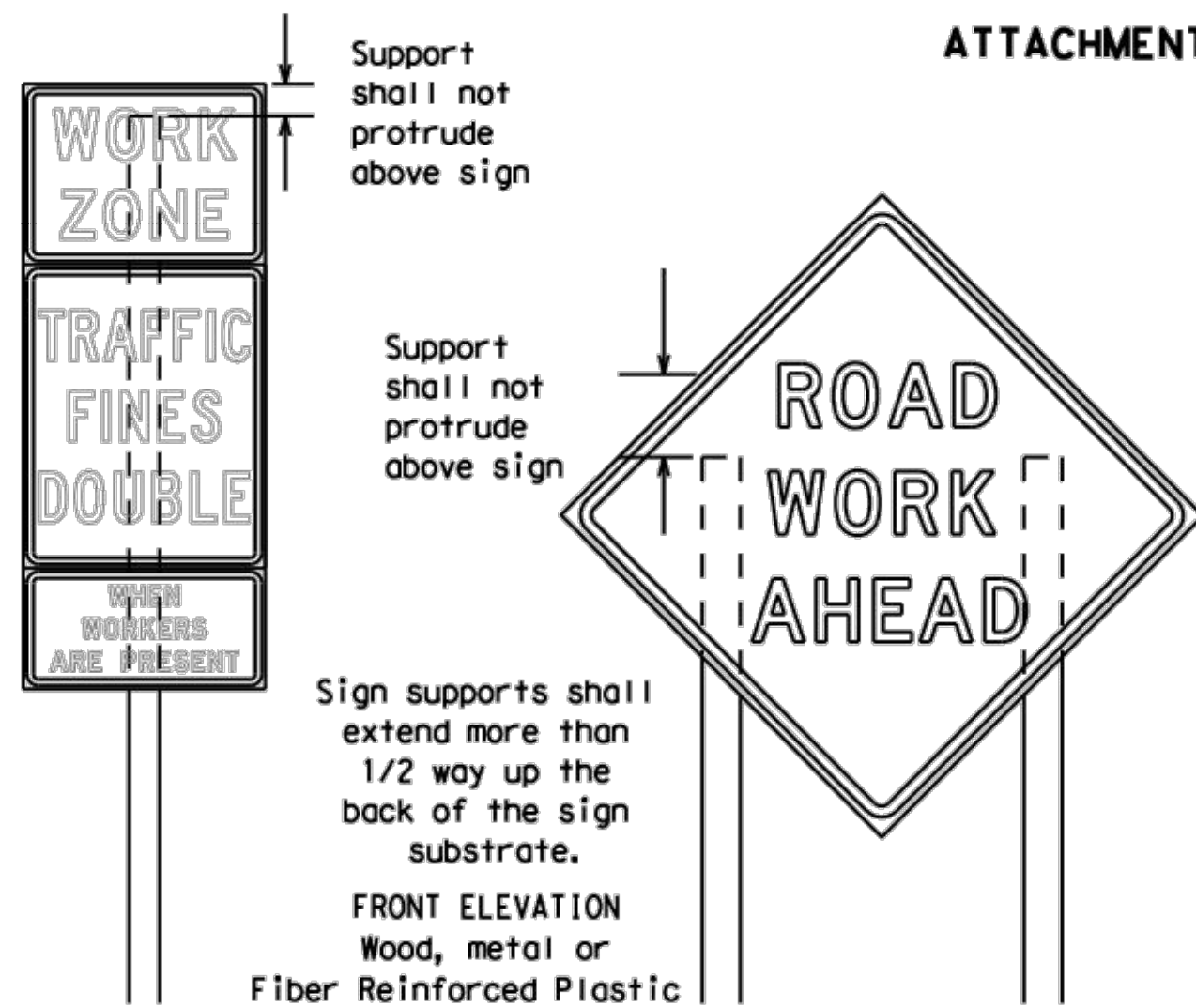
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



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

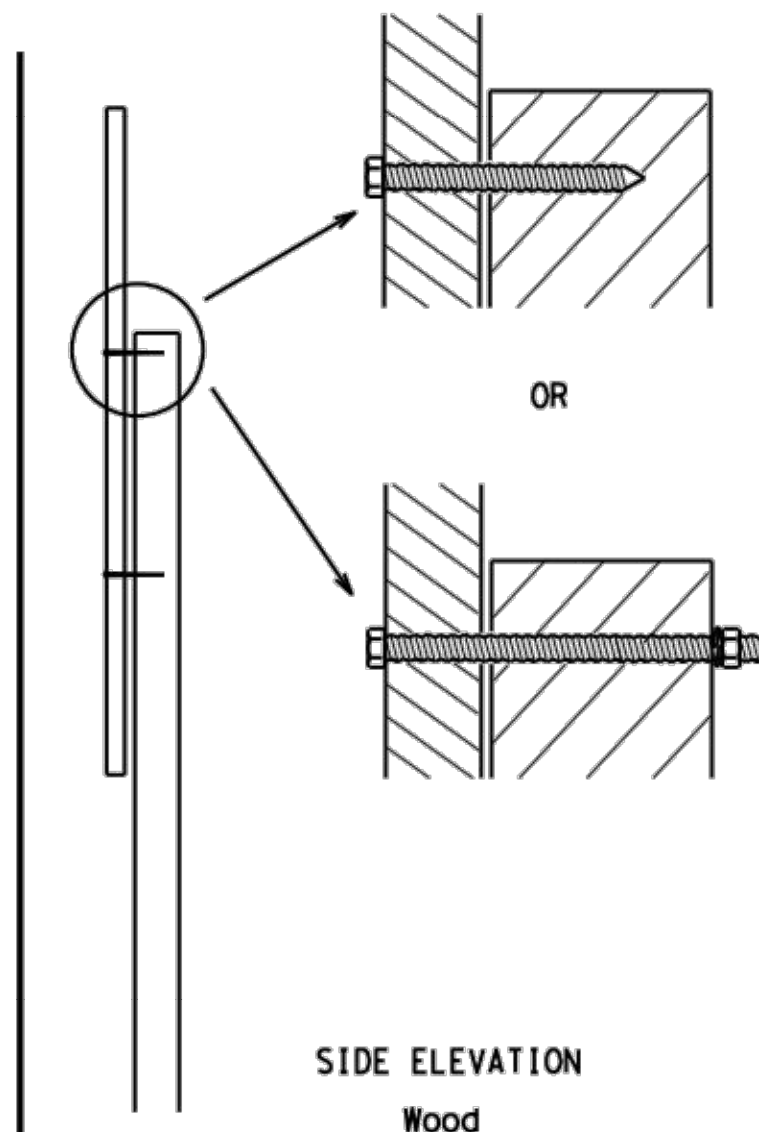
** When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

ATTACHMENT FOR SIGN SUPPORTS



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

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



Nails 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.

GENERAL NOTES FOR WORK ZONE SIGNS

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
- Wooden sign posts shall be painted white.
- Barricades shall NOT be used as sign supports.
- 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.
- 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.
- The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD) for small roadside signs. Supports for temporary large roadside signs shall meet the requirements detailed on the Temporary Large Roadside Signs (TLRS) standard sheets. 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.
- 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.
- 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.
- The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

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

- 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.
 - Long-term stationary - work that occupies a location more than 3 days.
 - 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.
 - Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
 - Short, duration - work that occupies a location up to 1 hour.
 - Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

- 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.
- 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.
- Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
- 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.
- Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

- 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).
- White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
- Orange sheeting, meeting the requirements of DMS-8300 Type B_{FL} or Type C_{FL}, shall be used for rigid signs with orange backgrounds.

SIGN LETTERS

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

REMOVING OR COVERING

- When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
- 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.
- 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.
- 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.
- Burlap shall NOT be used to cover signs.
- Duct tape or other adhesive material shall NOT be affixed to a sign face.
- Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

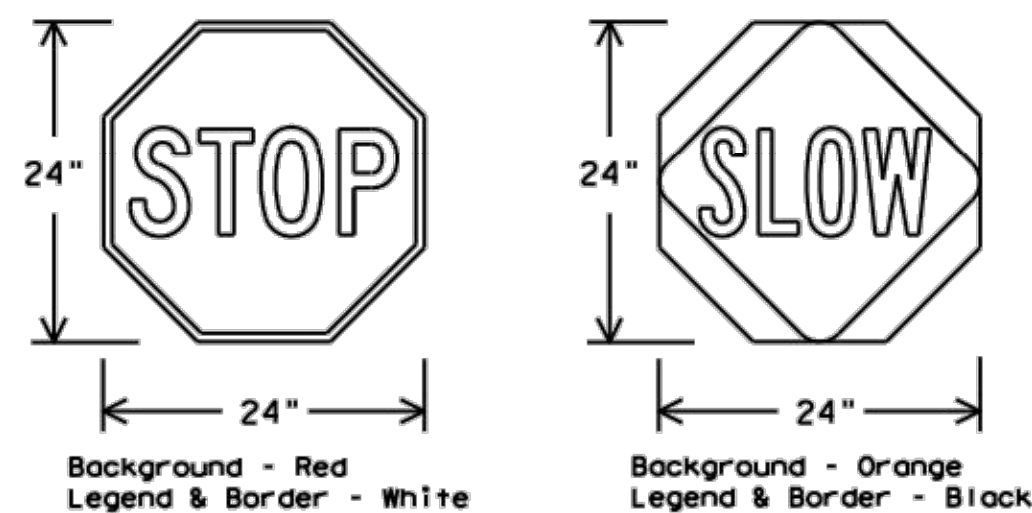
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
- 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.
- Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
- 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.
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

- 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.

STOP/SLOW PADDLES

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



SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B _{FL} OR C _{FL} SHEETING
LEGEND & BORDER	WHITE	TYPE B OR C SHEETING
LEGEND & BORDER	BLACK	ACRYLIC NON-REFLECTIVE FILM

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

- 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, specific service (LOGO), 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.
- 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. For details for covering large guide signs see the TS-CD standard.
- When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
- 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.
- If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC standard sheets, TLRS standard sheets or the CWZTCD list. The signs shall meet the required mounting heights shown on the BC, or the SMD standard sheets during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
- 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.

SHEET 4 OF 12

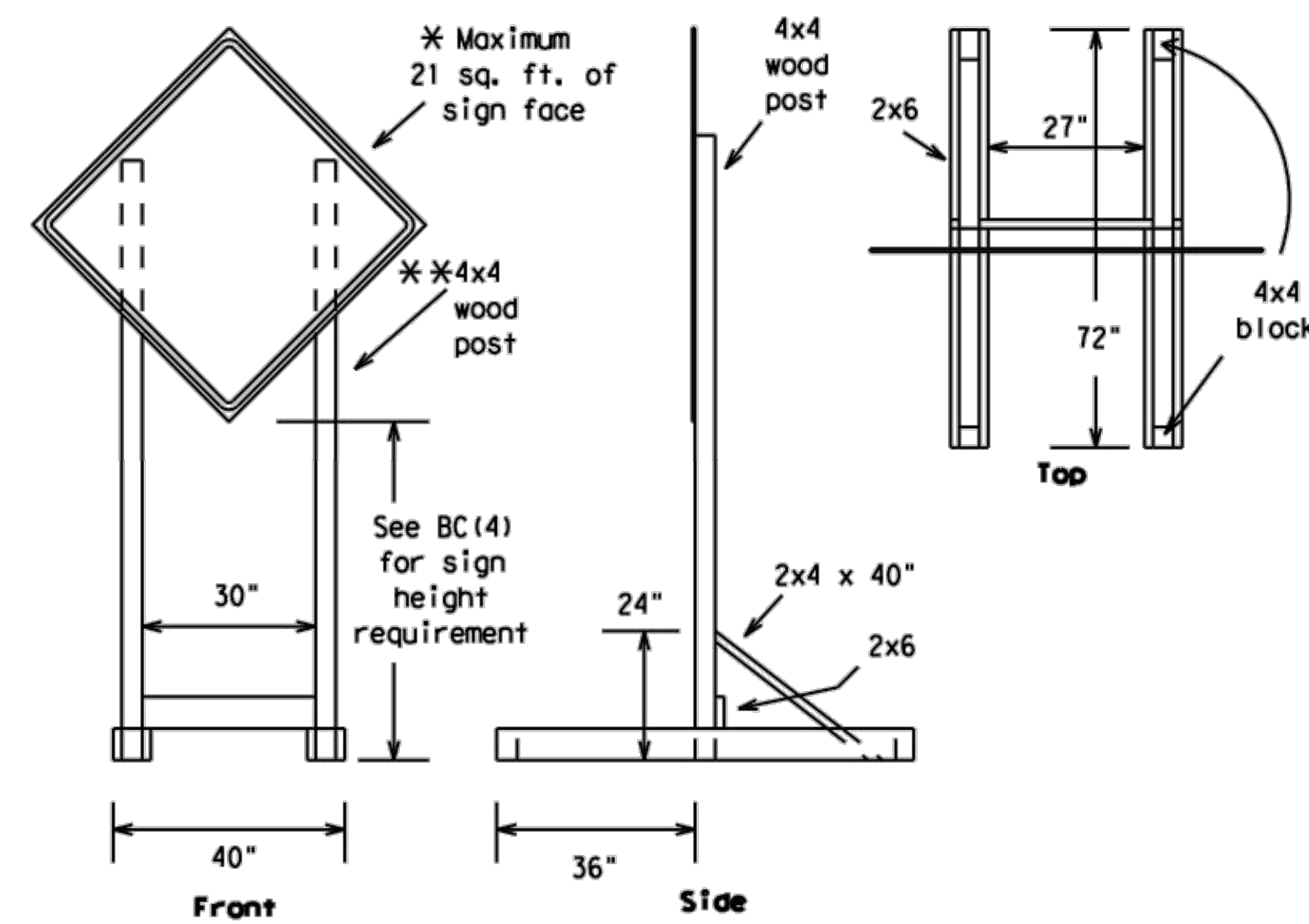


BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC (4) -21

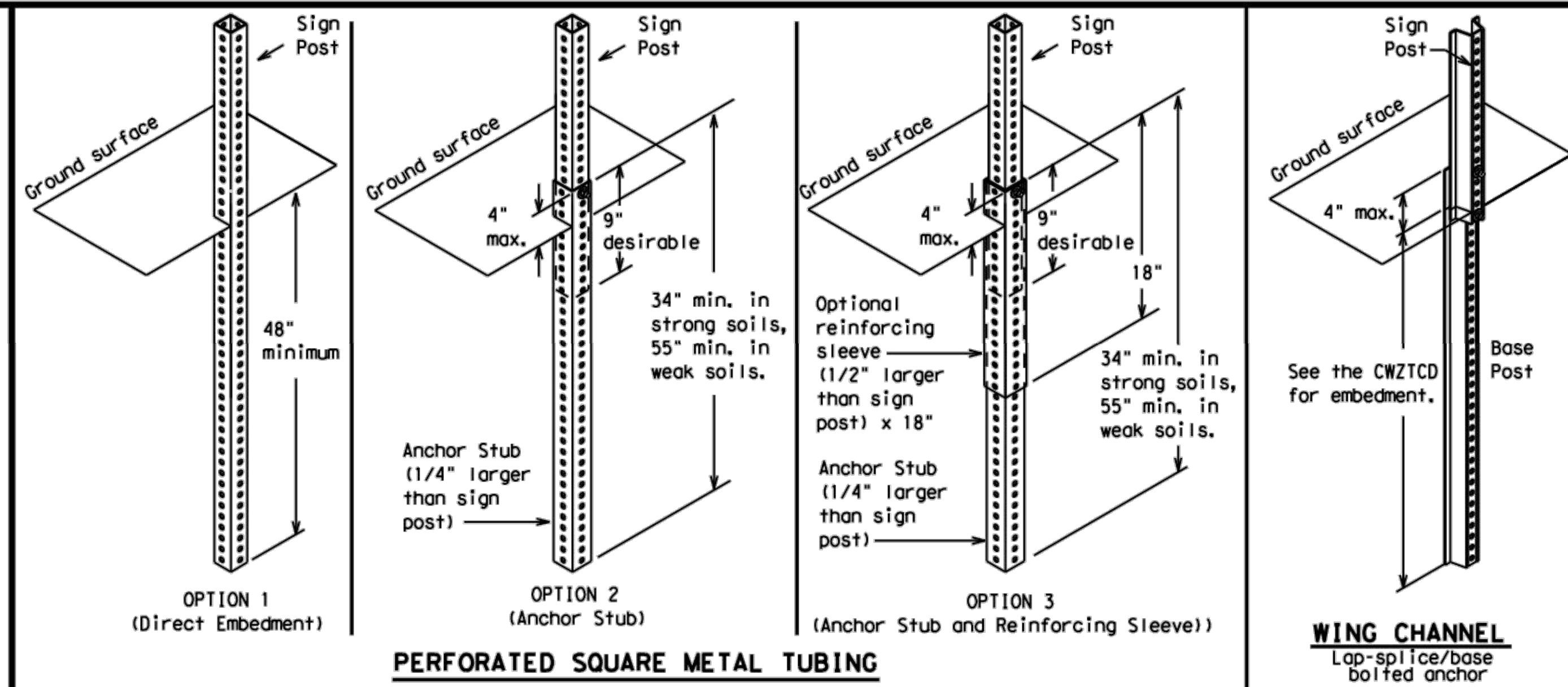
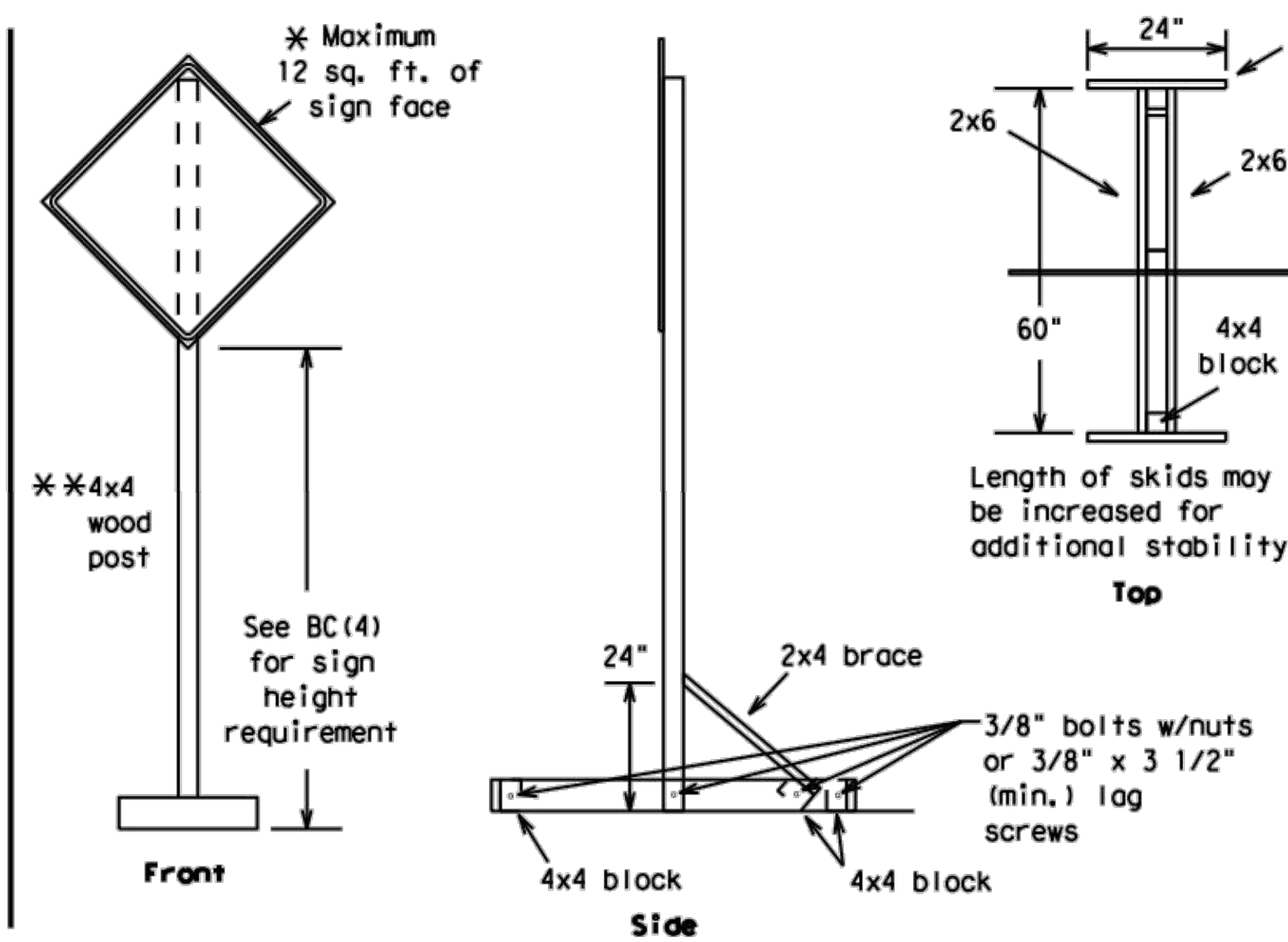
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REVISIONS									
9-07	8-14								
7-13	5-21								
		DIST		COUNTY				SHEET NO.	

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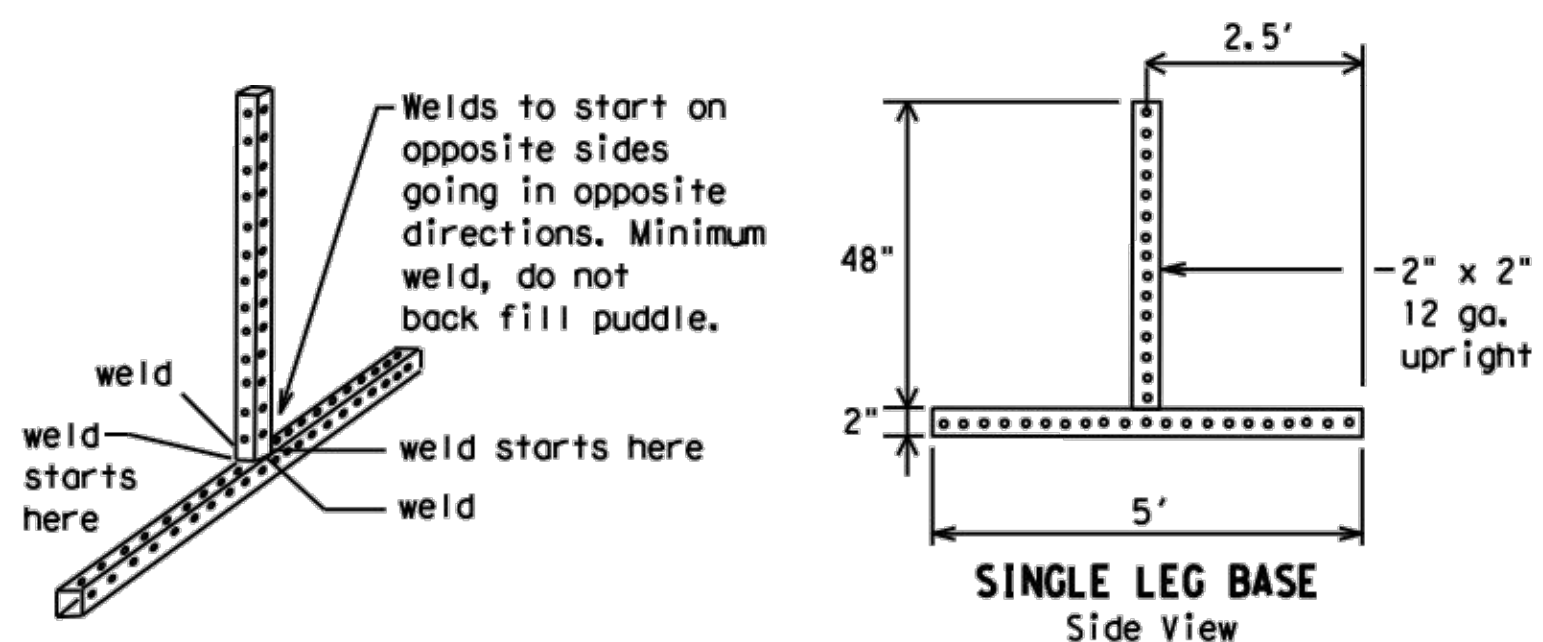
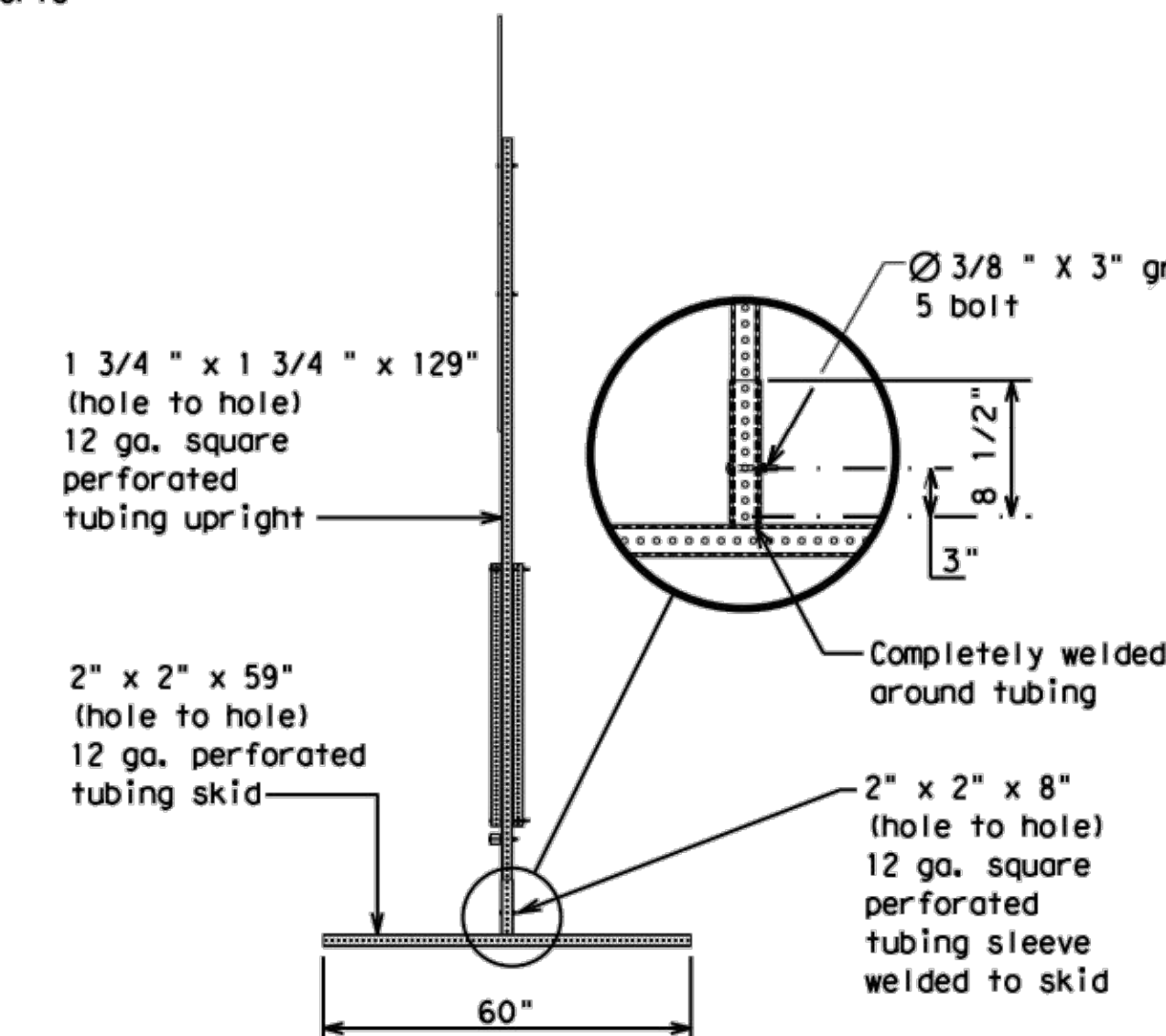
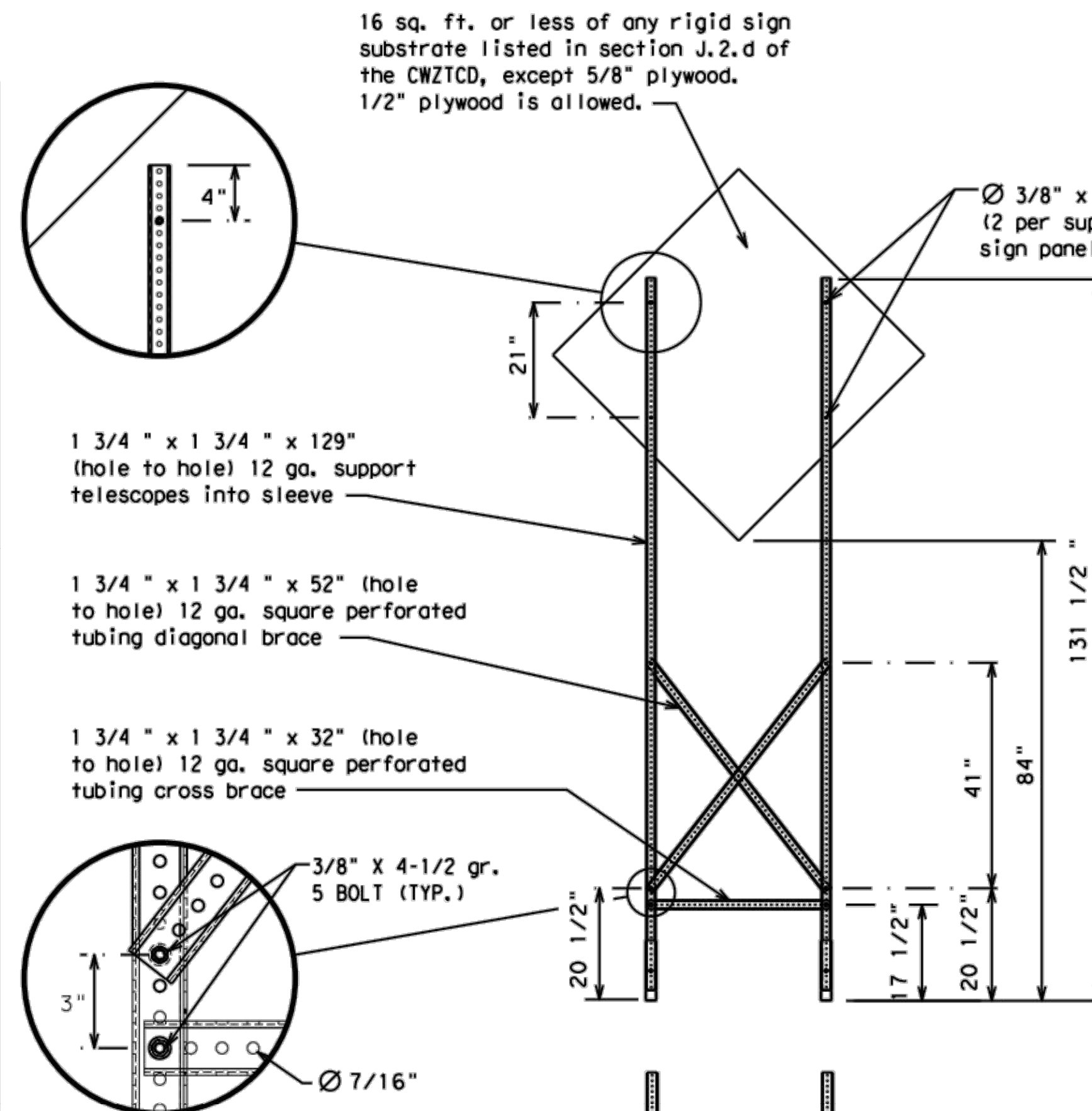
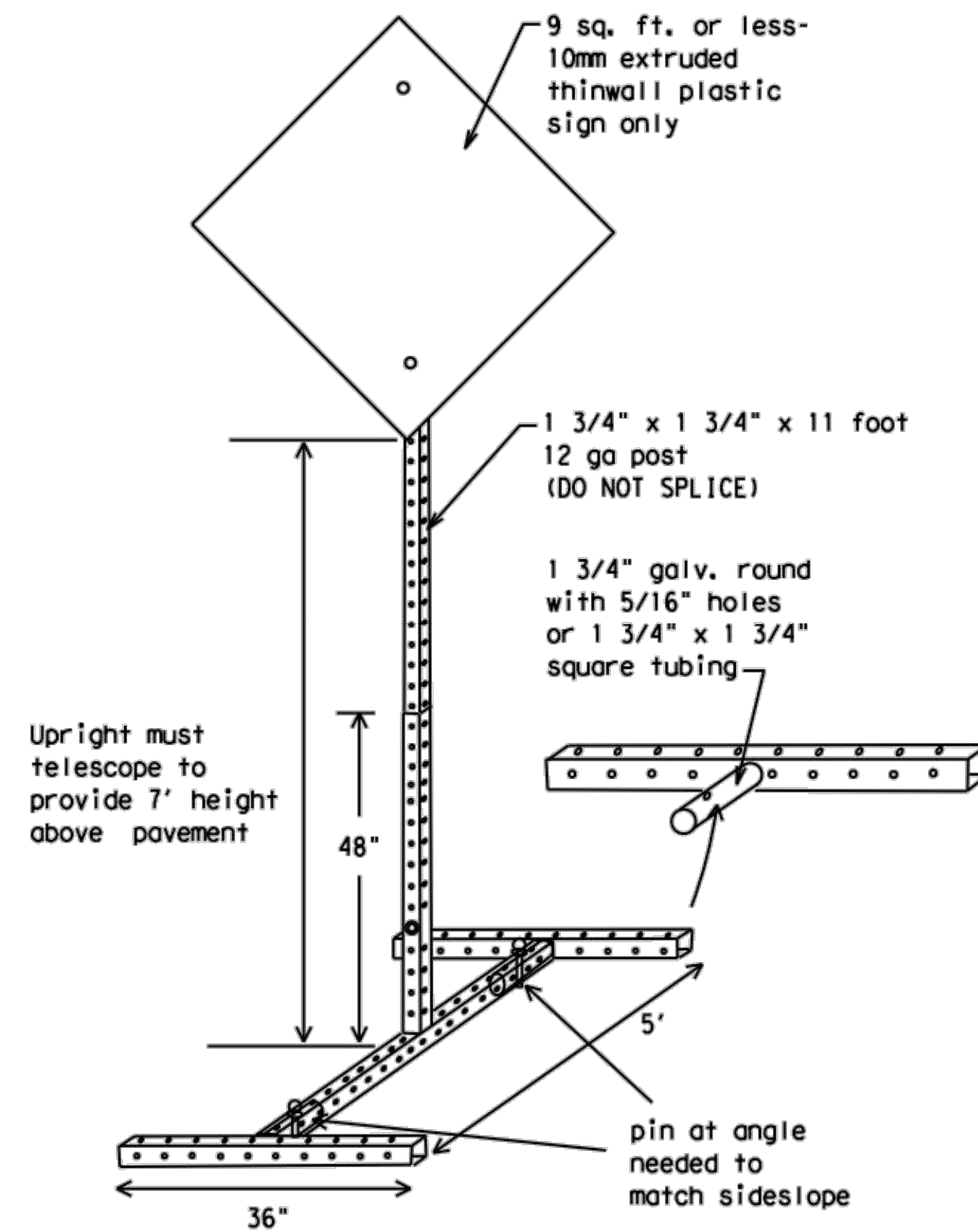
SKID MOUNTED WOOD SIGN SUPPORTS

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



GROUND MOUNTED SIGN SUPPORTS

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



SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

- * See BC(4) for definition of "Work Duration."
- ** Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.
- See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

SHEET 5 OF 12



BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5) - 21

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

WORD OR PHRASE	ABBREVIATION	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	PKING
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 DWNTN
Hazardous Driving	HAZ DRIVING	Traffic	TRAF
Hazardous Material	HAZMAT	Travelers	TRVLRS
High-Occupancy	HOV	Tuesday	TUES
Vehicle	HWY	Time Minutes	TIME MIN
Highway	HR, HRS	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

ROAD
CLOSED
AT SH XXX

ROAD
CLSD AT
FM XXXX

RIGHT X
LANES
CLOSED

CENTER
LANE
CLOSED

NIGHT
LANE
CLOSURES

VARIOUS
LANES
CLOSED

EXIT
CLOSED

MALL
DRIVEWAY
CLOSED

XXXXXXXX
BLVD
CLOSED

FRONTAGE
ROAD
CLOSED

SHOULDER
CLOSED
XXX FT

RIGHT LN
CLOSED
XXX FT

RIGHT X
LANES
OPEN

DAYTIME
LANE
CLOSURES

I-XX SOUTH
EXIT
CLOSED

EXIT XXX
CLOSED
X MILE

RIGHT LN
TO BE
CLOSED

X LANES
CLOSED
TUE - FRI

Other Condition List

ROADWORK
XXX FT

FLAGGER
XXXX FT

RIGHT LN
NARROWS
XXXX FT

MERGING
TRAFFIC
XXXX FT

LOOSE
GRAVEL
XXXX FT

DETOUR
X MILE

ROADWORK
PAST
SH XXXX

BUMP
XXXX FT

TRAFFIC
SIGNAL
XXXX FT

ROAD
REPAIRS
XXXX FT

LANE
NARROWS
XXXX FT

TWO-WAY
TRAFFIC
XX MILE

CONST
TRAFFIC
XXX FT

UNEVEN
LANES
XXXX FT

ROUGH
ROAD
XXXX FT

ROADWORK
NEXT
FRI-SUN

US XXX
EXIT
X MILES

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

DETOUR
NEXT
X EXITS

USE
EXIT XXX

STAY ON
US XXX
SOUTH

TRUCKS
USE
US XXX N

WATCH
FOR
TRUCKS

EXPECT
DELAYS

REDUCE
SPEED
XXX FT

USE
OTHER
ROUTES

STAY
IN
LANE

FORM
X LINES
RIGHT

USE
XXXXX
RD EXIT

USE EXIT
I-XX
NORTH

USE
I-XX E
TO I-XX N

WATCH
FOR
TRUCKS

EXPECT
DELAYS

END
SHOULDER
USE

WATCH
FOR
WORKERS

Location
List

AT
FM XXXX

BEFORE
RAILROAD
CROSSING

NEXT
X
MILES

PAST
US XXX
EXIT

XXXXXXX
TO
XXXXXXX

US XXX
TO
FM XXXX

Warning
List

SPEED
LIMIT
XX MPH

MAXIMUM
SPEED
XX MPH

MINIMUM
SPEED
XX MPH

ADVISORY
SPEED
XX MPH

RIGHT
LANE
EXIT

USE
CAUTION

DRIVE
SAFELY

DRIVE
WITH
CARE

** Advance
Notice List

TUE-FRI
XX AM-
X PM

APR XX-
XX
X PM-X AM

BEGINS
MONDAY

BEGINS
MAY XX

MAY X-X
XX PM -
XX AM

NEXT
FRI-SUN

XX AM
TO
XX PM

NEXT
TUE
AUG XX

TONIGHT
XX PM-
XX AM

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

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

FULL MATRIX PCMS SIGNS

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

WORDING ALTERNATIVES

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

SHEET 6 OF 12



Texas Department of Transportation

Traffic
Safety
Division
Standard

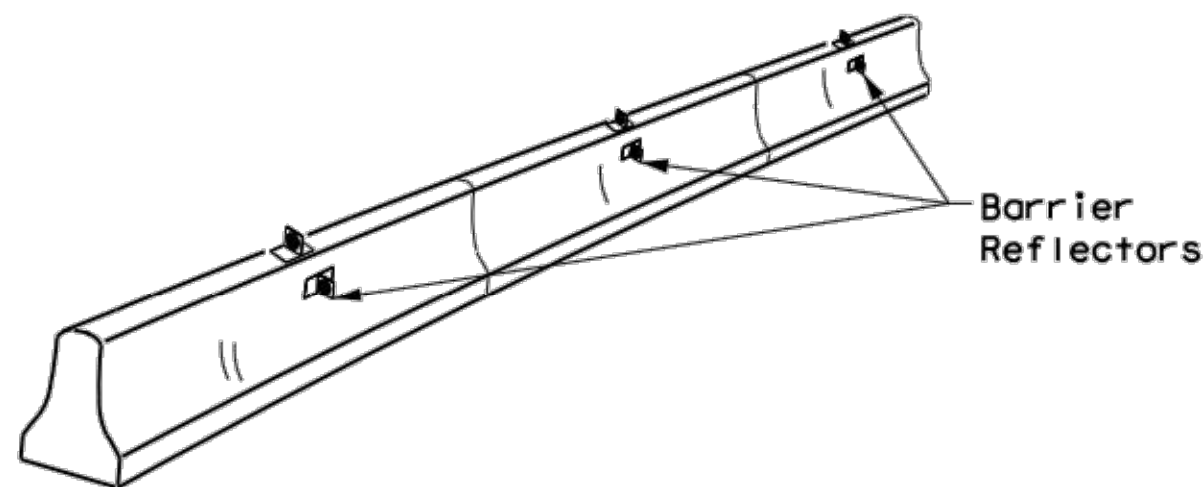
BARRICADE AND CONSTRUCTION
PORTABLE CHANGEABLE
MESSAGE SIGN (PCMS)

BC (6) - 21

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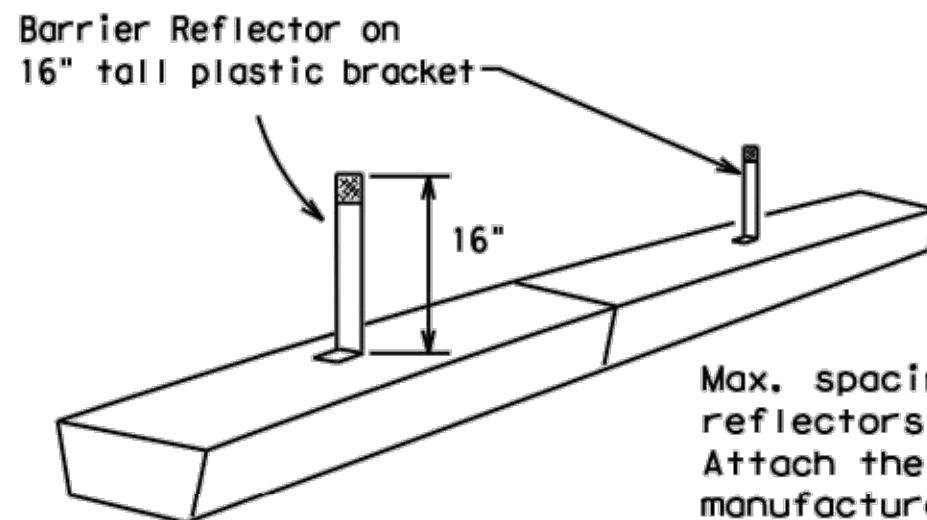
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors 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.

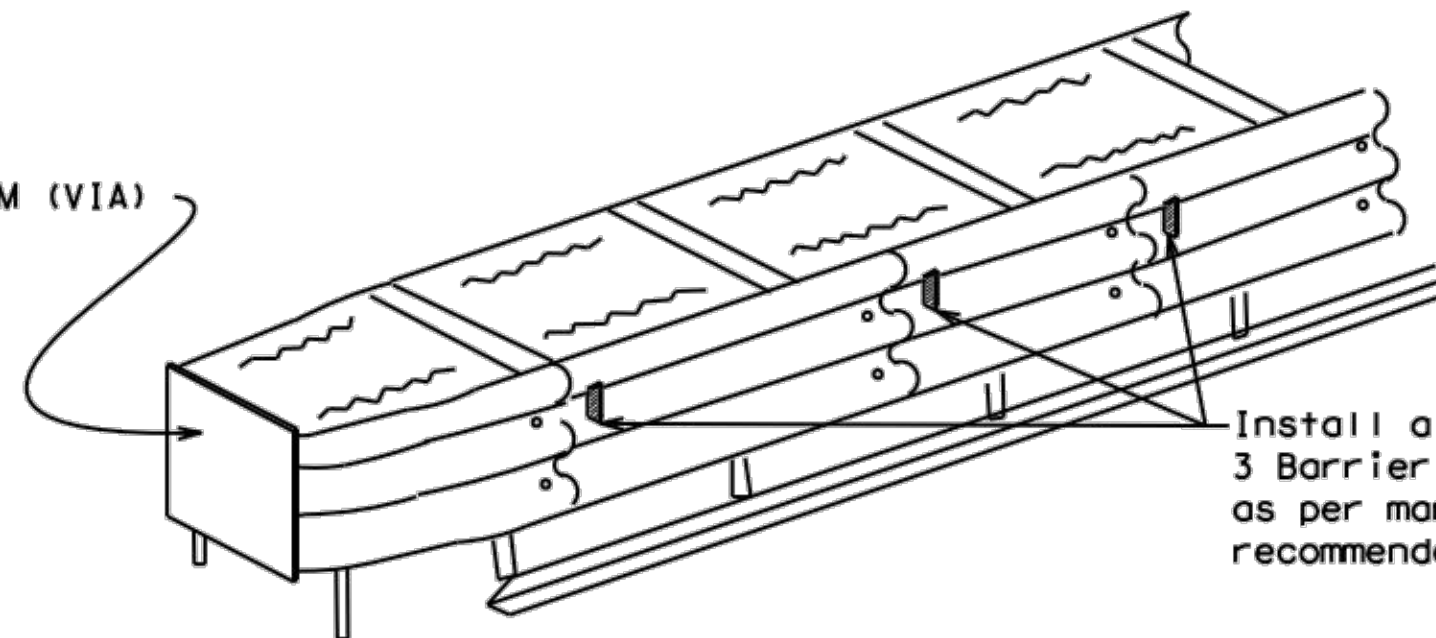


LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)



DELINEATION OF END TREATMENTS

END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet the appropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH). Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS

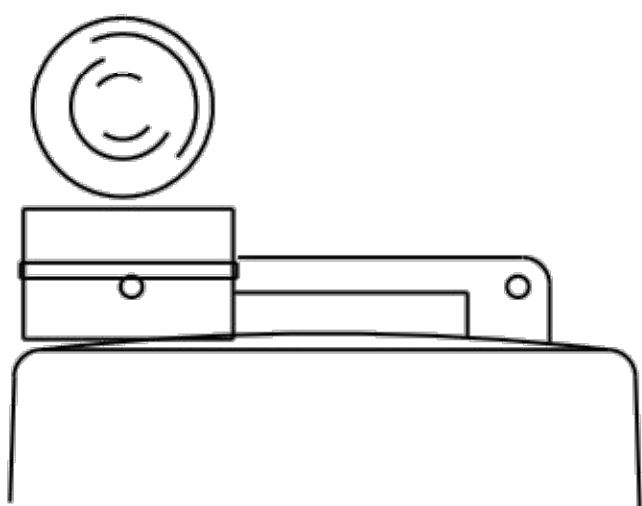
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet 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_{PL} or C_{FL} 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

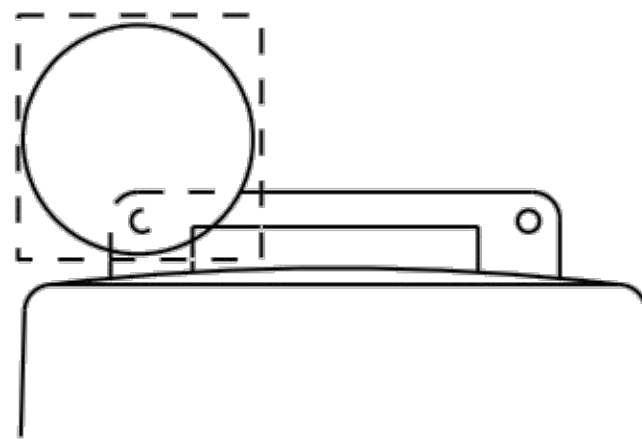
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing 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.



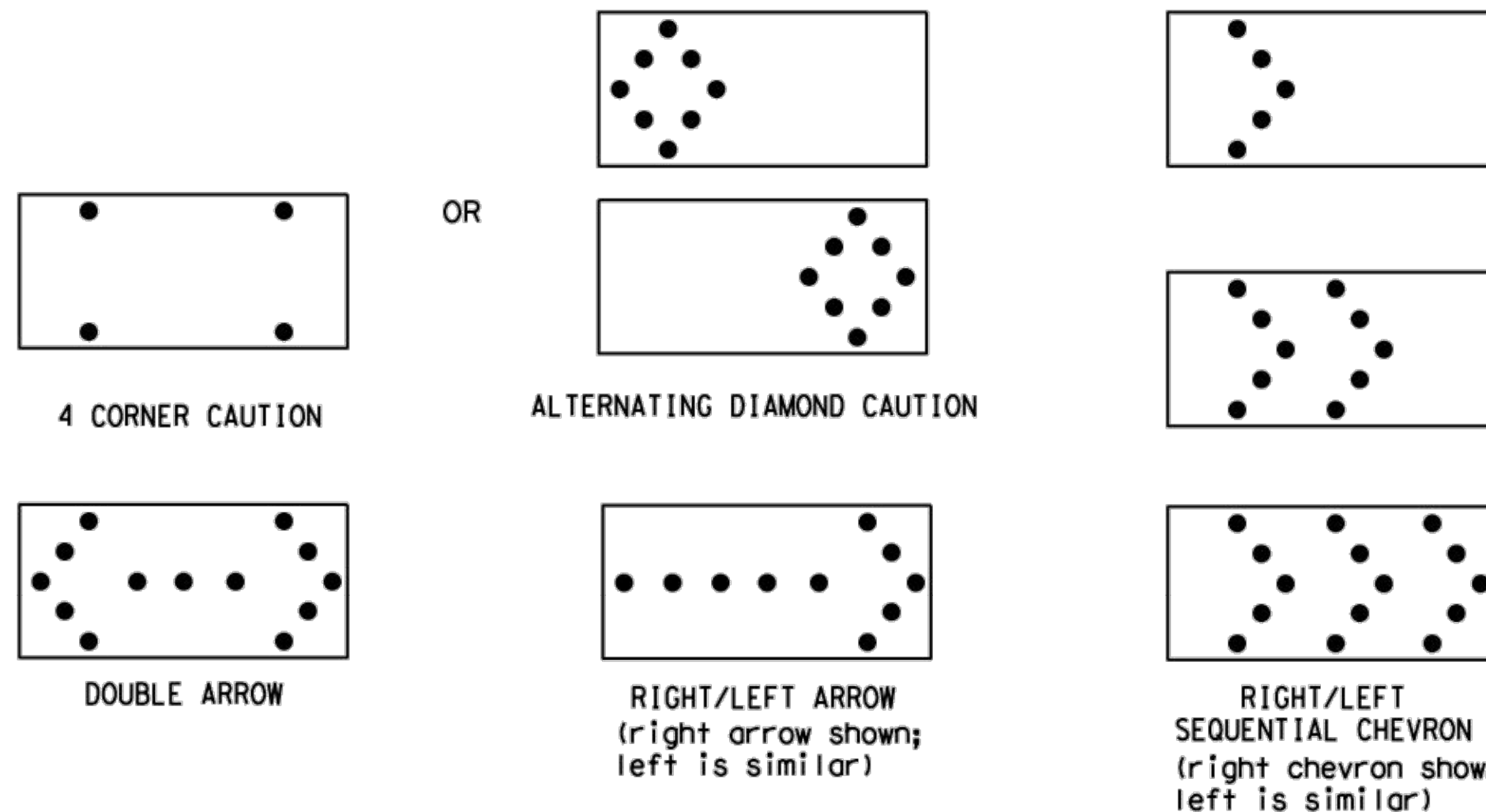
Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



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

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 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 an extended distance from the TMA.



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

BC (7) -21

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DISCLAIMER:

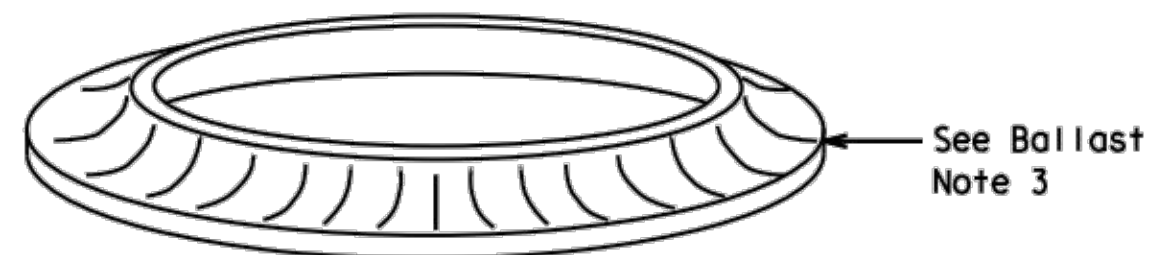
1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
2. For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece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

Pre-qualified plastic drums shall meet the following requirements:

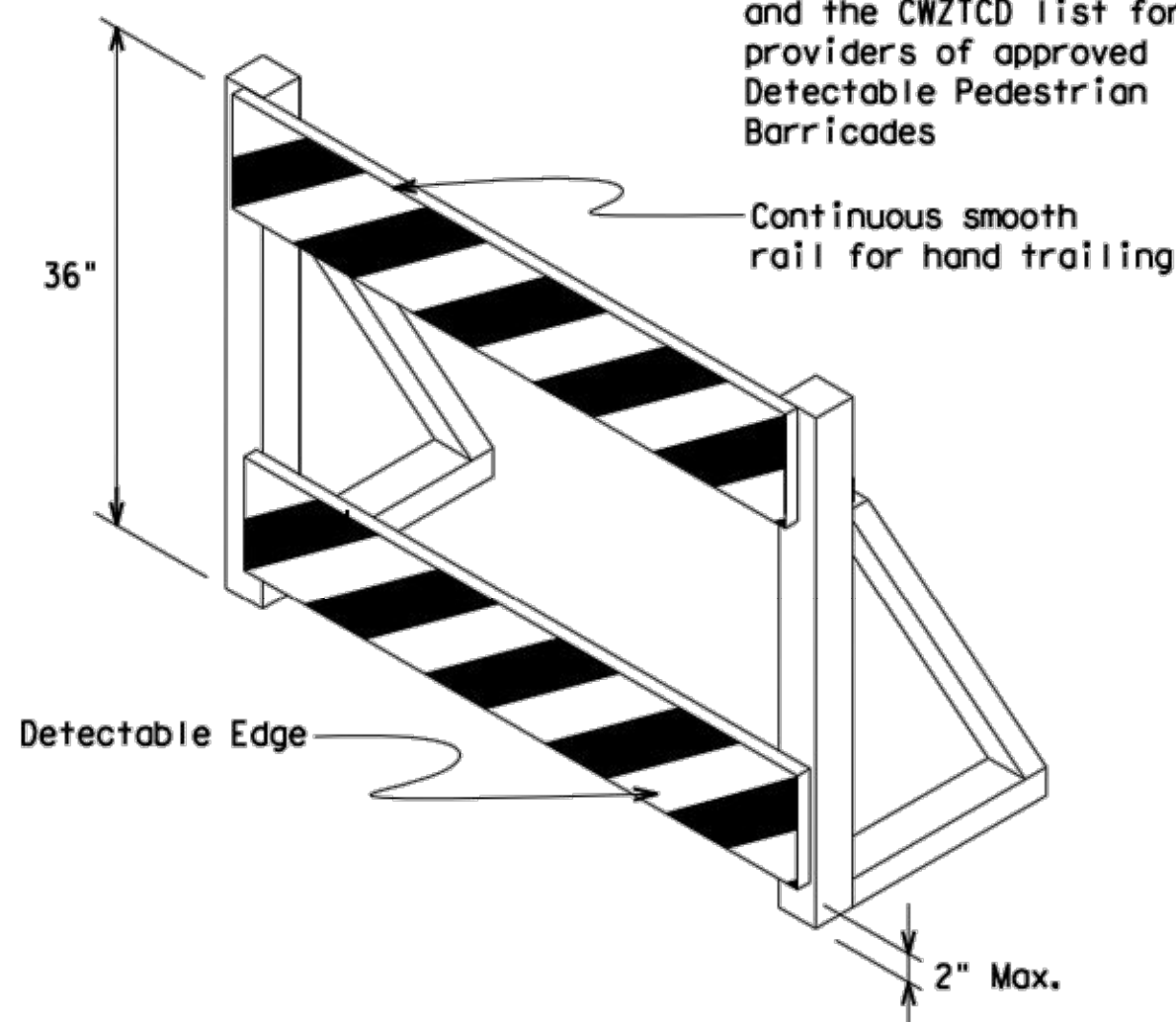
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

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

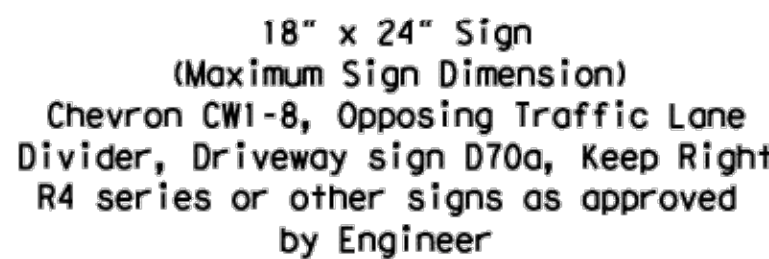
1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other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



This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades



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



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

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

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

SHEET 8 OF 12



**Traffic
Safety
Division
Standard**

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

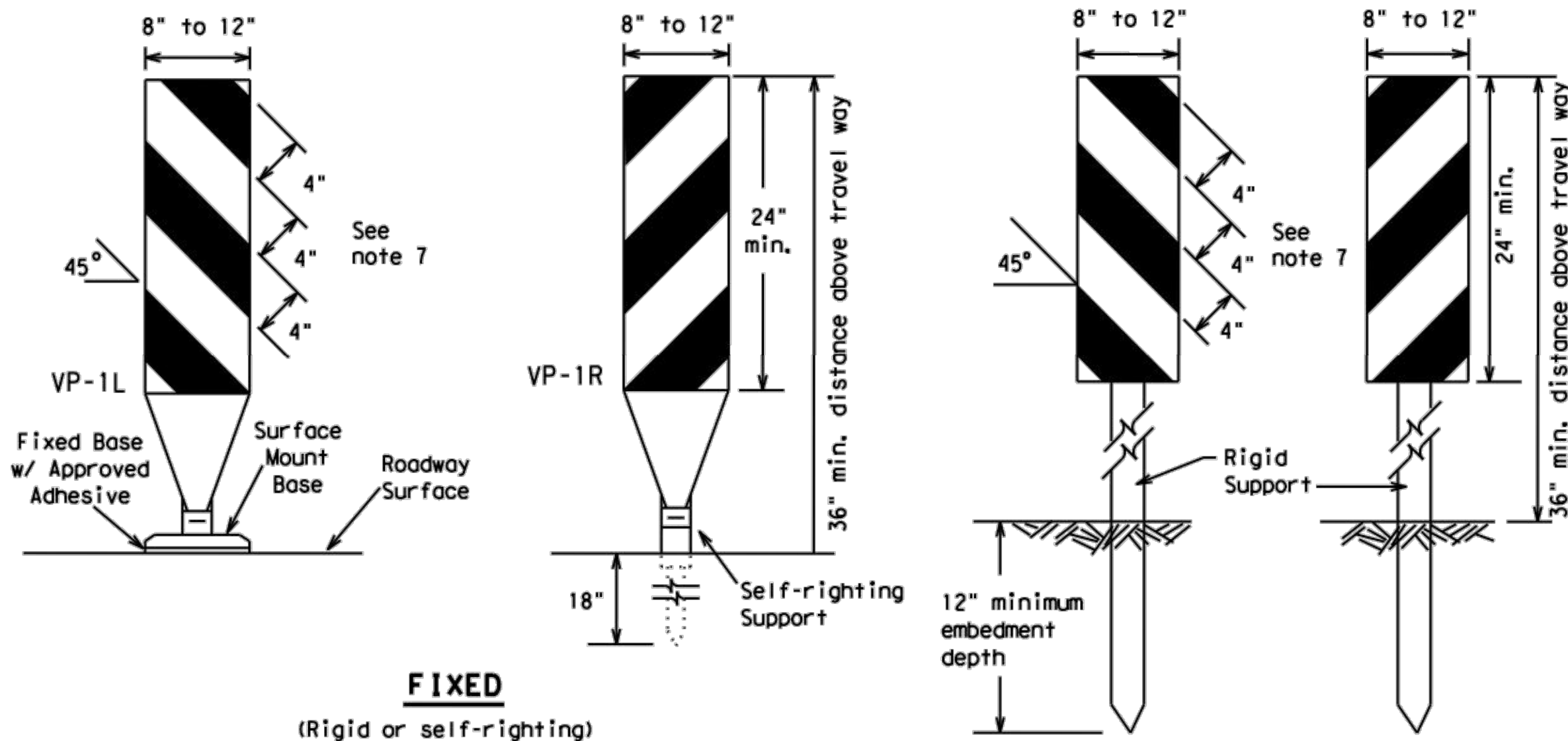
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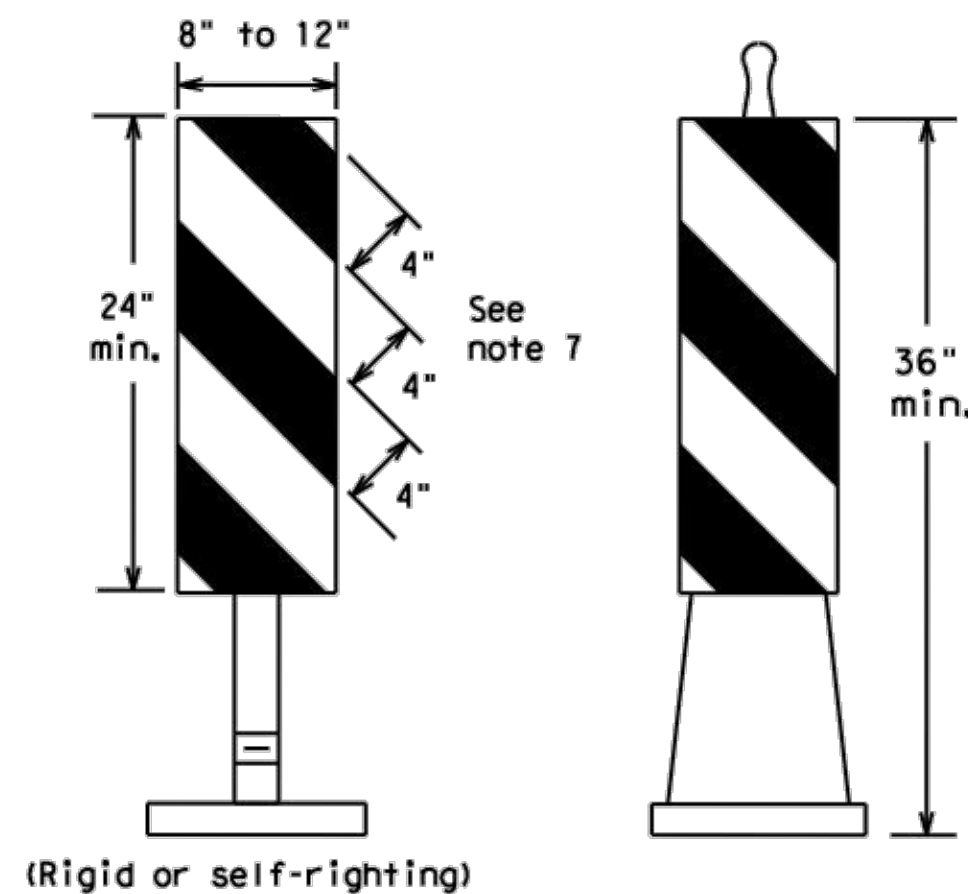
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FIXED
(Rigid or self-righting)

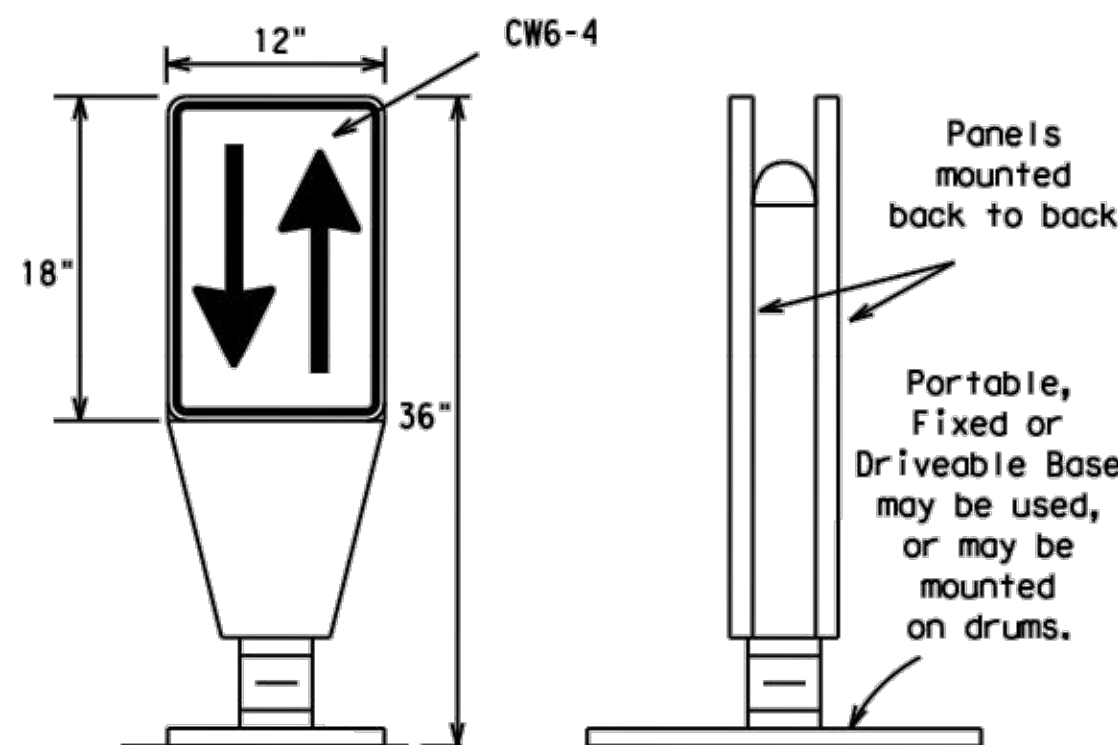
DRIVEABLE



PORTABLE

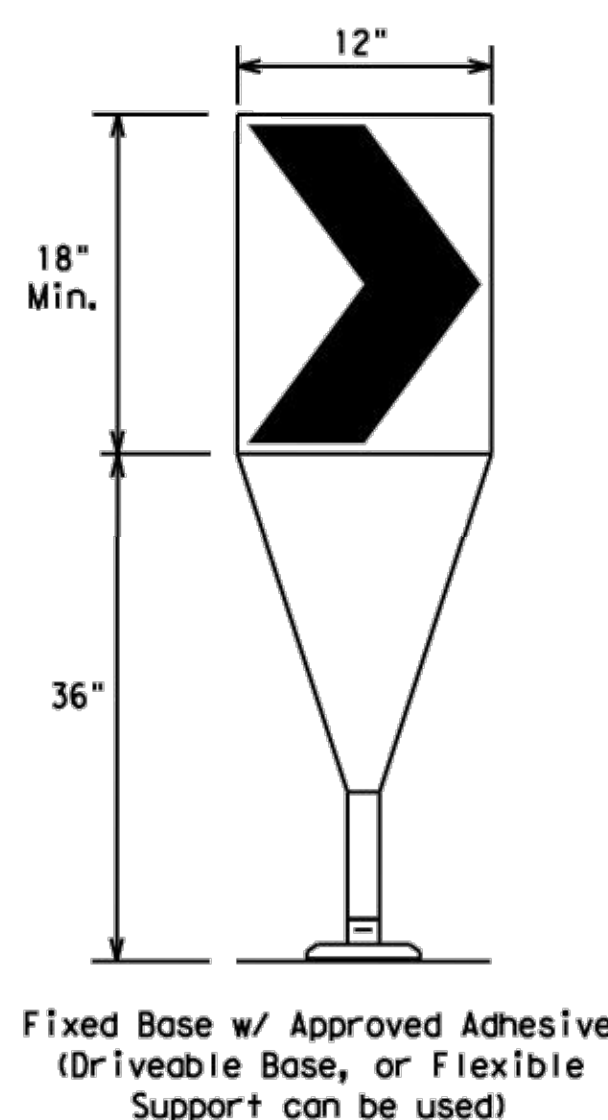
VERTICAL PANELS (VPs)

- 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 for additional requirements on the use 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 or Type B 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.



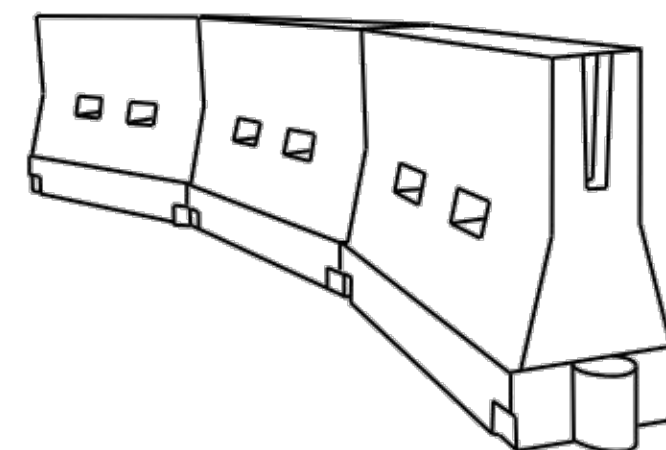
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

- 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). Place reflective sheeting 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 Manual for Assessing Safety Hardware (MASH) 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 canes and the top of the unit shall not be less than 32 inches in height.

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

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 * *			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'

* * * 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) - 21

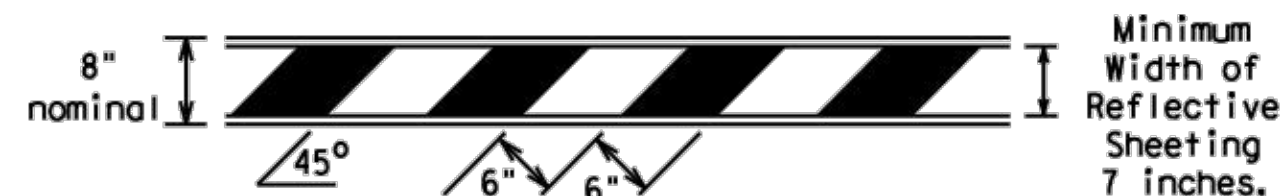
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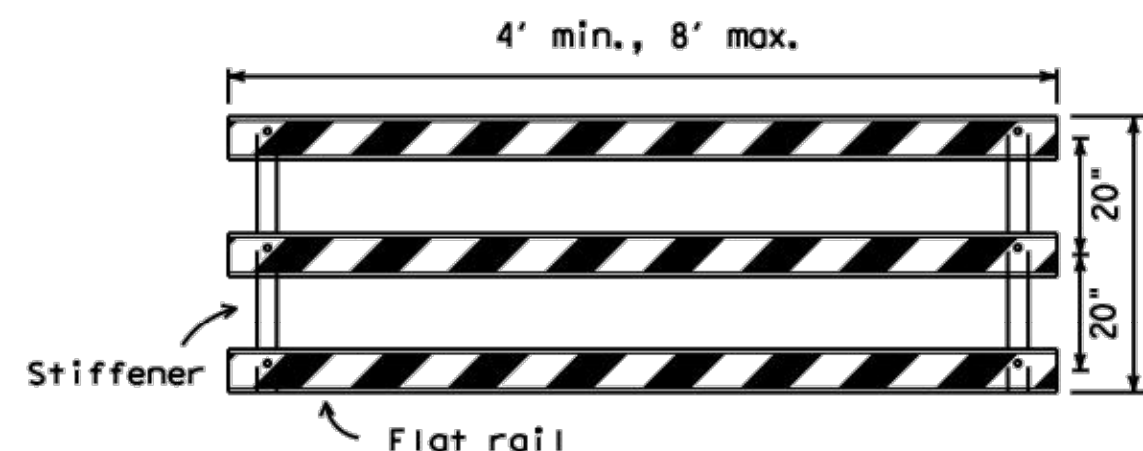
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.

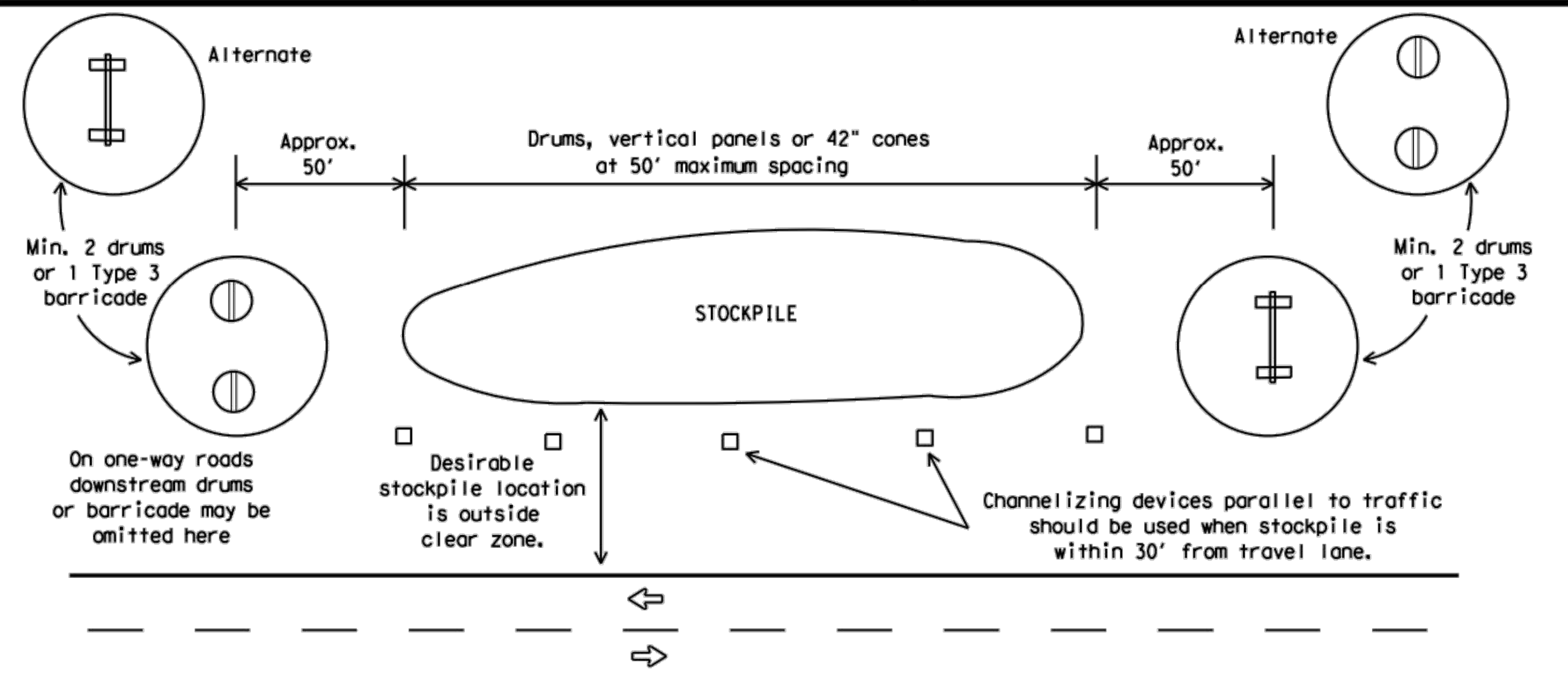


TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



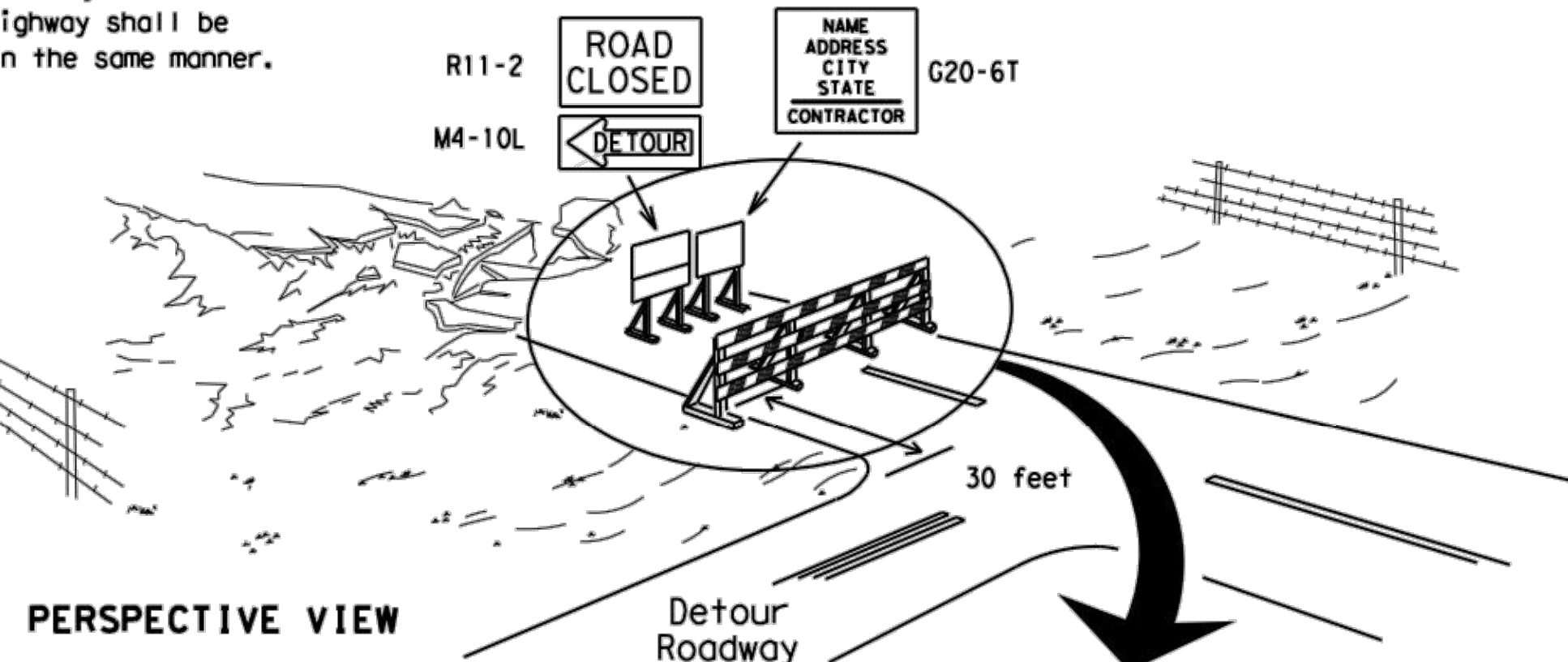
Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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



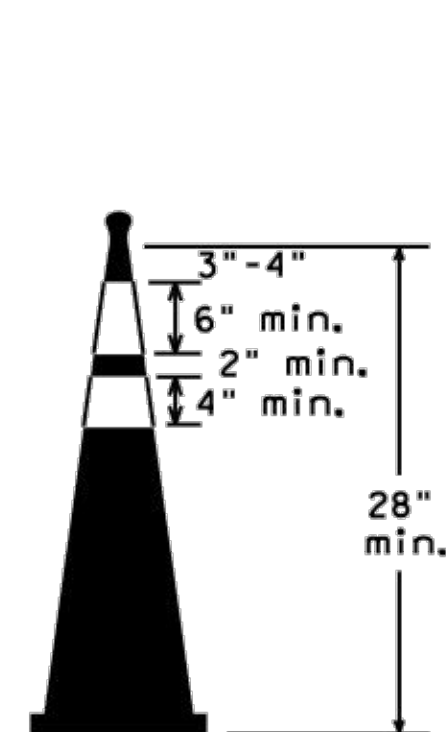
PERSPECTIVE VIEW

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.

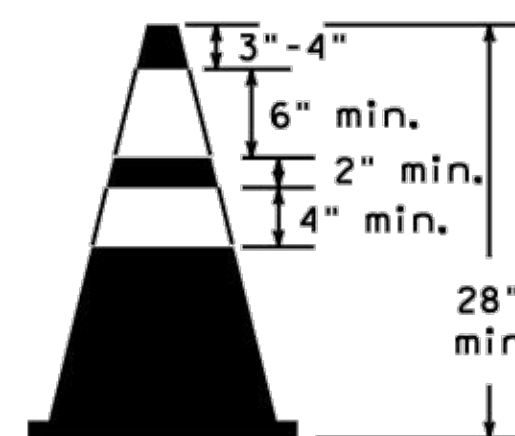
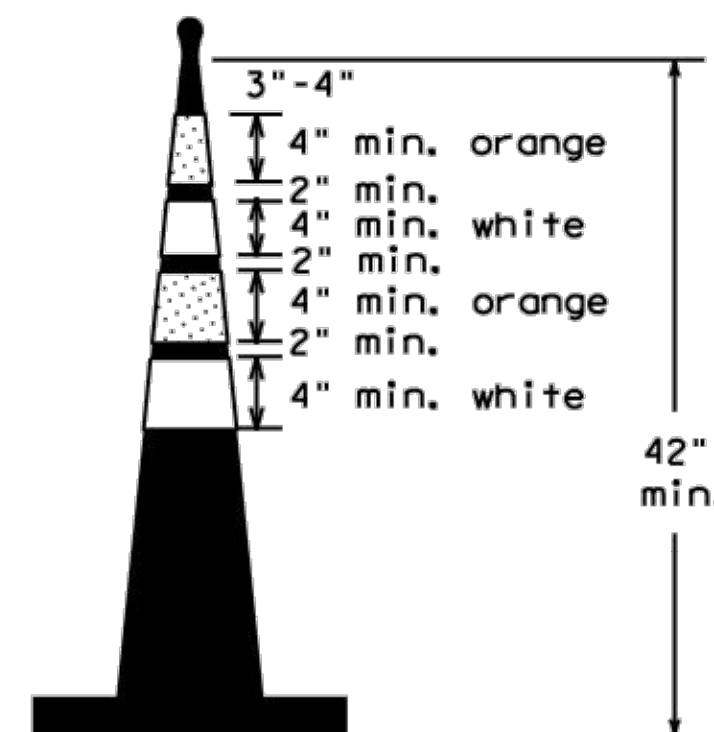
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

PLAN VIEW

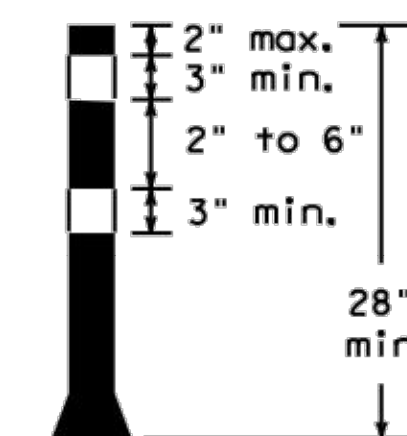
TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



Two-Piece cones



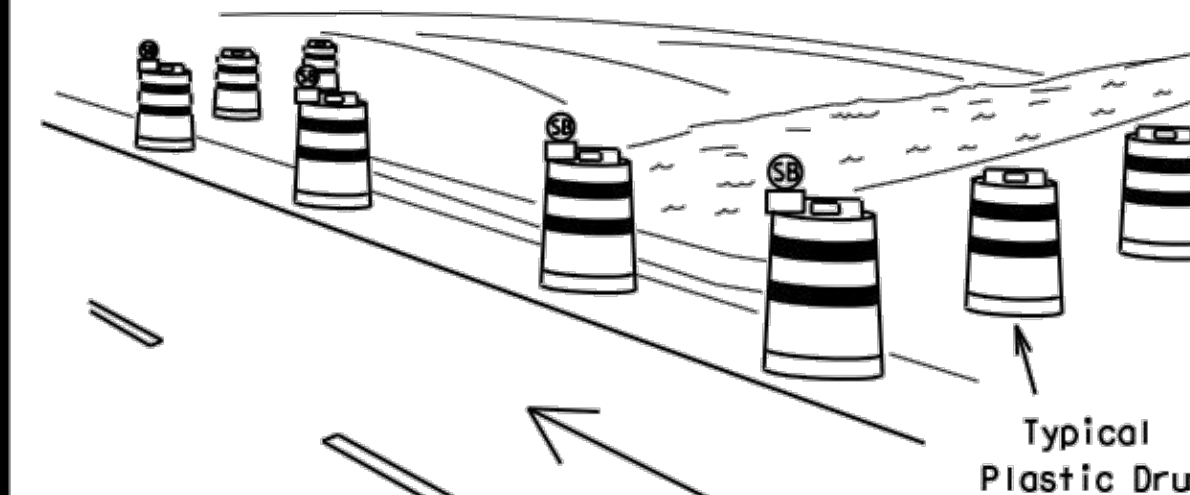
One-Piece cones



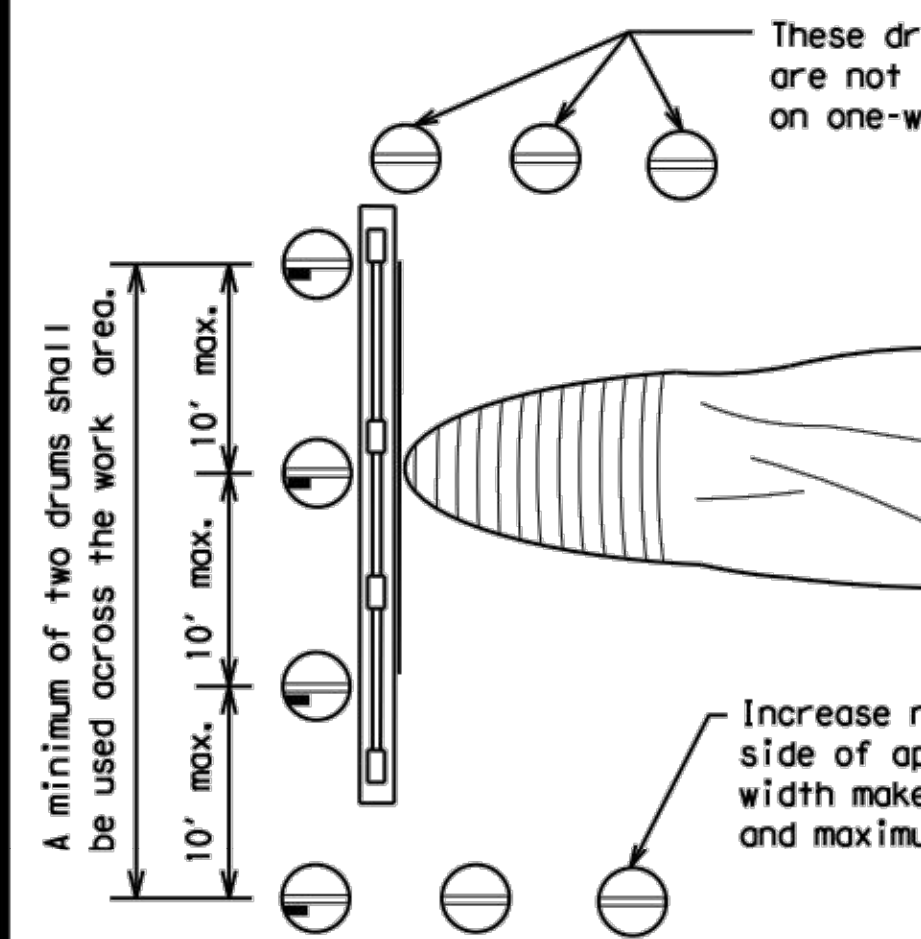
Tubular Marker

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 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 or Type B.
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

These drums are not required on one-way roadway

Increase number of plastic drums on the side of approaching traffic if the crown width makes it necessary. (minimum of 2 and maximum of 4 drums)

SHEET 10 OF 12



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT	CR: TxDOT
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REVISIONS				
9-07 8-14				
7-13 5-21				
	DIST	COUNTY		SHEET NO.
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DATE:
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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

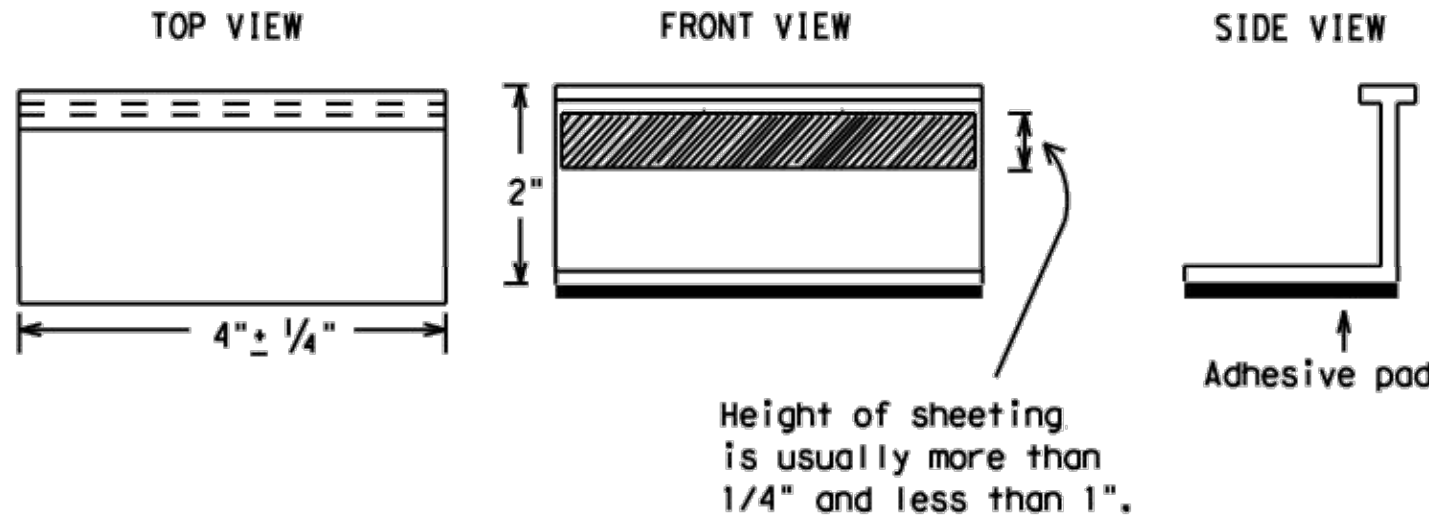
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective
Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

SHEET 11 OF 12



Texas Department of Transportation

Traffic
Safety
Division
Standard

BARRICADE AND CONSTRUCTION
PAVEMENT MARKINGS

BC(11)-21

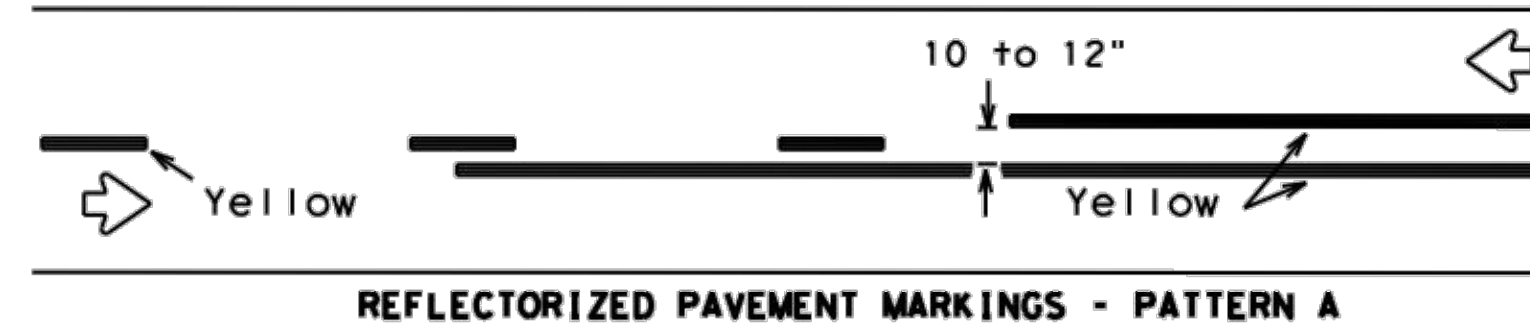
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© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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DIST			COUNTY	SHEET NO.

D-15

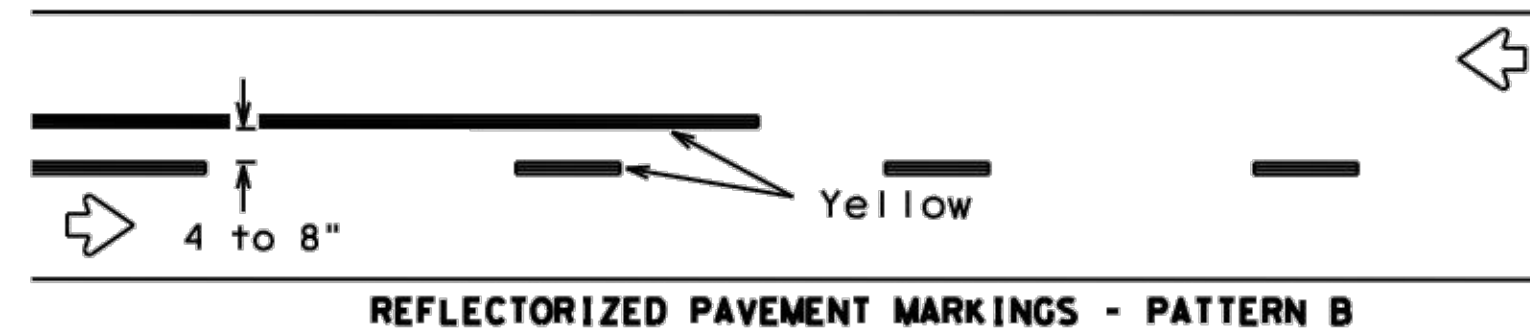
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PAVEMENT MARKING PATTERNS



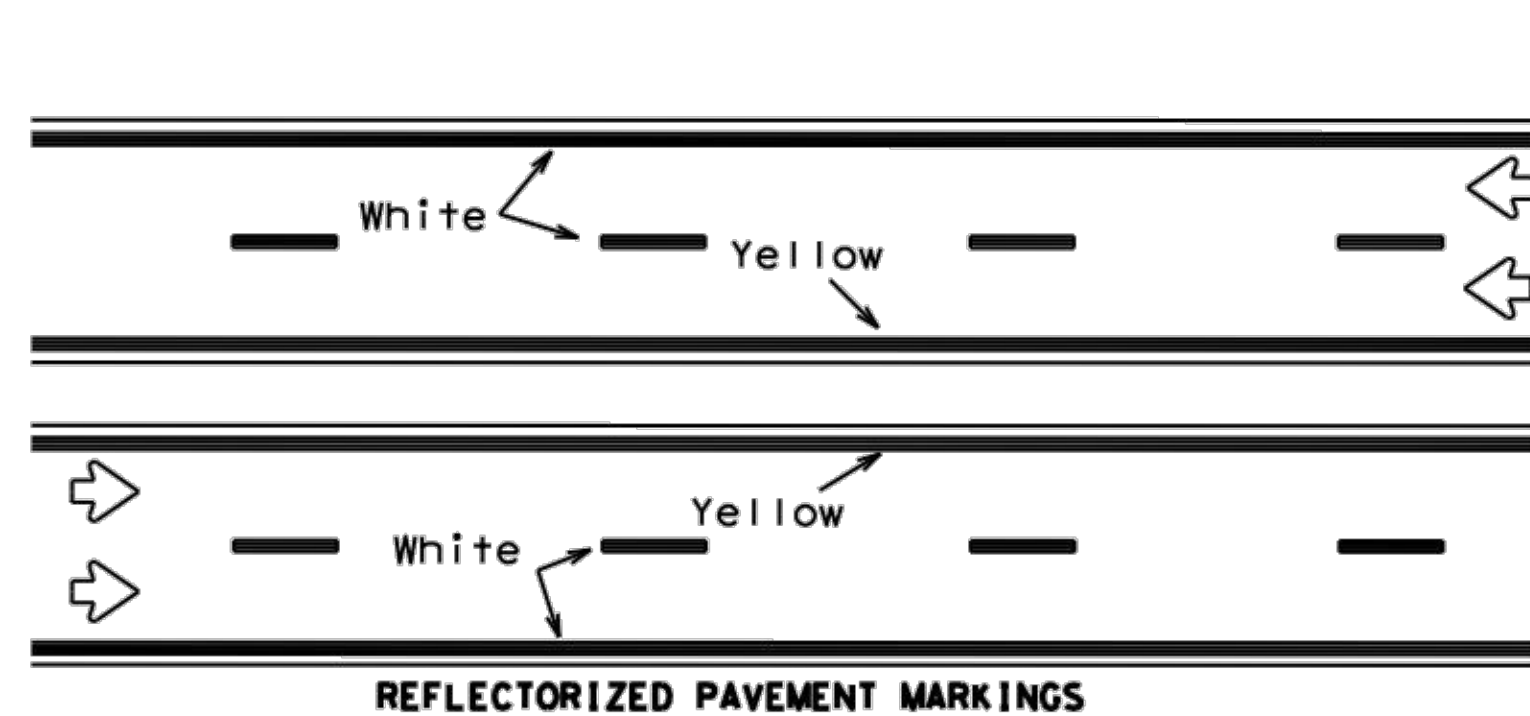
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

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

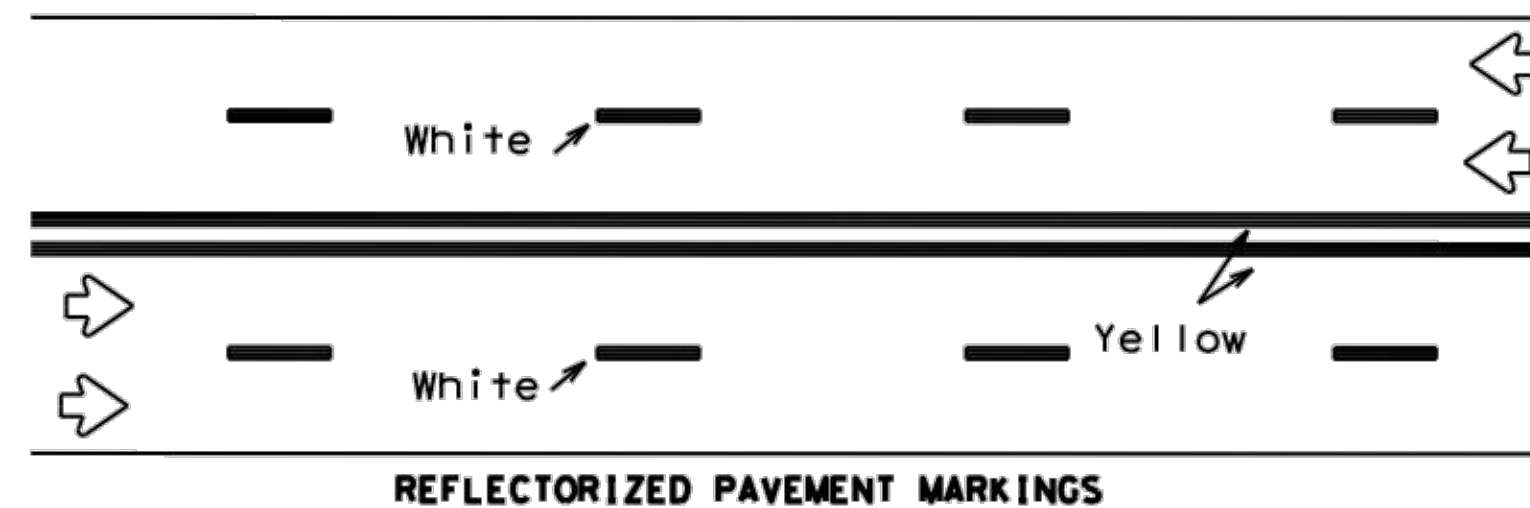
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.

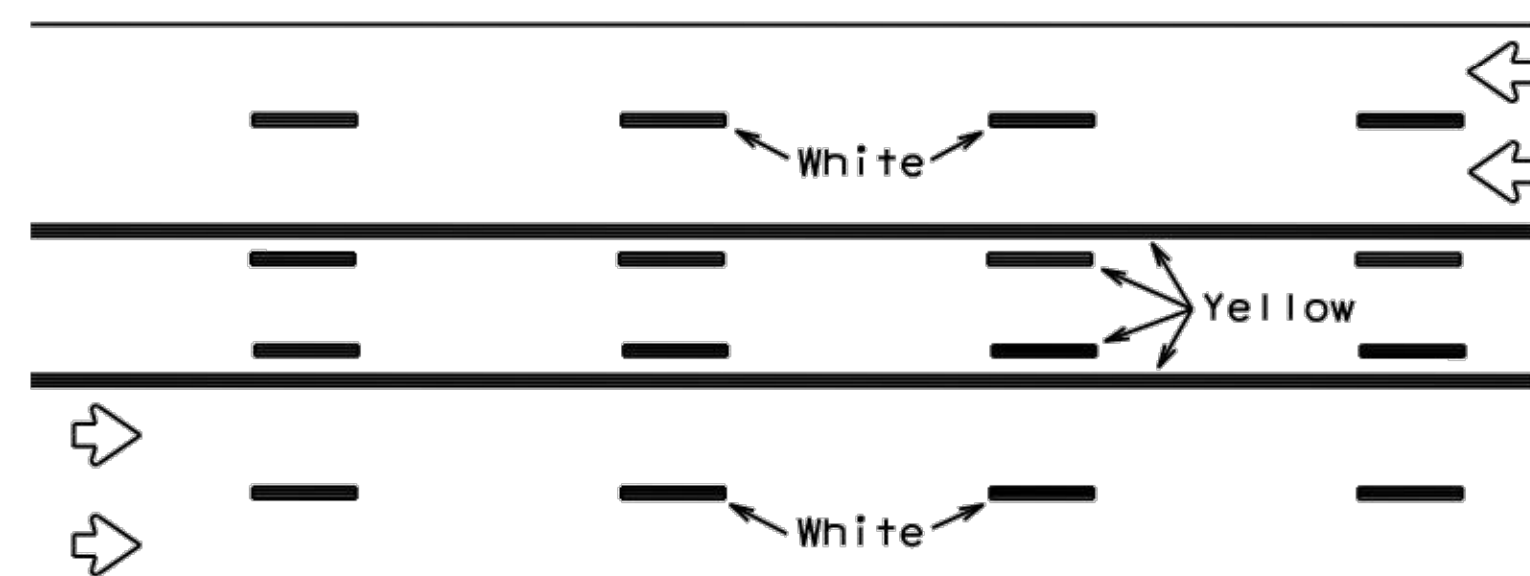
EDGE & LANE LINES FOR DIVIDED HIGHWAY



REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.

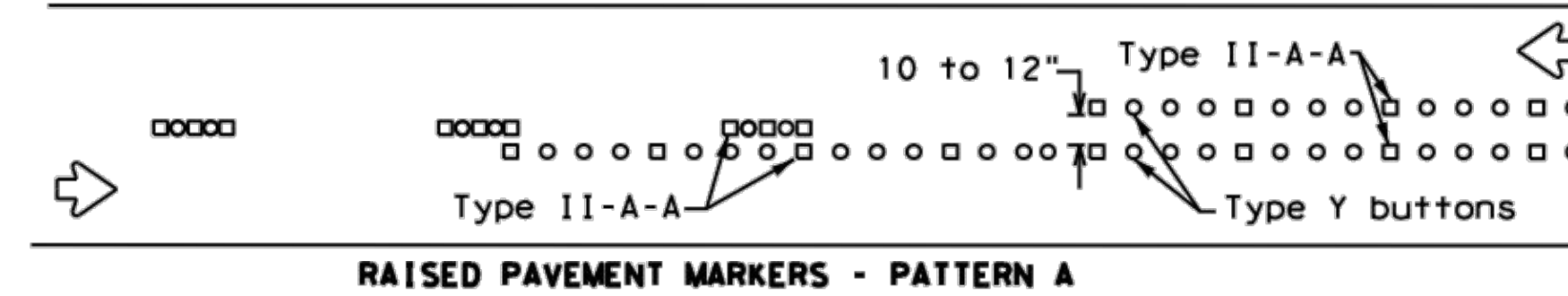
LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



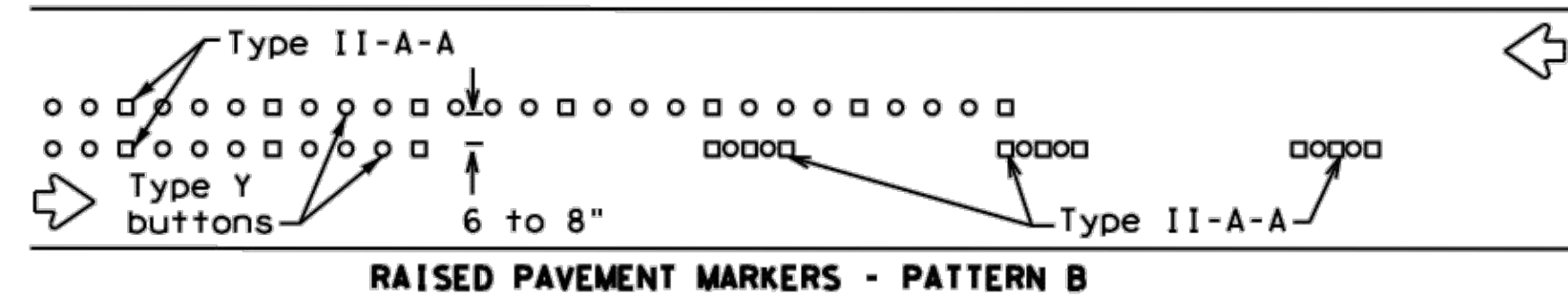
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.

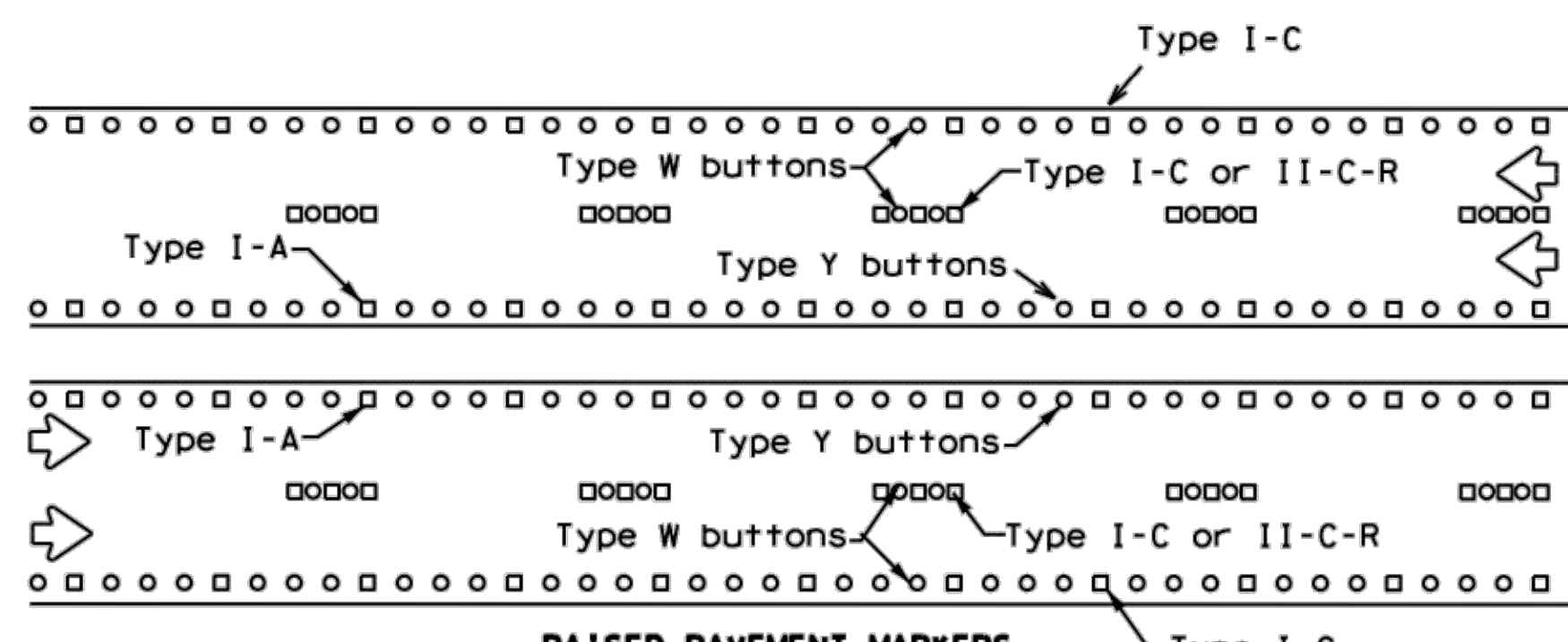
TWO-WAY LEFT TURN LANE



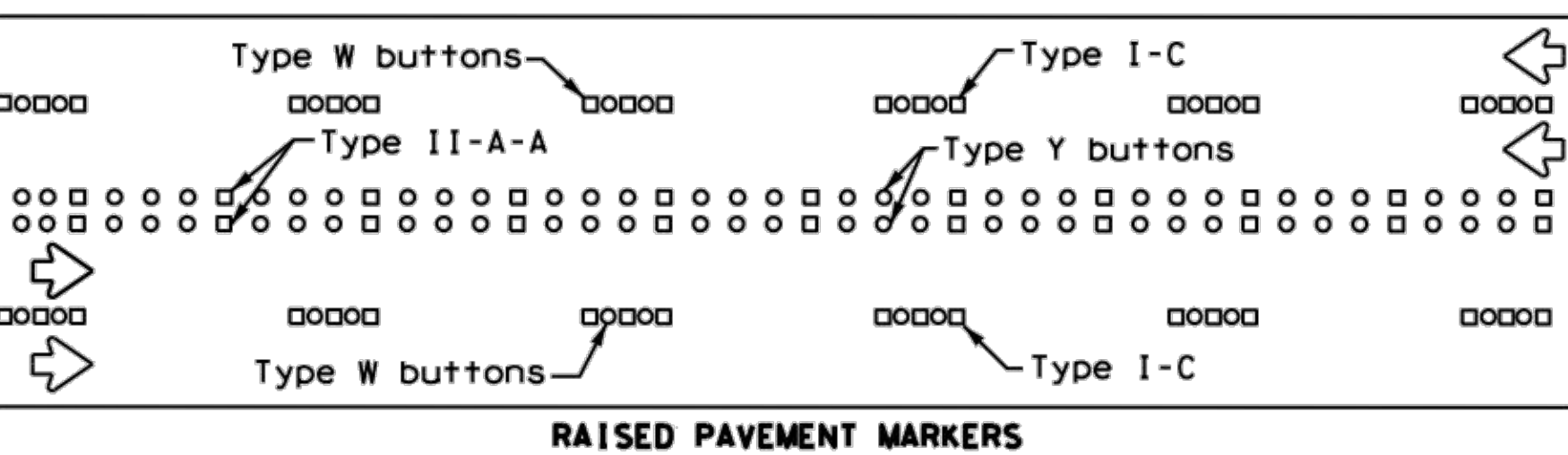
RAISED PAVEMENT MARKERS - PATTERN A



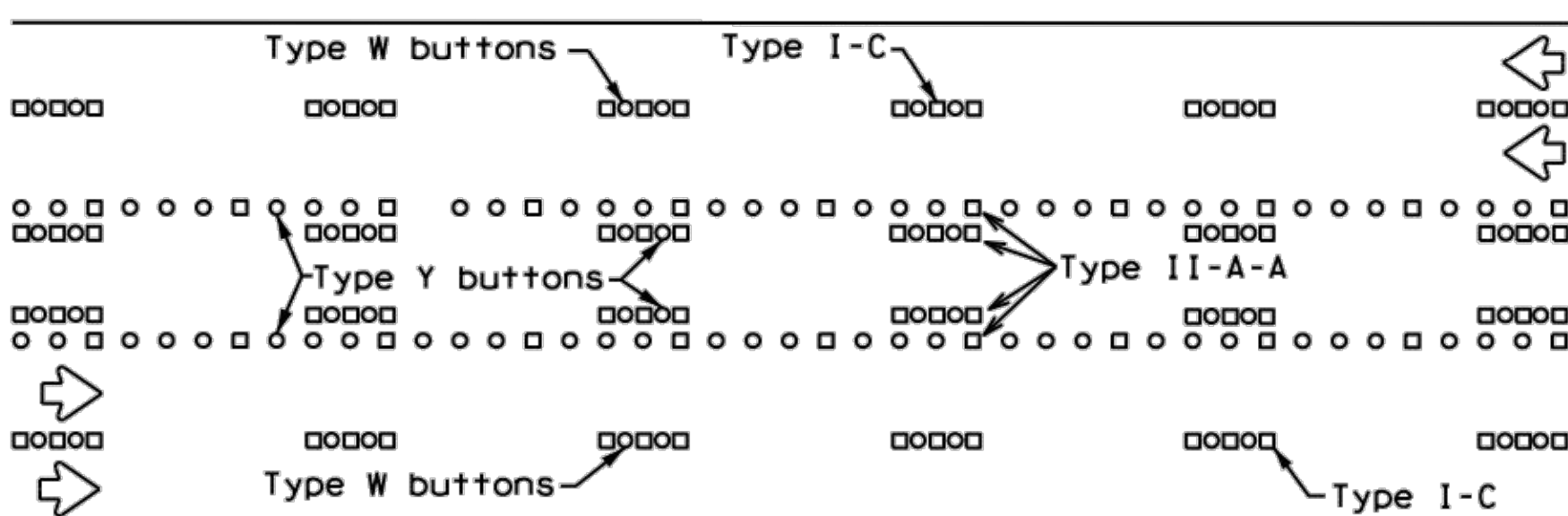
RAISED PAVEMENT MARKERS - PATTERN B



RAISED PAVEMENT MARKERS

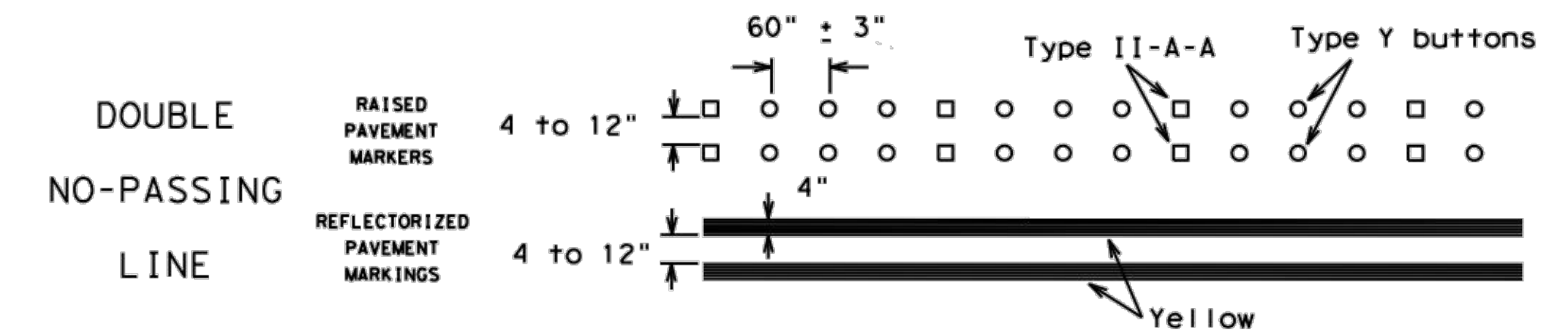


RAISED PAVEMENT MARKERS

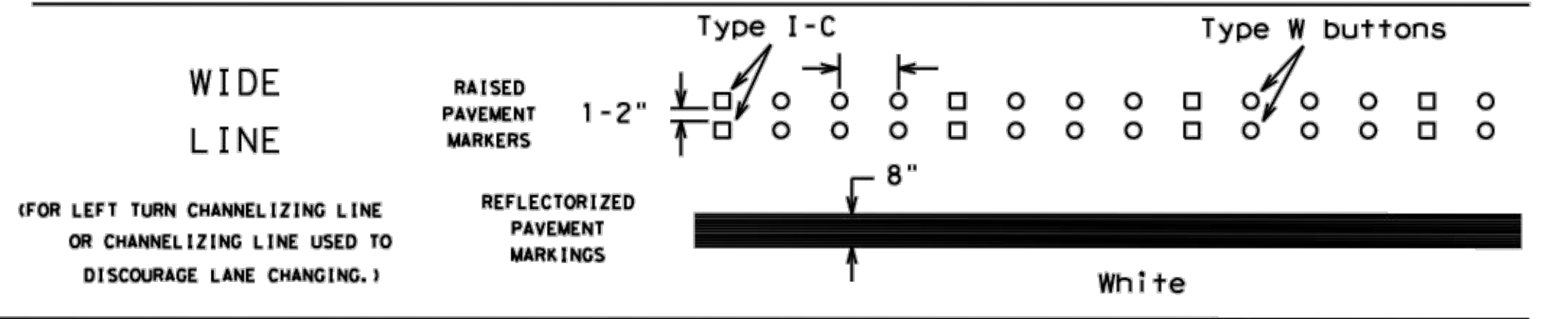
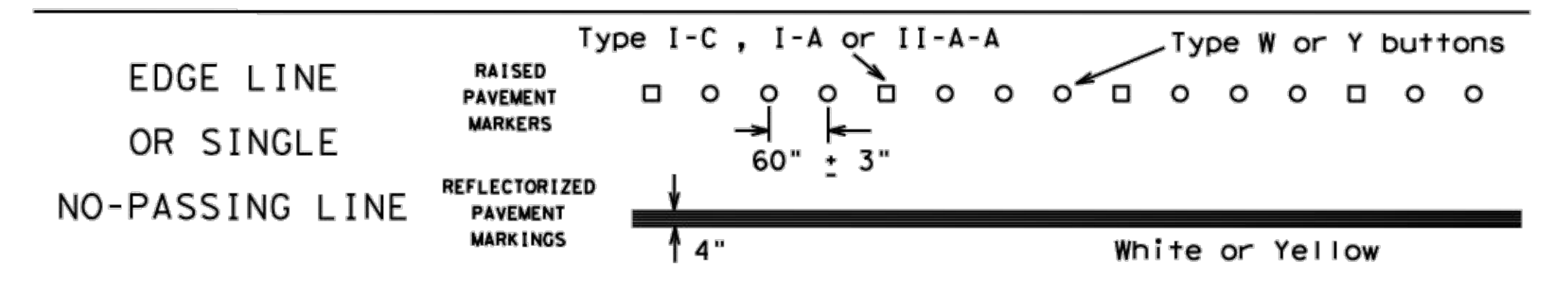


RAISED PAVEMENT MARKERS

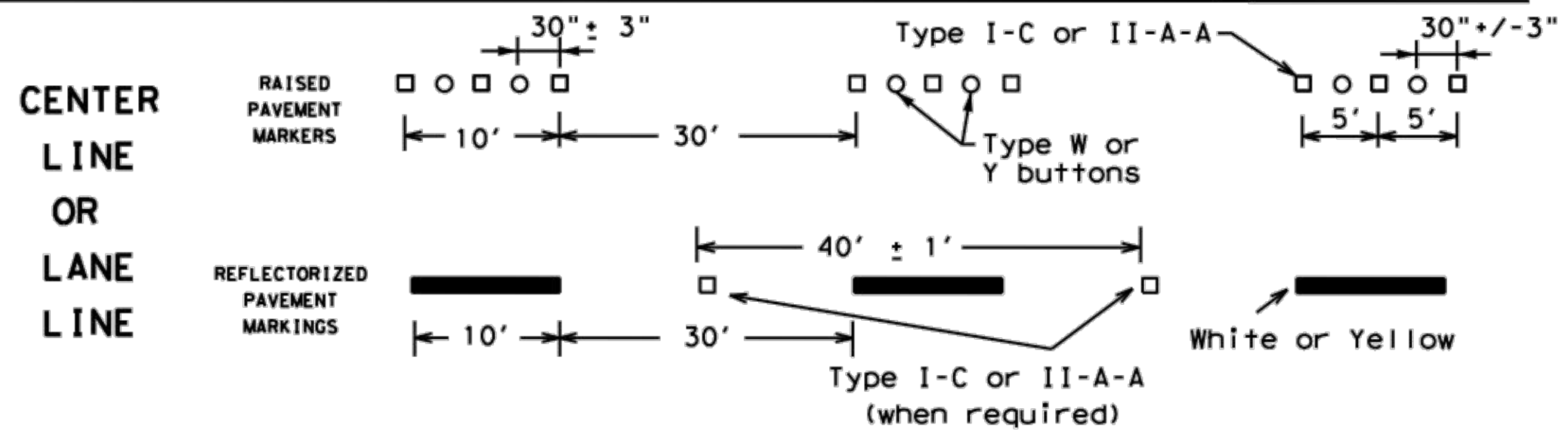
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



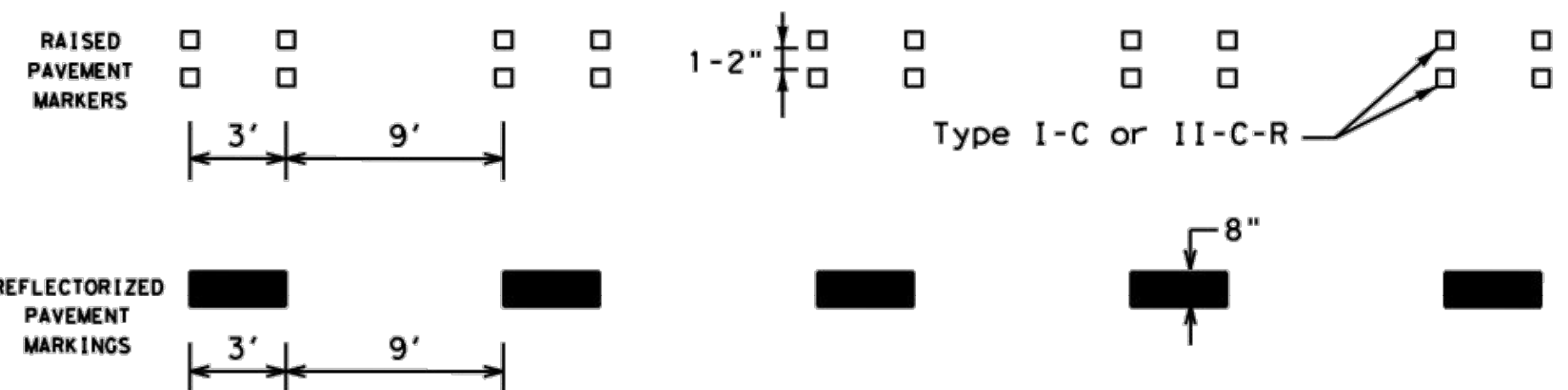
SOLID LINES



BROKEN LINES

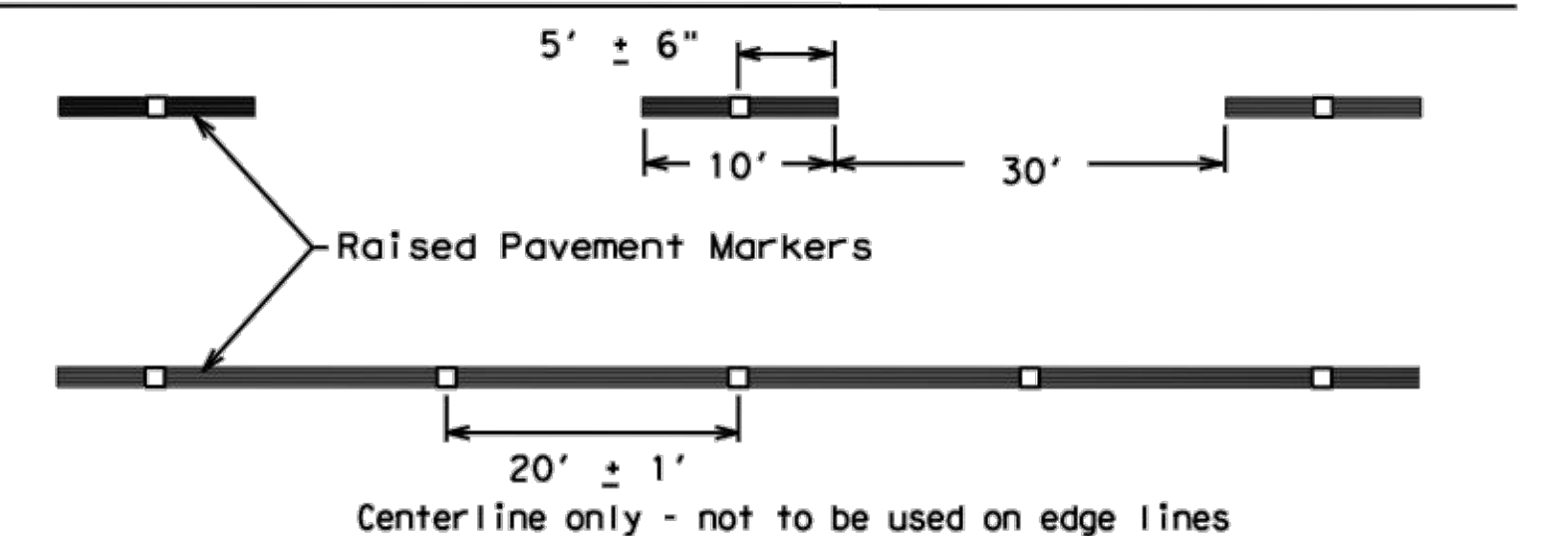


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



SHEET 12 OF 12



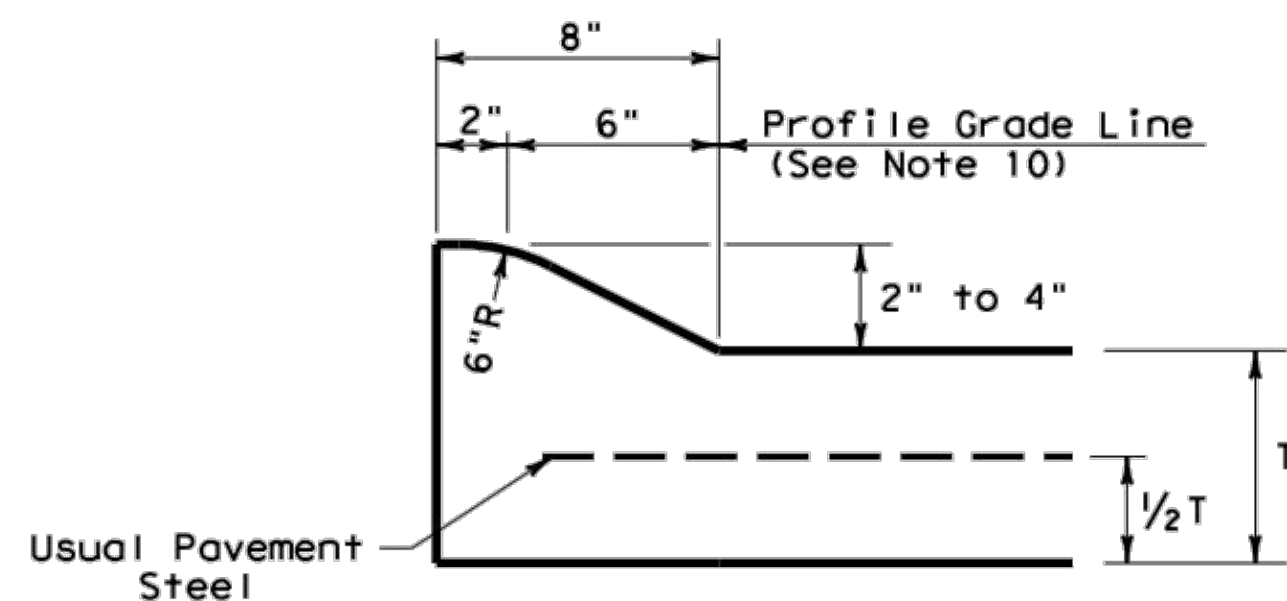
BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC (12) - 21

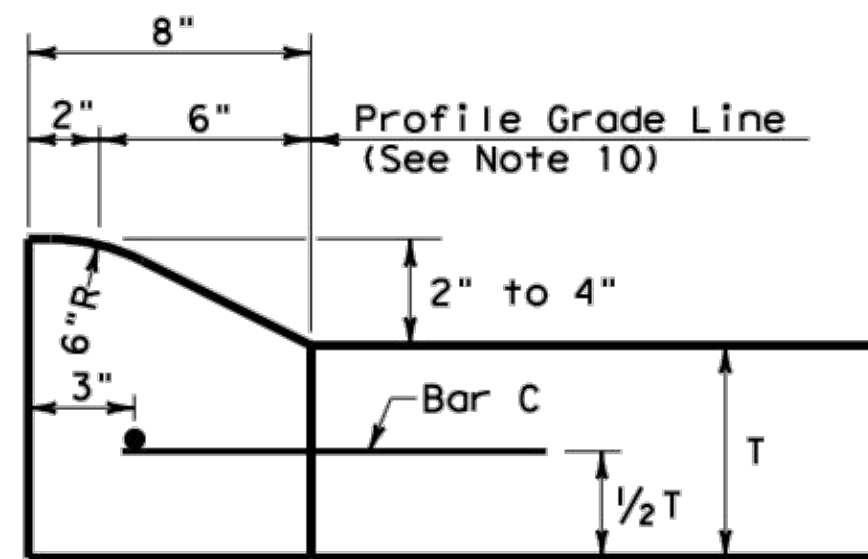
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©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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2-98 7-13				
11-02 8-14				
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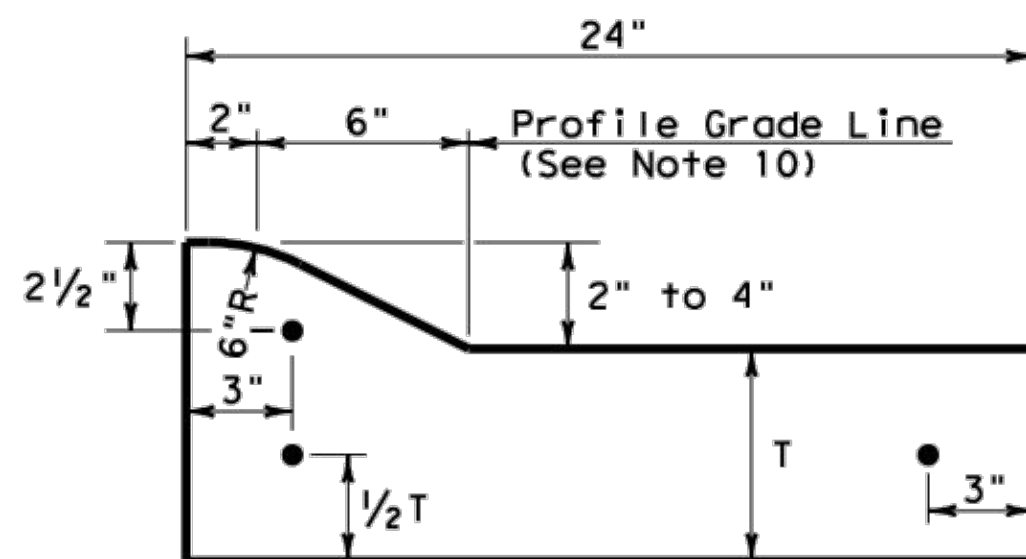
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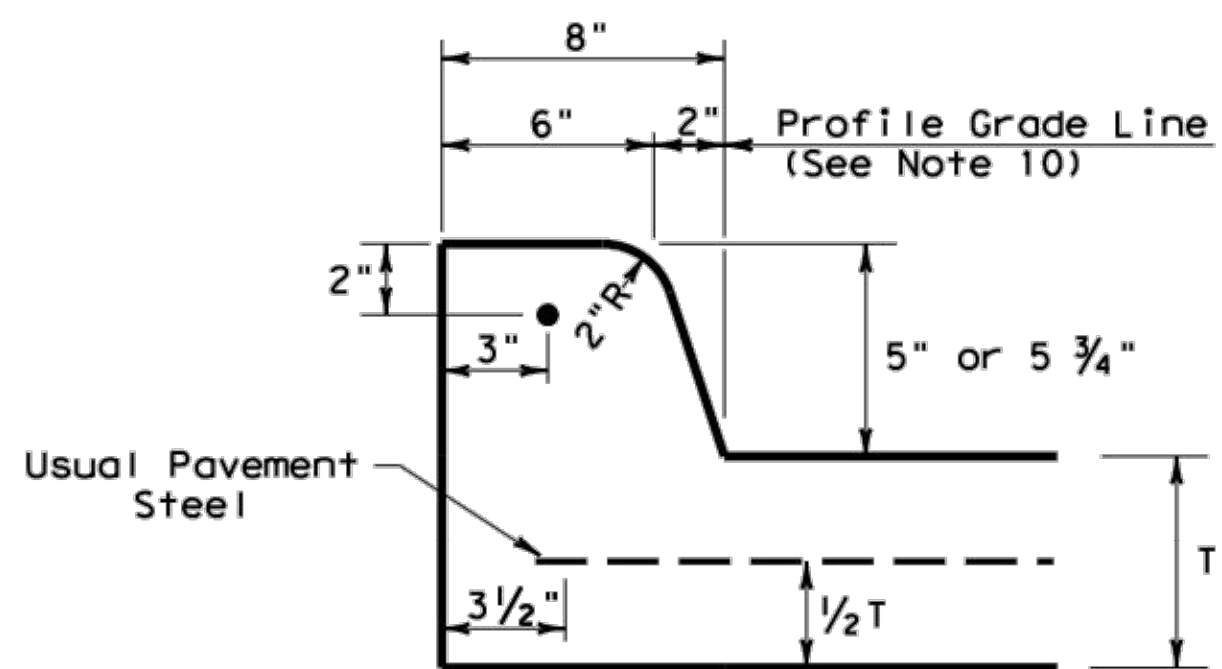
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



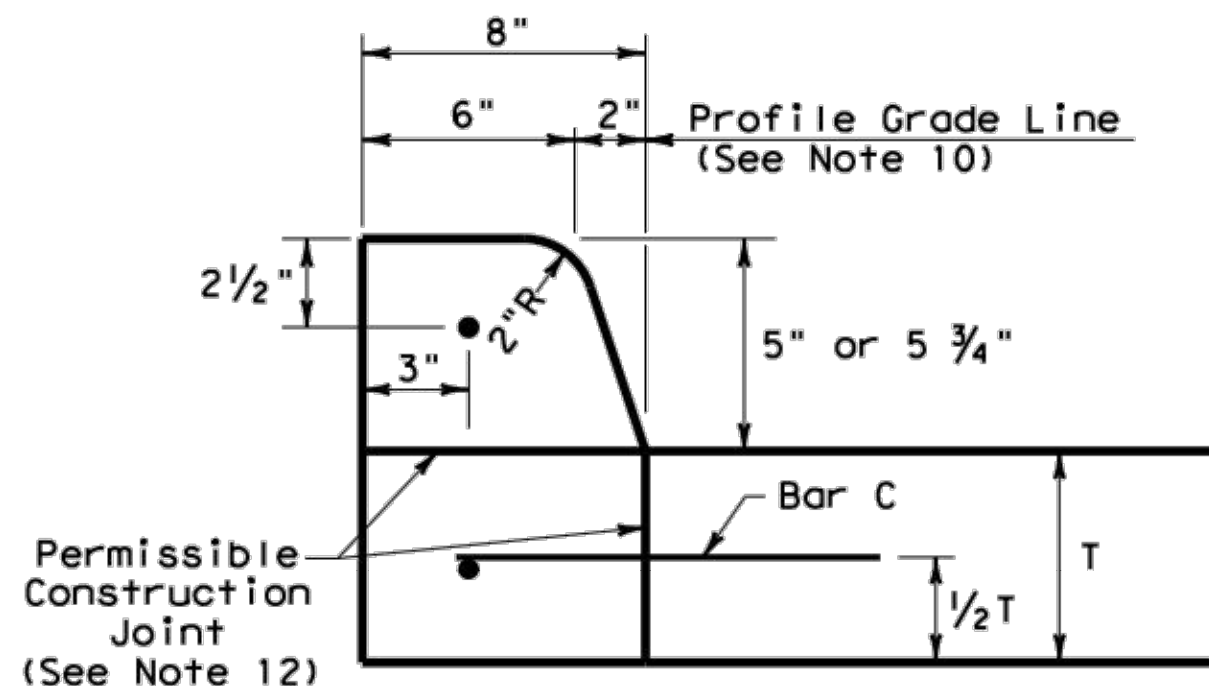
TYPE I CURB
2" - 4" HEIGHT



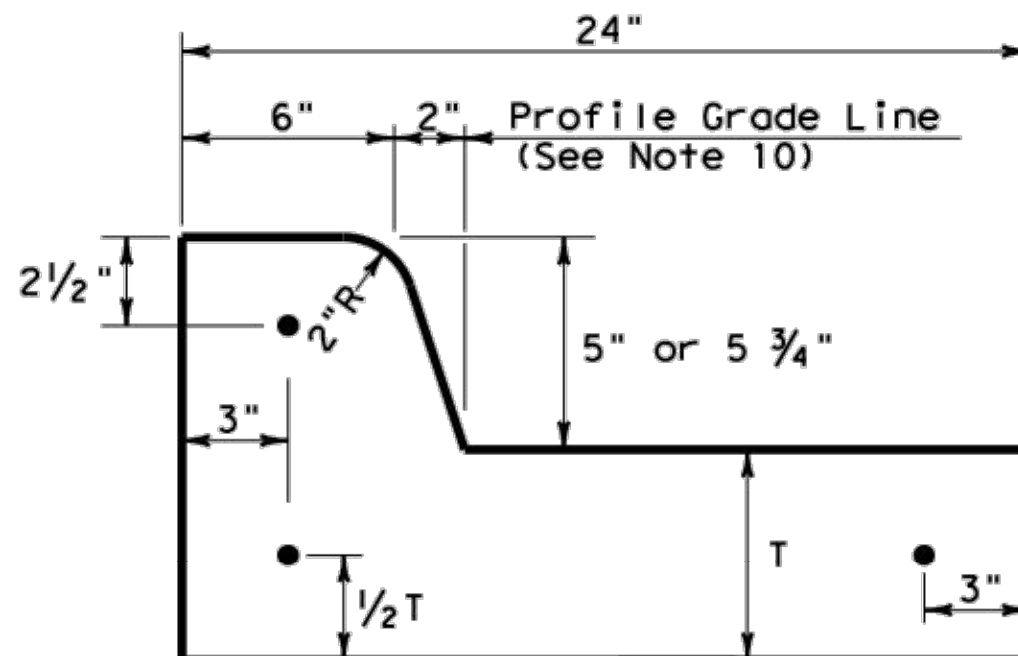
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



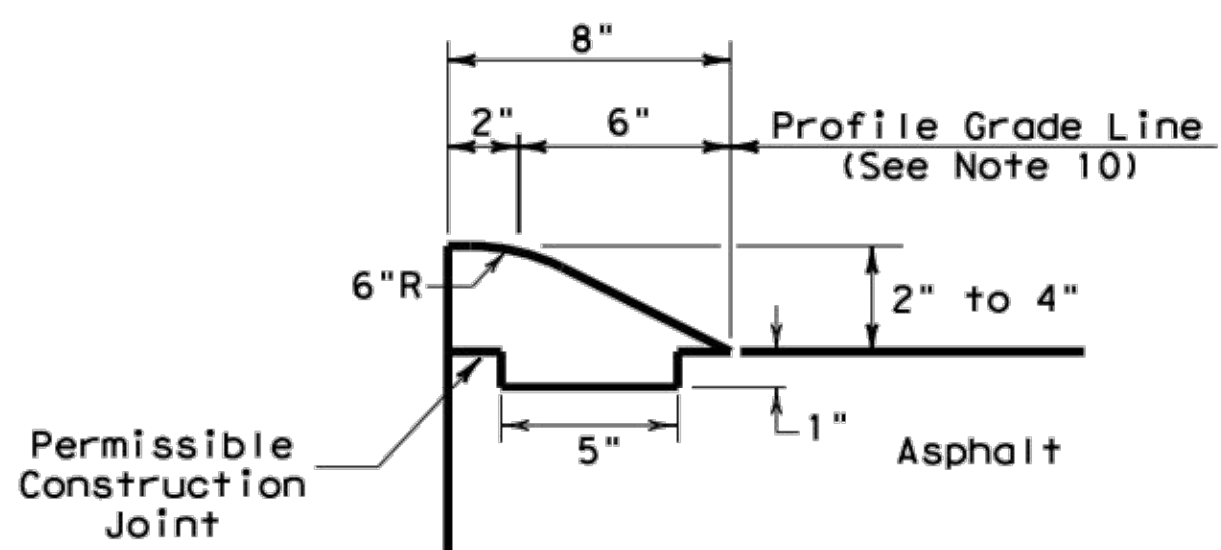
TYPE II CURB (MONOLITHIC)
5" - 5 3/4" HEIGHT



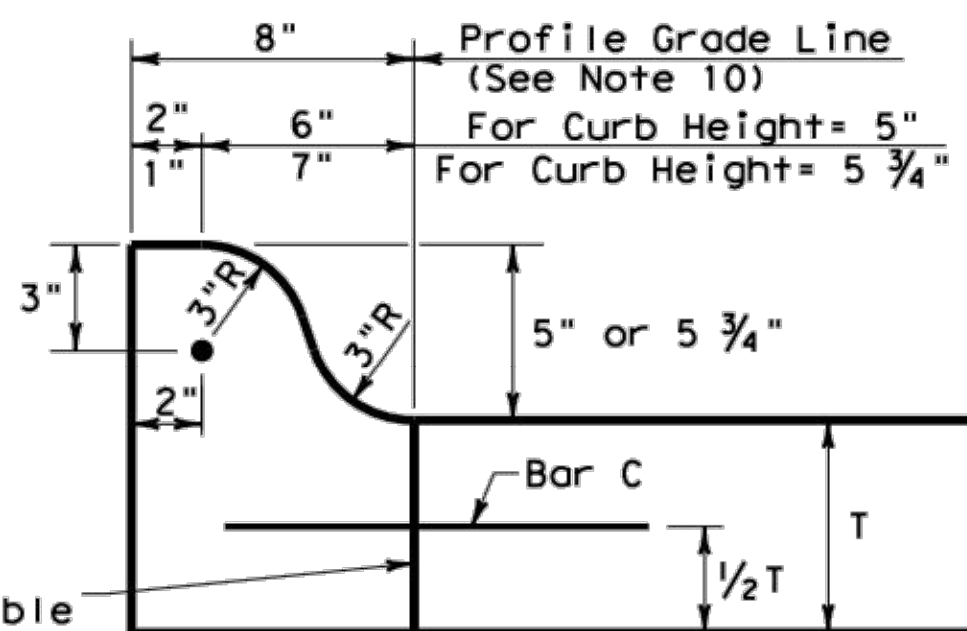
TYPE II CURB
5" - 5 3/4" HEIGHT



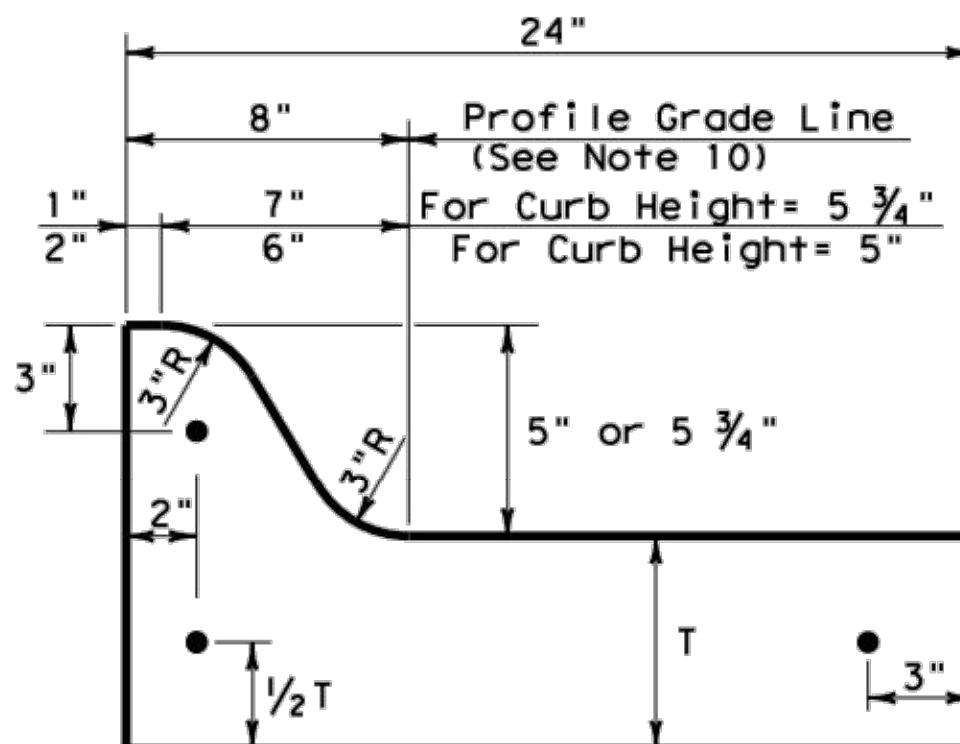
TYPE II CURB AND GUTTER
5" - 5 3/4" HEIGHT



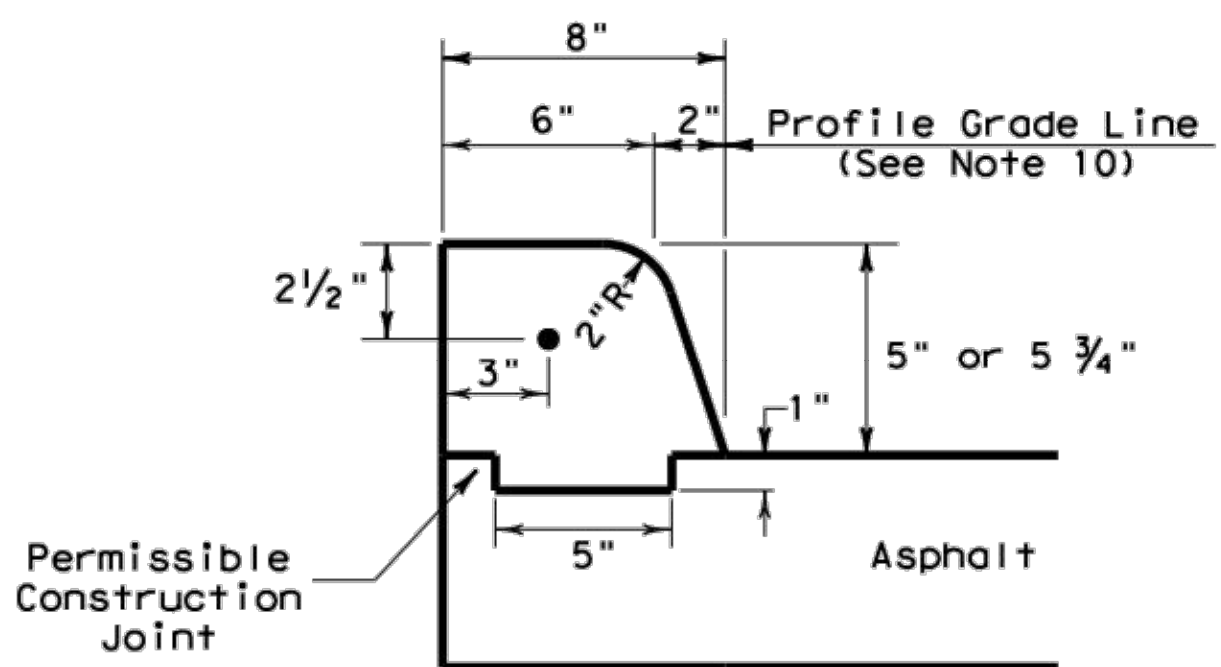
TYPE III CURB (KEYED)
2" - 4" HEIGHT



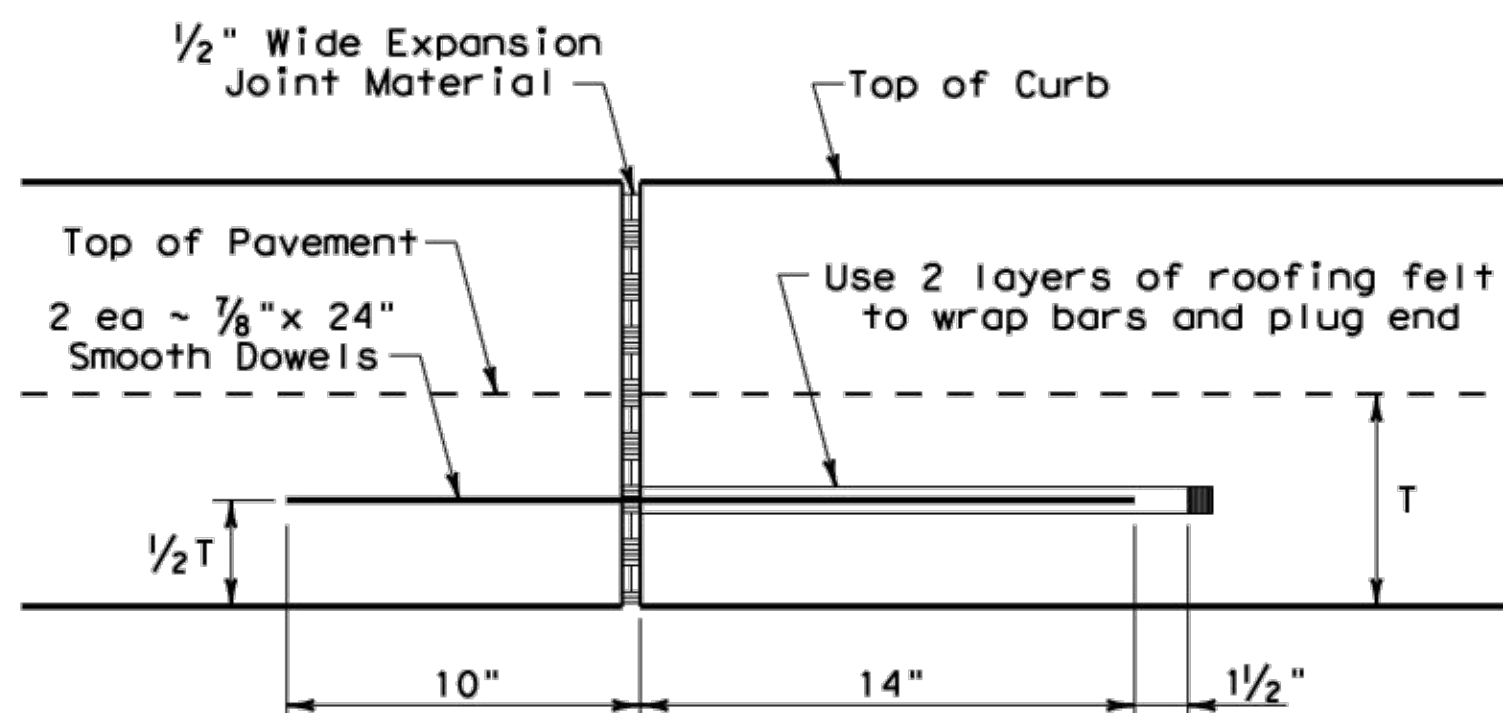
TYPE IIa CURB
5" - 5 3/4" HEIGHT



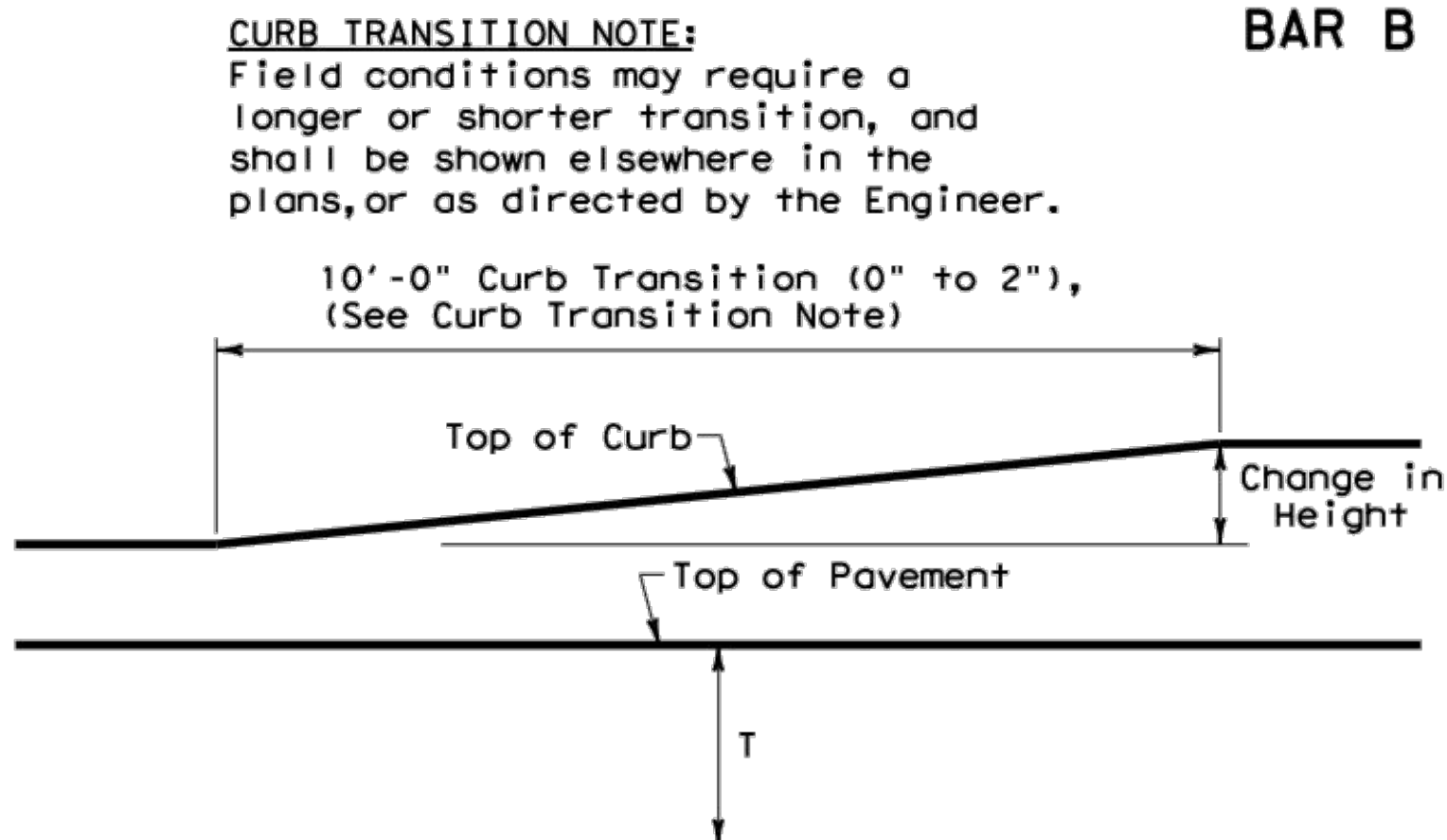
TYPE IIa CURB AND GUTTER
5" - 5 3/4" HEIGHT



TYPE IV CURB (KEYED)
5" - 5 3/4" HEIGHT



EXPANSION JOINT DETAIL

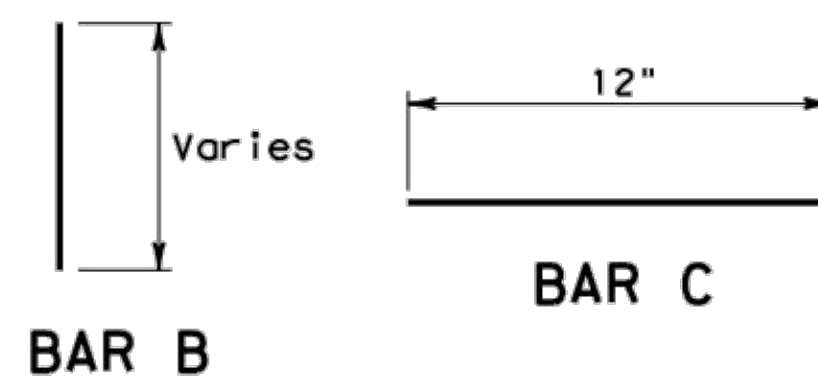


CURB TRANSITION

Note: To be paid for as Highest Curb

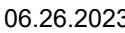
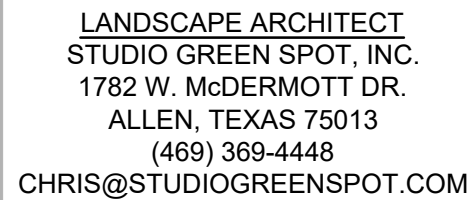
GENERAL NOTES

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 fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
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 to be placed on existing concrete pavement, Bar B may be drilled and the grouted in place, or may be inserted into fresh concrete.
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 horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
13. Bar B used as needed to support curb reinforcing steel during concrete placement.



CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.

 Texas Department of Transportation				Design Division Standard	
CONCRETE CURB AND CURB AND GUTTER					
CCCG-21					
FILE: cccg21.dgn		DN: TxDOT	CK: AN	DW: SS	CK: KM
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REVISIONS		DIST	COUNTY		SHEET NO.
					D-31



GROUNDCOVERS				
TYPE	QTY	COMMON NAME	BOTANICAL NAME	REMARKS
		'419' Bermudagrass	<i>Cynodon dactylon</i> '419'	Solid Sod refer to notes

NOTE: Plant list is an aid to bidders only. Contractor shall verify all quantities on plan. All heights and spreads are minimums. All plant material shall meet or exceed remarks as indicated. All trees to have straight trunks and be matching within varieties.

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DOLLAR GENERAL

**F.M. HWY 2450
SANGER, TEXAS**

ISSUE:

FOR APPROVAL 06.08.2023

OWNER COMMENTS 06.26.2023

DATE:

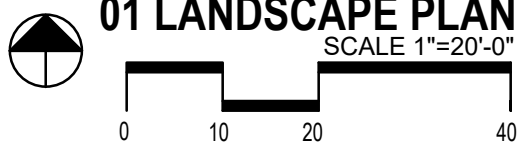
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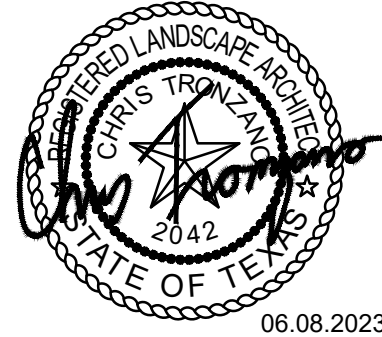
SHEET NAME:

LANDSCAPE PLAN

SHEET NUMBER

L.1





SECTION 02900 - LANDSCAPE

PART 1 - GENERAL

1.1 REFERENCED DOCUMENTS

Refer to bidding requirements, special provisions, and schedules for additional requirements.

1.2 DESCRIPTION OF WORK

Work included: Furnish all supervision, labor, materials, services, equipment and appliances required to complete the work covered in conjunction with the landscaping covered in these specifications and landscaping plans, including:

- Planting (trees, shrubs, and grass)
- Bed preparation and fertilization
- Notification of sources
- Water and Maintenance until final acceptance
- Guarantee

1.3 REFERENCE STANDARDS

- American Standard for Nursery Stock published by American Association of Nurserymen: 27 October 1980, Edition; by American National Standards Institute, Inc. (Z60.1) – plant material.
- American Joint Committee on Horticultural Nomenclature: 1942 Edition of Standardized Plant Names.
- Texas Association of Nurserymen, Grades and Standards.
- Hortis Third, 1976 - Cornell University

1.4 NOTIFICATION OF SOURCES AND SUBMITTALS

- The Contractor shall, within ten (10) days following acceptance of bid, notify the Architect/Owner of the sources of plant materials and bed preparation required for the project.
- Samples: Provide representative quantities of sandy loam soil, mulch, bed mix material, gravel, and crushed stone. Samples shall be approved by Architect before use on project.
- Product Data: Submit complete product data and specifications on all other specified materials.
- Submit three representative samples of each variety of ornamental trees, shrubs, and groundcover plants for Architect's approval. When approved, tag, install, and maintain as representative samples for final installed plant materials.
- File Certificates of Inspection of plant material by state, county, and federal authorities with Architect, if required.
- Soil Analysis: Provide sandy loam soil analysis if requested by the Architect.

PART 3 - EXECUTION

3.1 BED PREPARATION & FERTILIZATION

- Landscaping Contractor to inspect all existing conditions and report any deficiencies to the Owner.
- All planting areas shall be conditioned as follows:
 - Prepare new planting beds by scraping away existing grass and weeds as necessary. Till existing soil to a depth of six (6") inches prior to placing compost and fertilizer. Apply fertilizer as per manufacturers recommendations. Add six (6") inches of compost and till into a depth of six (6") inches of the topsoil. Apply organic fertilizer such as Sustane or Green Sense at the rate of twenty (20) pounds per one thousand (1,000) square feet.
 - All planting areas shall receive a two (2") inch layer of specified mulch.
 - Backfill for tree pits shall be as follows: Use existing top soil on site (use imported topsoil as needed) free from large clumps, rocks, debris, caliche, subsoils, etc., placed in nine (9") inch layers and watered in thoroughly.
- Grass Areas:
 - Areas to be Solid Sod Bermudagrass: Blocks of sod should be laid joint to joint, (staggered joints) after fertilizing the ground first. Roll grass areas to achieve a smooth, even surface. The joints between the blocks of sod should be filled with topsoil where they are evidently gaped open, then watered thoroughly.
 - Areas to be Hydromulch Common Bermudagrass: Hydromulch with bermudagrass seed at a rate of two (2) pounds per one thousand (1,000) square feet. Use a 4' x 8' batter board against the bed areas.

3.2 INSTALLATION

- Maintenance of plant materials shall begin immediately after each plant is delivered to the site and shall continue until all construction has been satisfactorily accomplished.
- Plant materials shall be delivered to the site only after the beds are prepared and area ready for planting. All shipments of nursery materials shall be thoroughly protected from the drying winds during transit. All plants which cannot be planted at once, after delivery to the site, shall be well protected against the possibility of drying by wind and sun. Balls of earth of B & B plants shall be kept covered with soil or other acceptable material. All plants remain the property of the Contractor until final acceptance.
- Position the trees and shrubs in their intended location as per plan.
- Notify the Landscape Architect for inspection and approval of all positioning of plant materials.
- Excavate pits with vertical sides and horizontal bottom. Tree pits shall be large enough to permit handling and planting without injury to balls of earth or roots and shall be of such depth that, when planted and settled, the crown of the plant shall bear the same relationship to the finish grade as it did to soil surface in original place of growth.

JOB CONDITIONS

- General Contractor to complete the following punch list: Prior to Landscape Contractor initiating any portion of landscape installation, General Contractor shall leave planting bed areas three (3") inches below finish grade of sidewalks, drives and curbs as shown on the drawings. All lawn areas to receive solid sod shall be left one (1") inch below the finish grade of sidewalks, drives, and curbs. All construction debris shall be removed prior to Landscape Contractor beginning any work.
- General Contractor shall provide topsoil as described in Section 02200 - Earthwork.
- Storage of materials and equipment at the job site will be at the risk of the Landscape Contractor. The Owner cannot be held responsible for theft or damage.

1.6 MAINTENANCE AND GUARANTEE

- Maintenance:
 - The Landscape Contractor will be held responsible for the maintenance of all work from the time of planting until final acceptance by the Owner. No trees, shrubs, groundcover or grass will be accepted unless they show a healthy growth and satisfactory foliage conditions.
 - Maintenance shall include watering of trees and plants, cultivation, weeding, spraying, edging, pruning of trees, mowing of grass, cleaning up and all other work necessary of maintenance.
 - A written notice requesting final inspection and acceptance should be submitted to the Owner at least seven (7) days prior to completion. An on-site inspection by Owner and Landscape Contractor will be completed prior to written acceptance.
 - After final acceptance of installation, the Landscape Contractor will not be required to do any of the above listed work.
- Guarantee:
 - Trees shall be guaranteed for a twelve (12) month period after acceptance. Shrubs and groundcover shall be guaranteed for twelve (12) months. The Contractor shall replace all dead materials as soon as weather permits and upon notification of the Owner. Plants, including trees, which have partially died so that shape, size, or symmetry has been damaged, shall be considered subject to replacement. In such cases, the opinion of the Owner shall be final.
 - Plants used for replacement shall be of the same size and kind as those originally planted and shall be planted as originally specified. All work, including materials, labor and equipment used in replacements, shall carry a twelve (12) month guarantee. Any damage, including ruts in lawn or bed areas, incurred as a result of making replacements shall be immediately repaired.
 - At the direction of the Owner, plants may be replaced at the start of the next year's planting season. In such cases, dead plants shall be removed from the premises immediately.
 - When plant replacements are made, plants, soil mix, fertilizer and mulch are to be utilized as originally specified and reinspected for full compliance with Contract requirements. All replacements are to be included under "Work" of this section.

- The Owner agrees that for the guarantee to be effective, he will water plants at least twice a week during dry periods and cultivate beds once a month after final acceptance.
- The above guarantee shall not apply where plants die after acceptance because of injury from storms, hail, freeze, insects, diseases, injury by humans, machines or theft.
- Acceptance for all landscape work shall be given after final inspection by the Owner provided the job is in a completed, undamaged condition, and there is a stand of grass in all lawn areas. At this time, the Owner will assume maintenance on the accepted work.
- Repairs: Any necessary repairs under the Guarantee must be made within ten (10) days after receiving notice, weather permitting, and in the event the Landscape Contractor does not make repairs accordingly, the Owner, without further notice to Contractor, may provide materials and men to make such repairs at the expense of the Landscape Contractor.

1.7 QUALITY ASSURANCE

- General: Comply with applicable Federal, State, County and Local regulations governing landscape materials and work.
- Personnel: Employ only experienced personnel who are familiar with the required work. Provide full time supervision by a qualified foreman acceptable to Landscape Architect.
- Selection of Plant Material:
 - Make contact with suppliers immediately upon obtaining notice of contract acceptance to select and book materials. Develop a program of maintenance (pruning and fertilization) which will insure the purchased materials will meet and/or exceed project specifications.
 - Landscape Architect will provide a key identifying each tree location on site. Written verification will be required to document material selection, source and delivery schedules to site.
 - Owner and/or Architect shall inspect all plant materials when reasonable at place of growth for compliance with requirements for genus, species, cultivar/variety, size and quality.
 - Owner and/or Architect retains the right to further inspect all plant material upon arrival at the site and during installation for size and condition of root balls, limbs, branching habit, insects, injuries, and latent defects.
 - Owner and/or Architect may reject unsatisfactory or defective material at any time during the process of work. Remove rejected materials from the site immediately. Plants damaged in transit or at job site shall be rejected.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

- Preparation:
 - Balled and Burlapped (B&B) Plants: Dig and prepare shipment in a manner that will not damage roots, branches, shape, and future development.
 - Container Grown Plants: Deliver plants in rigid container to hold ball shape and protect root mass.

A. Delivery:

- Deliver packaged materials in sealed containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.
- Deliver only plant materials that can be planted in one day unless adequate storage and watering facilities are available on job site.
- Protect root balls by heeling in with sawdust or other approved moisture retaining material if not planted within 24 hours of delivery.
- Protect plants during delivery to prevent damage to root balls or desiccation of leaves. Keep plants moist at all times. Cover all materials during transport.
- Notify Architect of delivery schedule 72 hours in advance so plant material may be observed upon arrival at job site.
- Remove rejected plant material immediately from site.
- To avoid damage or stress, do not lift, move, adjust to plumb, or otherwise manipulate plants by trunk or stems.

PART 2 - PRODUCTS

2.1 PLANTS

- General: Well-formed No. 1 grade or better nursery grown stock. Listed plant heights are from tops of root balls to nominal tops of plants. Plant spread refers to nominal outer width of the plant, not to the outer leaf tips. Plants will be individually approved by the Architect and his decision as to their acceptability shall be final.
- Quantities: The drawings and specifications are complementary. Anything called for on one and not the other is as binding as if shown and called for on both. The plant schedule is an aid to bidders only. Confirm all quantities on plan.
- Quality and size: Plant materials shall conform to the size given on the plan, and shall be healthy, symmetrical, well-shaped, full branched, and well rooted. The plants shall be free from injurious insects, diseases, injuries to the bark or roots, broken branches, objectionable disfigurements, insect eggs and larvae and are to be of specimen quality.
- Approval: All plant materials shall be subject to the approval of the Owner. All plants which are found unsuitable in growth, or in any unhealthy, badly shaped, or undersized condition, will be rejected by the Landscape Architect, either before or after planting, and shall be removed at the expense of the Landscape Contractor and replaced with acceptable plants as specified.
- Trees shall be healthy, full-branched, well-shaped and shall meet the trunk diameter and height requirements of the plant schedule. Balls shall be firm, neat, slightly tapered, and well wrapped in burlap. Any tree loose in the ball or with broken ball at time of planting will be rejected. Balls shall be ten (10") inches in diameter for each one (1") inch of trunk diameter. Measured six (6") inches above ball.
Nomenclature conforms to the customary nursery usage: for clarification, the term "multi-trunk" defines a plant having three (3) or more trunks of nearly equal diameter.
- Pruning: All pruning of trees and shrubs, as directed by the Landscape Architect, shall be executed by the Landscape Contractor at no additional cost to the Owner.

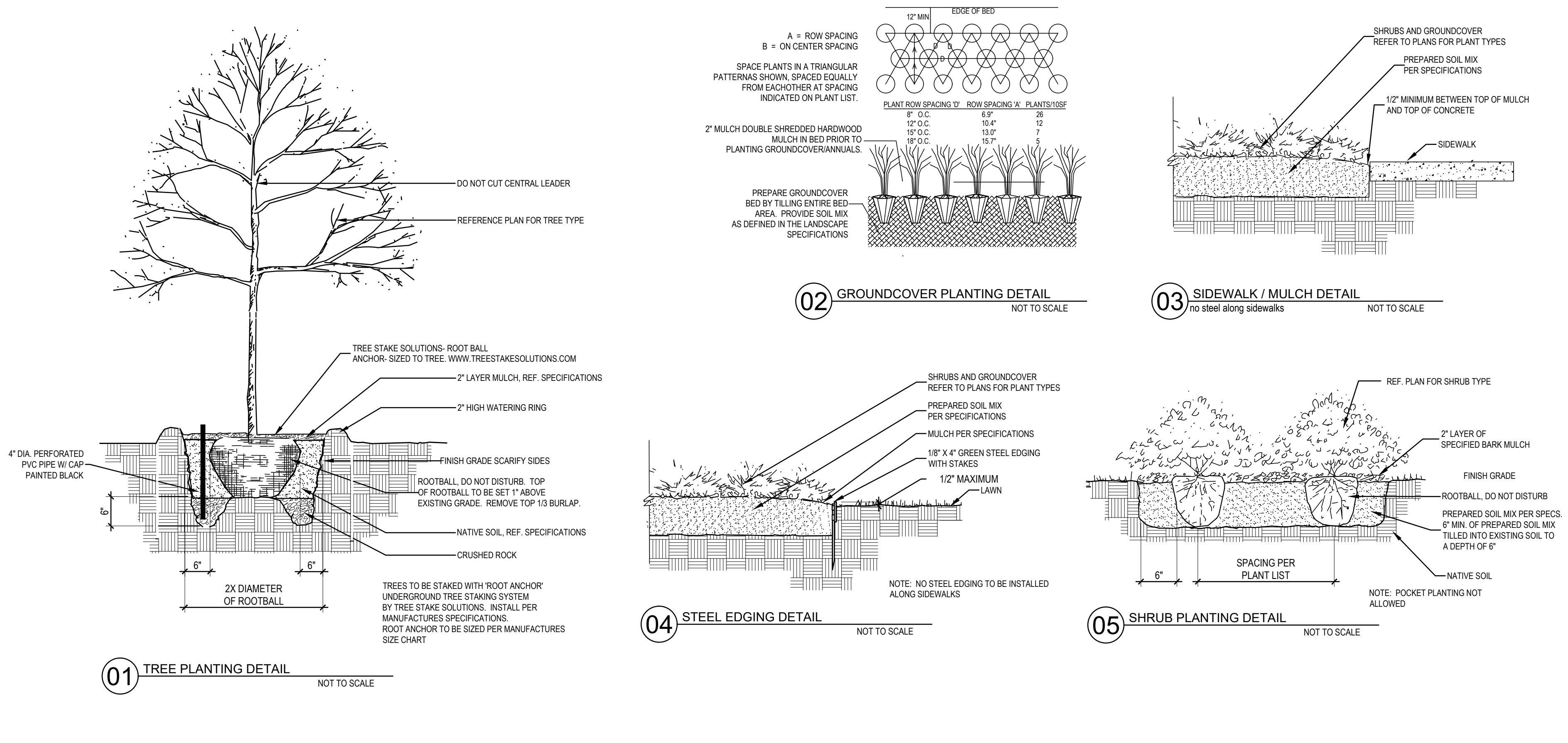
2.2 SOIL PREPARATION MATERIALS

- Sandy Loam:
 - Friable, fertile, dark, loamy soil, free of clay lumps, subsoil, stones and other extraneous material and reasonably free of weeds and foreign grasses. Loam containing Dallasgrass or Nutgrass shall be rejected.
 - Physical properties as follows:
 - Clay – between 7-27 percent
 - Silt – between 15-25 percent
 - Sand – less than 52 percent
 - Organic matter shall be 3%-10% of total dry weight.
 - If requested, provide a certified soil analysis conducted by an approved soil testing laboratory verifying that sandy loam meets the above requirements.
- Organic Material: Compost with a mixture of 80% vegetative matter and 20% animal waste. Ingredients should be a mix of course and fine textured material.
- Premixed Bedding Soil as supplied by Vital Earth Resources, Gladewater, Texas; Professional Bedding Soil as supplied by Living Earth Technology, Dallas, Texas or Acid Gro Municipal Mix as supplied by Soil Building Systems, Dallas, Texas or approved equal.
- Sharp Sand: Sharp sand must be free of seeds, soil particles and weeds.
- Mulch: Double Shredded Hardwood Mulch, partially decomposed, dark brown. Living Earth Technologies or approved equal.
- Organic Fertilizer: Fertiland, Sustane, or Green Sense or equal as recommended for required applications. Fertilizer shall be delivered to the site in original unopened containers, each bearing the manufacturer's guaranteed statement of analysis.

- Commercial Fertilizer: 10-20-10 or similar analysis. Nitrogen source to be a minimum 50% slow release organic Nitrogen (SCU or UF) with a minimum 8% sulphur and 4% iron, plus micronutrients.
- Peat: Commercial sphagnum peat moss or partially decomposed shredded pine bark or other approved organic material.

2.3 MISCELLANEOUS MATERIALS

- Steel Edging: Shall be Ryerson "Estate Curbing", 1/8" x 4" with stakes 4' on center.
- Staking Material for Shade Trees:
 - Post: Studded T-Post, #1 Armco with anchor plate; 6'-0" length; paint green.
 - Wire: 12 gauge, single strand, galvanized wire.
 - Rubber hose: 2 ply, fiber reinforced hose, minimum 1/2 inch inside diameter. Color: Black.
- Gravel: Washed native pea gravel, graded 1 in. to 1-1/2 in.
- Filter Fabric: Mirafi 140N by Celanese Fibers Marketing Company, available at Loftland Co., (214) 631-5250 or approved equal.



3.3 CLEANUP AND ACCEPTANCE

- Cleanup: During the work, the premises shall be kept neat and orderly at all times. Storage areas for all materials shall be so organized that they, too, are neat and orderly. All trash and debris shall be removed from the site as work progresses. Keep paved areas clean by sweeping or hosing at end of each days work.

END OF SECTION

DOLLAR GENERAL

F.M. HWY 2450
SANGER, TEXAS

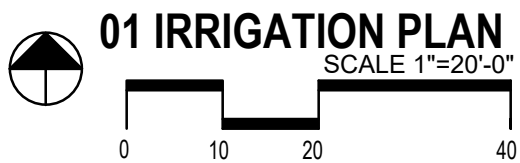
ISSUE:
FOR APPROVAL 06.08.2023

DATE:
06.08.2023

SHEET NAME:
LANDSCAPE DETAILS

SHEET NUMBER:

L.2



SECTION 02810 - IRRIGATION

PART 1 - GENERAL

- 1.1 SCOPE**
- A. Provide complete sprinkler installation as detailed and specified herein, includes furnishing all labor, materials, and equipment for the proper installation. Work includes but is not limited to:
1. Trenching and backfill
 2. Automatic controlled system.
 3. Upon completion of installation, supply drawings showing details of construction including location of mainline piping, manual and automatic valves, electrical supply valves, and specifically exact location of automatic valves.
- B. All sleeves as shown on plans will be furnished by General Contractor. Meter and power source to be provided by General Contractor.
- 1.2 RELATED WORK SPECIFIED ELSEWHERE**
- A. See Irrigation Plans. See plans for controller, heads, and valves.
- B. Section 02900-Landscape
- C. Section 02811-Underground Irrigation Sleeve and Utility Conduits
- 1.3 APPLICABLE STANDARDS**
- A. America Standard for Testing and Materials (ASTM) – Latest edition.
1. D2241 Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR)
 2. D2484 Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Thread, Schedule 80
 3. D2455 Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
 4. D2467 Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Socket Type, Schedule 80
 5. D2564 Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
 6. D2287 Flexible Poly Vinyl Chloride (PVC) Plastic Pipe
 7. F856 Poly Vinyl Chloride (PVC) Solvent Weld Primer
 8. D2655 Making Solvent – Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings
- 1.4 MAINTENANCE AND GUARANTEE**
- A. Materials and workmanship shall be fully guaranteed for one (1) year after final acceptance.
- B. Provide maintenance of system, including raising and lowering of heads to compensate for lawn growth, cleaning and adjustment of heads, raising and lowering of shrub heads to compensate for shrub growth, for one (1) year after completion of installation.
- C. Guarantee is limited to repair and replacement of defective materials or workmanship, including repair of backfill settlement.

1.5 SUBMITTALS

- A. Procedure: Comply with Division I requirements.
- B. Product Data: Submit (5) copies of equipment manufacturer's specifications and literature for approval by Landscape Architect prior to installation.
- C. Project Record Documents
1. Comply with Division I requirements.
 2. Locate by written dimension, routing of mainline piping, remote control valves and quick coupling valves. Locate mainlines by single dimensions from permanent site features provided they run parallel to these elements. Locate valves, intermediate electrical connections, and quick couplers by two dimensions from a permanent site feature at approximately 70 degrees to each other.
 3. When dimensioning is complete, transcribe work to mylar reproducible tracings.
 4. Submit completed tracings prior to final acceptance. Mark tracings "Record Prints Showing Significant Changes". Date and sign drawings.
 5. Provide three complete operation manuals and equipment brochures neatly bound in a hard back three-ring binder. Include product data on all installed materials. Include warranties and guarantees extended to the Owner by the manufacturer of all equipment.
- D. Quick Coupler Keys: Provide 3 coupler keys with boiler drains attached using brass reducer.
- E. Controller Keys: Provide three sets of keys to controller enclosure(s).
- F. Use of materials differing in quality, size, or performance from those specified will only be allowed upon written approval of the Landscape Architect. The decision will be based on comparative ability of material or article to perform fully all purposes of mechanics and general design considered to be possessed by item specified.
- G. Bidders desiring to make a substitution for specified sprinklers shall submit manufacturer's catalog sheet showing full specification of each type sprinkler proposed as a substitute, including discharge in GPM maximum allowable operating pressure at sprinkler.
- H. Approval of substitute sprinkler shall not relieve Irrigation Contractor of his responsibility to demonstrate that final installed sprinkler system will operate according to intent of originally designed and specified system.
- I. It is the responsibility of the Irrigation Contractor to demonstrate that final installed sprinkler system will operate according to intent of originally designed and specified system. If Irrigation Contractor notes any problems in head spacing or potential coverage, it is his responsibility to notify the Landscape Architect in writing, before proceeding with work. Irrigation Contractor guarantees 100% coverage of all areas to be irrigated.

1.6 TESTING

- A. Perform testing required with other trades, including earthwork, paving, plumbing, electrical, etc. to avoid unnecessary cutting, patching and boring.
- B. Wire Connectors: Waterproof splice kit connectors. Type DBY by 3M.

2.6 SCHEDULE 80 PVC NIPPLES

- A. Composed of Standard Schedule 40 PVC Fittings and PVC meeting noted standards. No clamps or wires may be used. Nipples for heads and shrub risers to be nominal one-half inch diameter by eight inches long, where applicable.
- B. Polyethylene nipples six (6") inches long to be used on all pop-up spray heads.

2.7 MATERIALS - See Irrigation Plan

- A. Sprinkler heads in lawn area as specified on plan.
- B. PVC Pipe: Class 200, SPR 21 Copper Tubing (City Connection): Type "M" 24V Wire. Size 14, Type U.F.
- C. Electric valves to be all plastic construction as indicated on plans.
- D. Refer to drawing for backflow prevention requirements and flow valve.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

- A. Staking: Before installation is started, place a stake where each sprinkler is to be located, in accordance with drawing. Staking shall be approved by Landscape Architect before proceeding.
- B. Excavations: Excavations are unclassified and include earth, loose rock, rock or any combination thereof, in wet or dry state. Backfill trenches with material that is suitable for compaction and contains no lumps, clods rock, debris, etc. Special backfill specifications, if furnished take preference over this general specification.
- C. Backfill: Flood or hand-tamp to prevent after settling. Hand rake trenches and adjoining area to leave grade in as good or better condition than before installation.
- D. Piping Layout: Piping layout is diagrammatic. Route piping around trees and shrubs in such a manner as to avoid damage to plantings. Do not dig within ball of newly planted trees or shrubs.

3.2 PIPE INSTALLATION

- A. Sprinkler Mains: Install a four (4") inch minimum trench with a minimum of eighteen (18") inches of cover.
- B. Lateral Piping: Install a four (4") inch wide minimum trench deep enough to allow for installation of sprinkler heads and valves, but in no case, with less than twelve (12") of cover.
- C. Trenching: Remove lumber, rubbish, and large rocks from trenches. Provide firm, uniform bearing for entire length of each pipe line to prevent uneven settlement. Wedging or blocking of pipe will not be permitted. Remove foreign matter or dirt from inside of pipe before welding, and keep piping clean by approved means during and after laying of pipe.

3.3 PVC PIPE AND FITTING ASSEMBLY

- A. Solvent: Use only solvent recommended by manufacturer to make solvent-welded joints. Thoroughly clean pipe and fittings of dirt, dust and moisture before applying solvent.
- B. PVC to metal connection: Work metal connections first. Use a non-hardening pipe dope such as Permatex No. 2 on threaded PVC adapters into which pipe may be welded.

3.4 COPPER TUBING AND FITTING ASSEMBLY

- Clean pipe and fitting thoroughly and lightly sand pipe connections to remove residue from pipe. Attach fittings to tubing in an approved manner using 50-50 soft solid core solder.

3.5 POP-UP SPRAY HEADS

- Supply pop-up spray heads in accordance with materials list and plan. Attach sprinkler to lateral piping with a semi-flexible polyethylene nipple not less than three (3") inches or more than six (6") inches long.

3.6 VALVES

- Supply valves in accordance with materials list and sized according to drawings. Install valves in a level position in accordance with Manufacturer's Specifications. See plan for typical installation of electric valve, valve box.

3.7 WIRING

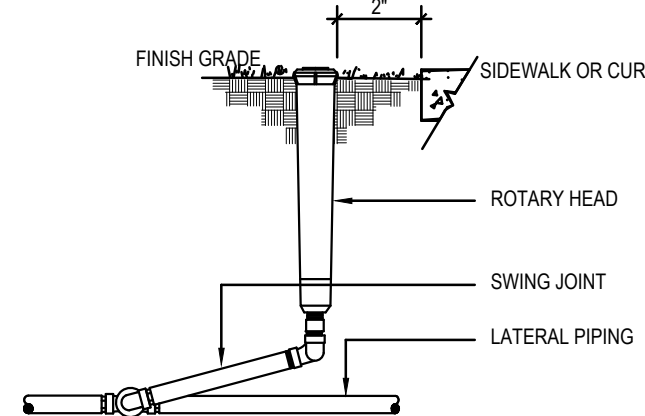
- A. Supply wire from the automatic sprinkler controls to the valves. No conduit will be required for U.F. wire unless otherwise noted on the plan. Wire shall be tucked under the piping.
- B. A separate wire is required from the control to each electric valve. A common neutral wire is also required from each control to each of the valves served by each particular control.
- C. Bundle multiple wires and tape them together at ten (10') foot intervals. Install ten (10") inch expansion coil at not more than one hundred (100') foot intervals. Make splices waterproof.

3.8 AUTOMATIC SPRINKLER CONTROLS

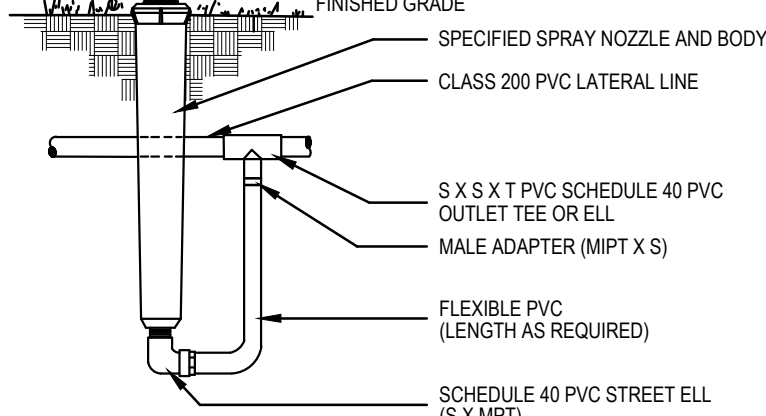
- Supply in accordance with Irrigation Plan. Install according to manufacturer's recommendations.

3.9 TESTING

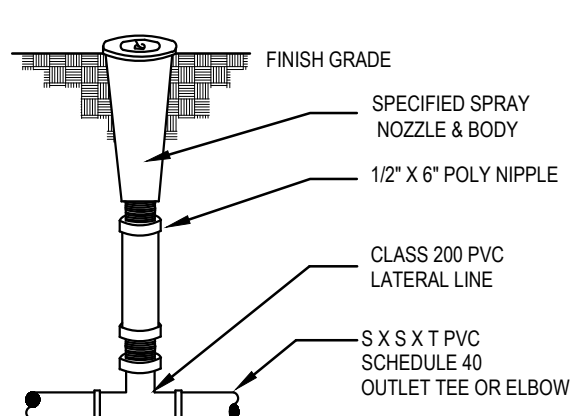
- A. Sprinkler Mains: Test sprinkler main only for a period of twelve (12) to fourteen (14) hours under normal pressure. If leaks occur, replace joint or joints and repeat test.
- B. Complete tests prior to backfilling. Sufficient backfill material may be placed in trenches between fittings to insure stability of line under pressure. In each case, leave fittings and couplings open to visual inspection for full period of test.



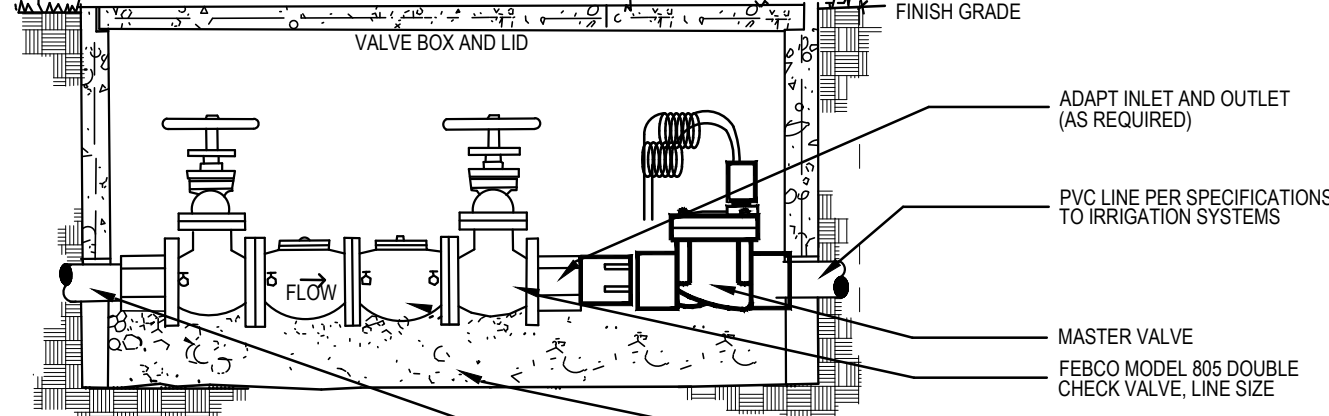
01 ROTARY HEAD NOT TO SCALE



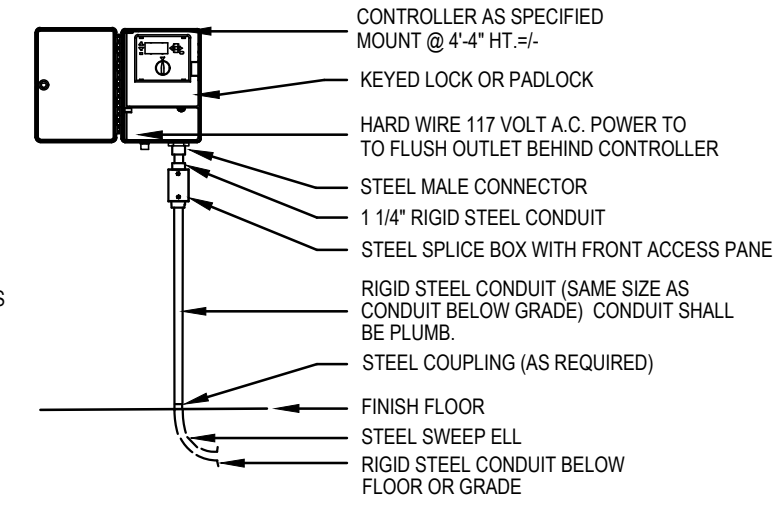
02 HIGH POP-UP SPRAY ASSEMBLY NOT TO SCALE



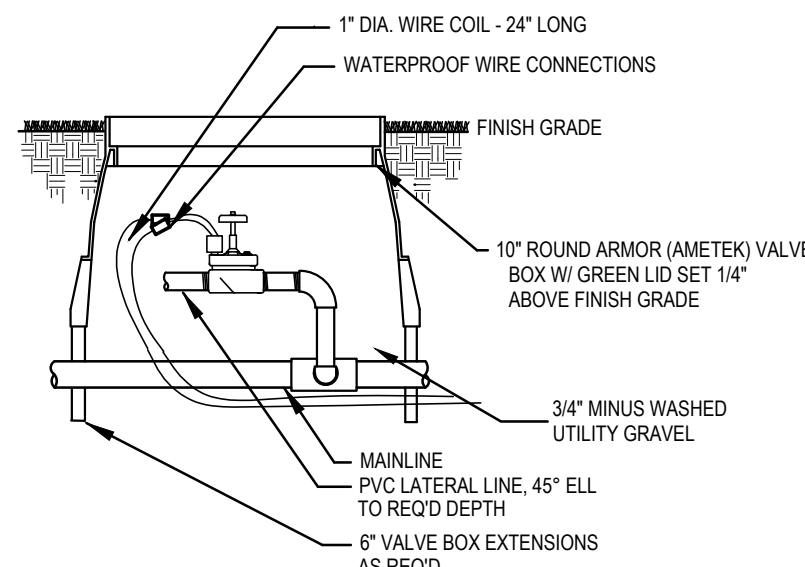
03 POP-UP LAWN SPRAY ASSEMBLY NOT TO SCALE



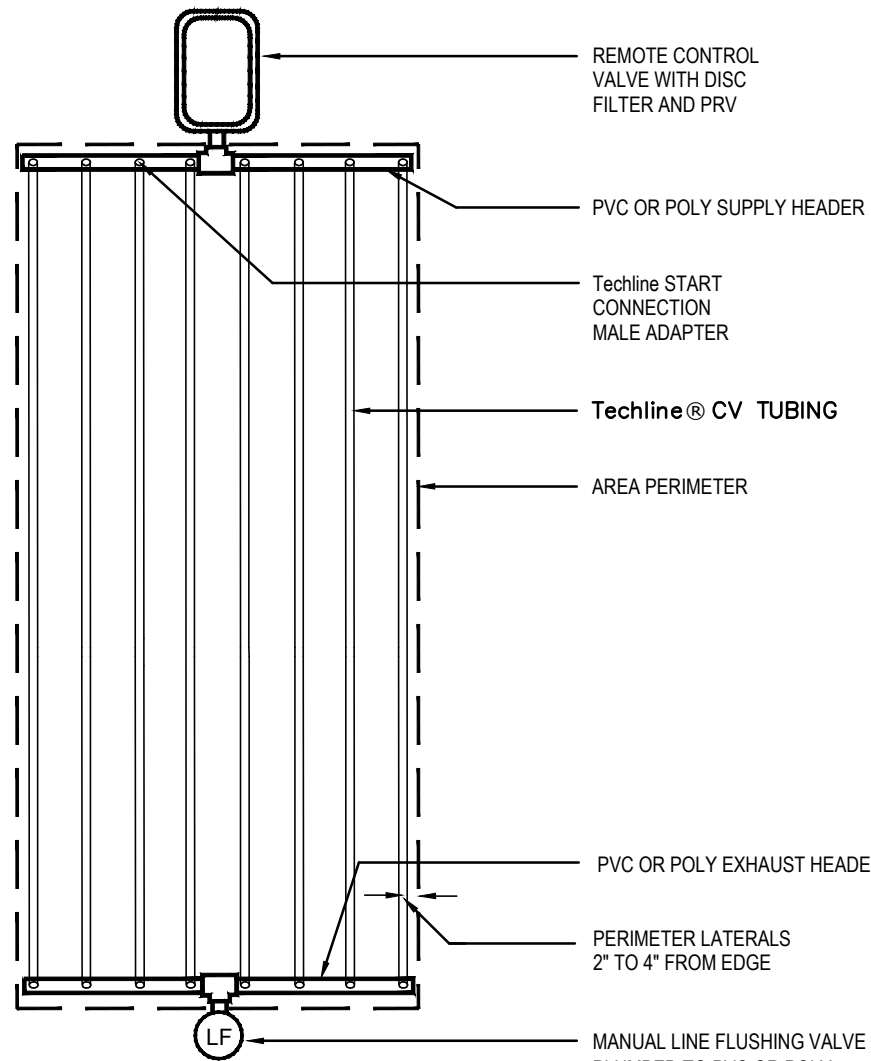
04 BACKFLOW PREVENTER NOT TO SCALE



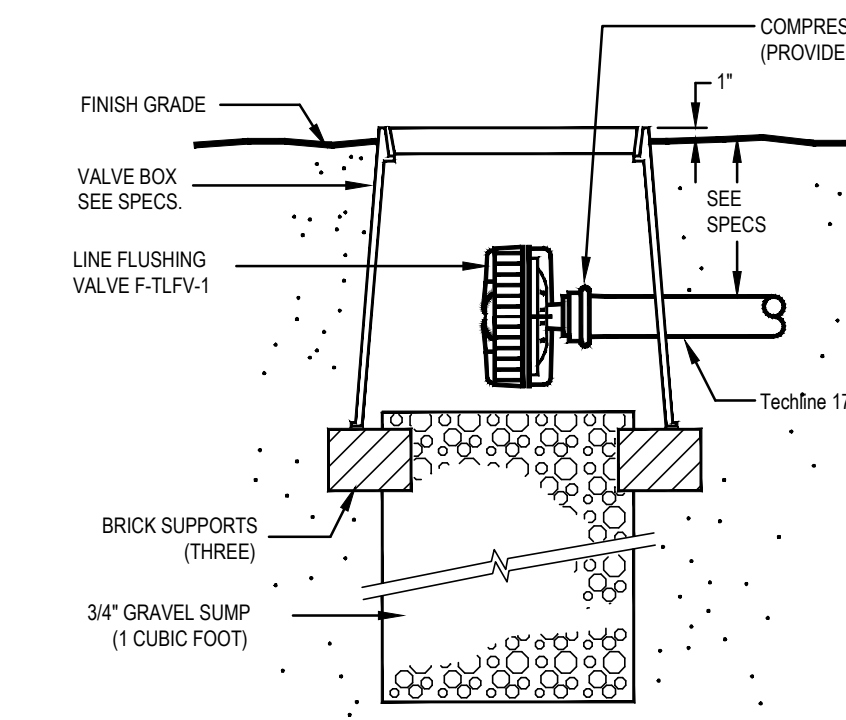
05 WALL MOUNTED CONTROLLER NOT TO SCALE



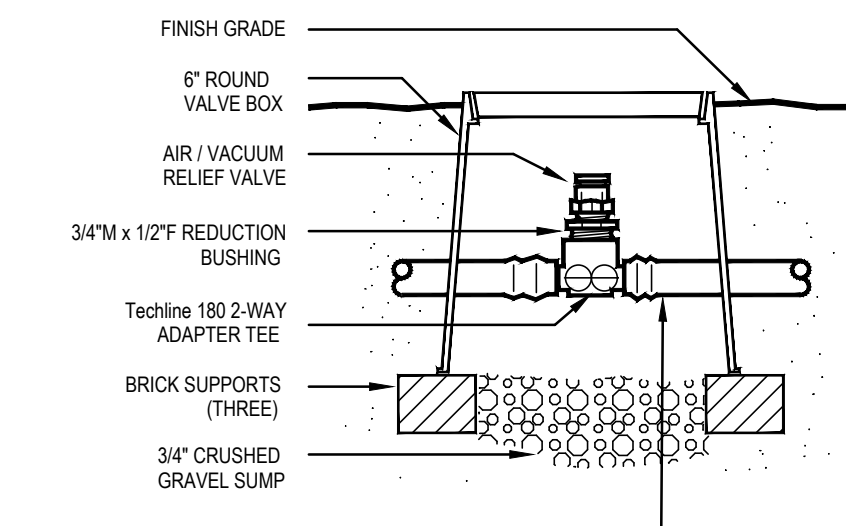
06 REMOTE CONTROL VALVE NOT TO SCALE



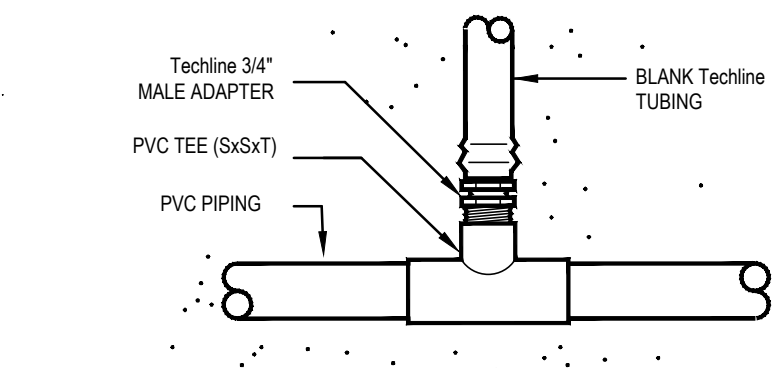
07 TechLine CV END FEED LAYOUT NOT TO SCALE



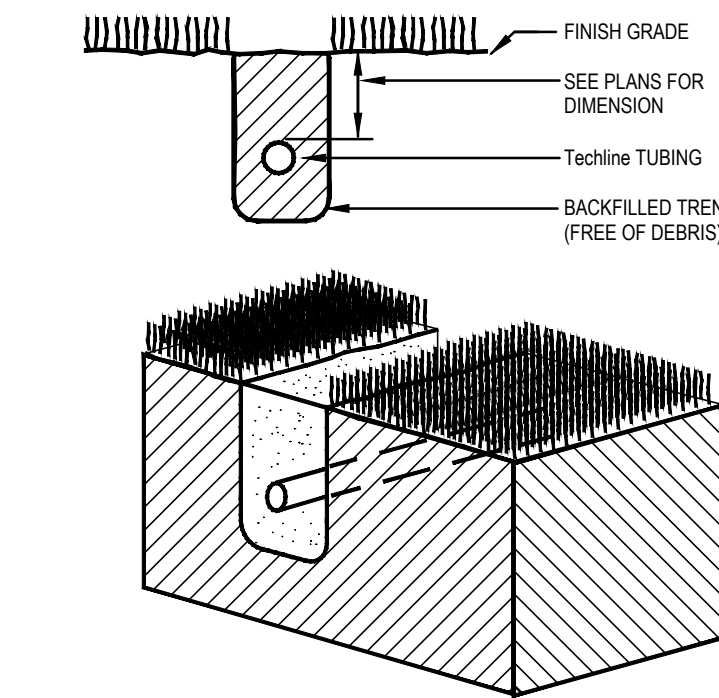
08 TechLine LINE FLUSHING VALVE NOT TO SCALE



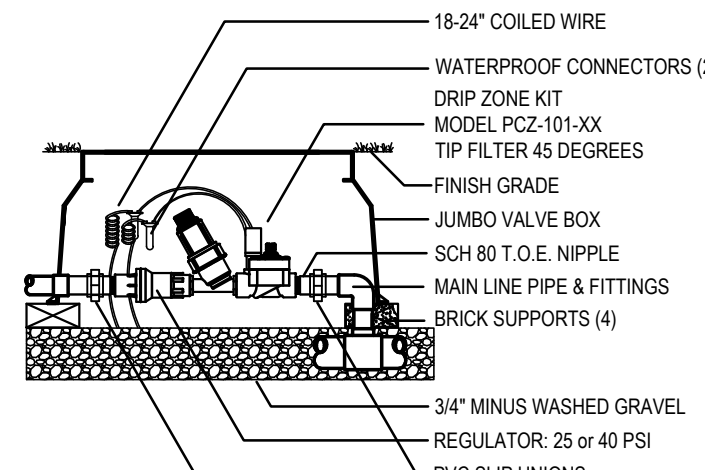
09 TechLine AIR/VACUUM RELIEF NOT TO SCALE



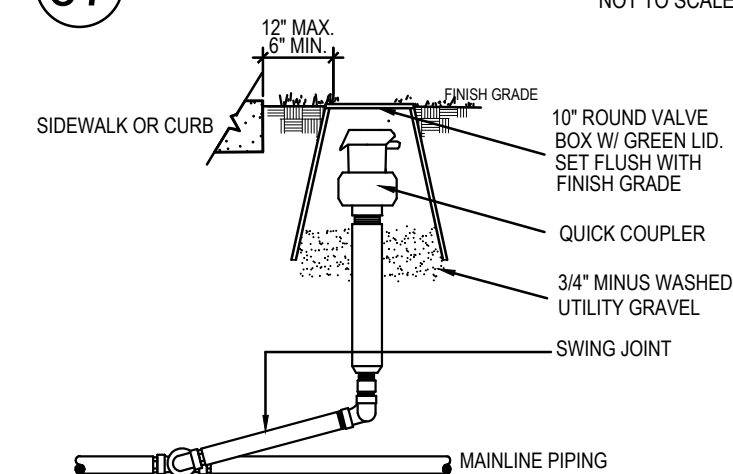
11 TechLine START CONNECTION NOT TO SCALE



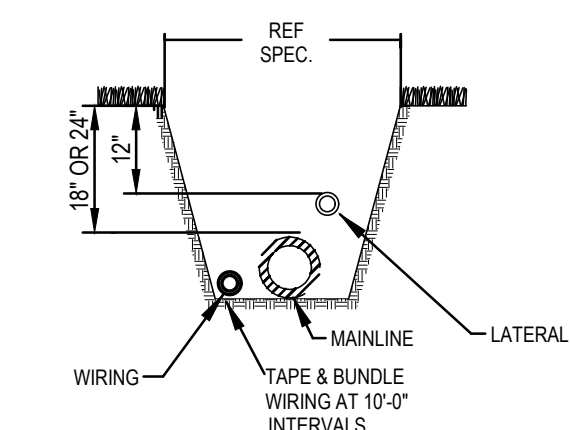
12 TechLine TRENCHING NOT TO SCALE



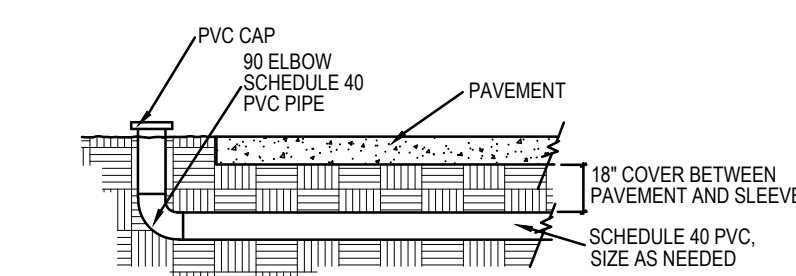
13 DRIP CONTROL VALVE NOT TO SCALE



14 QUICK COUPLER NOT TO SCALE

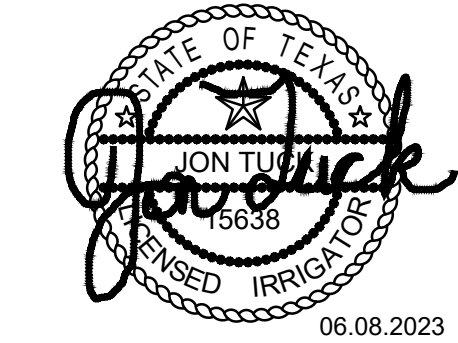


15 TRENCH DETAIL NOT TO SCALE



16 SLEEVE DETAIL NOT TO SCALE

LANDSCAPE ARCHITECT
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DOLLAR GENERAL

F.M. HWY 2450
SANGER, TEXAS

ISSUE:
FOR APPROVAL 06.08.2023

DATE:
06.08.2023

SHEET NAME:
IRRIGATION DETAILS

SHEET NUMBER:

L.4