

ENGINEER: MITCHELL & MORGAN, L.L.P. 3204 EARL RUDDER FREEWAY S. COLLEGE STATION, TEXAS 77845 (979) 260-6963

INDEX OF SHEETS

FOR INTERIM REVIEW ONL THESE DOCUMENTS ARE NOT INTENDED FOR CONSTRUCTION BIDDING, OR PERMIT PURPOSES PREPARED BY: JAMES T. BATENHORST No. 93631

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PROJECT BENCHMARK:



Lor Interm Review Only T.979.260.6963 F.979.260.3564 TX. FIRM # F-1443 3204 EARL RUDDER FWY. S. COLLEGE STATION, TX 77845 PLAN & DESIGN SPECIALISTS IN CIVIL ENGINEERING HYDRAULICS HYDROLOGY UTILITIES STREETS SITE PLANS SUBDIVISIONS WWW.mitchellandmorgan.com										
	JANUARY 2023	Drawn Bv: IB TF St	Checked By: VJBM							
Prepared For:	PVD Development Co. LLC	5222 Enchanted Oaks Dr.	(979) 225-3222							
Revisions										
PROPOSED WATERLINE WL-A & WL-B			PHASE 5 - COMMERCIAL BUILDING	SH30 - RPVAN						
\mathbb{V}	\mathbb{V}	7[[2						

TC = Top of Curb TP = Top of Pavement TS = Top of Sidewalk G = Top of Ground







POND EL = 304.00







 L	E	G	E	λ	ID)

XXX	Existing Grade
<u>XXX</u>	Proposed Grade
	Limit of Disturbance
-x-x-x-x-x-x-	Silt Fence
	Std. Storm Drain Inlet Protection

Scale: 1 inch = 30 feet	T.97 F.97 TX. FII 3204 EA COLLEGE PLAN & E CIVIL ENG HYDROLO SITE PI WWW.MI	These documents are not Intended for construction, These documents are not Intended for construction, Intended for construction,	pidding, or permit purposes. B C C C C C C C C C C C C C C C C C C	James I. Batenhorst No. 93631 No. 93631 James I. Batenhorst James J. Batenhorst James	CAN CAN CAN CAN CAN CAN CAN CAN CAN CAN	5 n
		JANUARY 2023	Drawn Bv ⁻ IB, TF, SB	Checked By: VJBM		
	Prepared For: PVD Development Co, LLC 5222 Enchanted Oaks Dr. College Station, TX 77845 (979) 225-3222 Checke					
	Revisions					
I sediment and erosion plans, r and post a copy at the construction site n activities, and maintain the notice in orm sewer system receiving the discharge, or of the municipal storm sewer system ve been removed. er, construction debris and construction e storm water plan: on of the site. anel making the inspection, the dates of rater plan. Major observations should		FROSION CONTROL PLAN		PHASE 5 - COMMERCIAL BUILDING	SH30 - RRVAN	
articular location; and late that a NOT is submitted:]_[$\overline{\mathbb{C}}$	ロク		5

6. Complete grading and install permanent seeding. 7. When all construction activity is completed the site is stabilized. Remove silt fence and re-seed any area disturbed during construction

Area of Disturbance: During the construction of the pavement, drainage, and utility improvements the entire lot will be disturbed except for the existing structures and the grass area behind the existing building.

Temporary stabilization ~ areas where construction activity temporarily ceases for at least 21 days will be stabilized with temporary seed no later than 14 days from the last construction activity in that area all proposed fill material will be seeded.

Storm water drainage will be controlled by existing grassed areas adjacent to the site. All areas affected by construction will be fine graded and have permanent seeding. The remainder of the area will remain in its natural state.

A stabilized construction entrance will be provided to help reduce vehicle tracking of sediments. The paved street adjacent to the site entrance will be swept to remove any excess mud, dirt, or rock tracked from the site. Dump trucks hauling material from the construction

Certification of Compliance with State and Local Regulations: This storm water pollution prevention plan reflects the city's/state's requirements for storm water management, erosion, and sediment control. to ensure compliance, this plan was prepared in accordance with the city's drainage policy.

These are the inspection and maintenance practices that will be used to maintain erosion and sediment controls: - All control measures will be inspected at least once every 14 days and following any storm event of 0.50 inches or greater. - All BMP's will be maintained in good working order; is a repair is necessary if will be initiated within 24 hours of the report. - Built up sediment will be removed from silt fence when it has reached one-half the height of the fence. - Silt fence will be inspected for depth of sediment, tears, to see if the fabric is securely attached to the fence posts, and to see that the

- Temporary and permanent and seeding and planting will be inspected for bare spots, washouts, and healthy growth.

- A maintenance inspection report will be made after each inspection. The inspection report form will be prepared by the site - A site superintendent will be responsible for inspections, maintenance and repair activities, and filling out the inspection and

It is expected that the following non-storm water discharges will occur from the site during the construction period:

 All contractor vehicles, including employee's vehicles, shall park within the project site to minimize traffic on the public streets adjacent to the worksite entrance. Contractor will provide sufficient parking areas to accommodate his vehicles. Any areas disturbed by vehicular parking will be repaired to original condition prior to completion of project. 2. If required on the plans, the contractor shall maintain a vehicle wash down area of sufficient size and in a location to facilitate cleaning his vehicles prior to leaving the work site. 3. All areas where existing vegetation and grass cover have been bared by construction shall be adequately block sodded or hydromulched and watered until growth is established. In developed areas where grass is present, block sod will be required. Bared areas shall be seeded or sodded within 14 calendars days of last disturbance. All erosion control measures shall remain in place until acceptable vegetative growth is established after construction is complete and

Approved erosion control measures must be installed during the entire time earth has been bared by construction and shall stay in place until acceptable vegetative growth is established after construction is complete and then removed

5. All erosion control measures should be cleaned of silt after every rain event. Approved erosion control measures must be installed during the entire time earth has been bared by construction 7. It is the responsibility of the contractor to use whatever means necessary to minimize erosion and prevent sediment

8. The contractor is responsible for implementing, inspecting and maintaining the erosion and sediment control devices. 9. Construction exit is to be dressed with additional rock as needed and maintain so as to prevent construction traffic

10. Inspection shall be performed every 14 days and every rainfall event of 1/2" or more. All erosion control devices shall be cleaned of silt (as needed) after every rain. 11. Structural controls shall be installed as soon after clearing as practical and maintained in good working order until the

site is stabilized. Alternate structural controls may be utilized if approved by Engineer. 12. The contractor is responsible for complying with the TPDES General Permit No. TXR150000 requirements for

13. The contractor shall coordinate with the owner to determine a temporary spoils, earthwork, and topsoil area for the 14. All areas that have a slope >15% shall be hydromulched (mix determined based upon season) upon completion of grading and contractor shall utilize a rolled single net straw erosion control blanket with poly netting (US-1S) as produced by US Erosion Control Products or approved equal to lay over the hydromulched slope. Contractor shall be responsible for watering and assuring 80% coverage in 21 days. 15. Contractor shall strip topsoil from the site prior to construction and stockpile and protect from contamination from other soils for later use onsite by the landscape contractor.

Site Description: Project name and location: PVD Phase 5 Bryan, Brazos County, Texas Developer PVD Development Co., LLC C/O Mark Dennard 5222 Enchanted Oaks, Dr.

College Station, TX 77845 The site is not located on Indian lands.

Latitude: 30° 39' 10.19" N Longitude: 96°16' 6.23" W

MS4 operator name: City of Bryan, Texas Receiving water body: Brushy Creek Tributary 11 Estimated area to be disturbed: 3.54 acres

The storm water pollution prevention plan shall be in compliance with state and local

Operator Requirements: The operator shall submit a NOI to TCEQ (when applicable) and a copy to the operator in a location where it is readily available for viewing prior to commencing construction that location until completion of the construction activity.

The operator shall provide a copy of NOI to the operator of the municipal separate stor at least two (2) days prior to commencing construction activities.

The operator shall submit a NOT to TCEQ (when applicable) and a copy to the operato once the final stabilization has been achieved and the temporary erosion controls have Controls must be developed to limit, to the extent practicable, offsite transport of litter

Operator Inspection Requirements: The following records must be maintained and either attached to or referenced in the

materials.

include:

The dates when major grading activities occur. The dates when construction activities temporarily or permanently cease on a portion

The dates when stabilization measures are initiated. A report summarizing the scope of the inspection, name and qualifications of personn the inspection, and major observations must be made and retained with the storm wa

The locations of discharges of sediment or other pollutants from the site; Locations of BMP's that failed to operate as designed or proved inadequate for a par Location where additional BMP's are needed.

<u>Operator's Record Keeping:</u> The permittee must retain the following records for a minimum of 3 years from the da

A copy of the storm water plan and

All reports and actions required by this permit, including a copy of the construction site notice all data used to complete the NOI.

BAR SPACING: #4 Bars @ 12" O.C.E.W.

POND OUTLET CONTROL STRUCTURE

NTS

PROJECT BENCHMARK:

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	JANUARY 2023 Drawn By: JB, TF, SB Checked By: VJBM											
Prepared For:	Prepared For: PVD Development Co, LLC 5222 Enchanted Oaks Dr. College Station, TX 77845 (979) 225-3222											
Revisions												
	MISCELLANEOLIS DETAILS		PHASE 5 - COMMERCIAL BUILDING	SH30 - RRVAN								
	<u></u>)	1								

J. BTU Transformer Specification for Single Phase Transformer Pad

B. General Specifications for Developer Installed Conduit

- 1. Ditch Line On all underground installations BTU will allow a shared ditch line with dry utilities only (Cable TV, Telephone). Refer to section V (E&F) for installation. BTU does not allow any type of public or private wet utilities (Sewer, Water, or Gas) installed in the same ditch with any BTU owned electrical line.
- 2. Conduit and Elbows All conduit used shall be minimum schedule 40 grey electrical PVC. All conduits shall be properly glued at all couplings and joints.

Description	600A Primary	200A Primary	Secondary to Pedestal	Service to Meter	Streetlight	
Conduit Size/Type	4" PVC	2" PVC	3" PVC	3" PVC (See Notes 2 & 4)	2" PVC	
Elbow Type	Aluminum wrapped with Scotchrap [™] 50 (See Note 3)	PVC (See Note 1)	PVC	PVC	PVC	
Elbow radius	42"	36"	12"	12"	9"	
Maximum Wire Pull Lengths	500'	700'	150'	200'	300'	

	elbow locations and at all equipment loc
NOTE 2:	Single phase services larger than 320 am larger PVC conduit to be installed. Con installations. Combined lengths of servic exceed 200 feet.
NOTE 3:	Information on Scotchrap [™] 50 can be for

NOTE 4: All primary and secondary stub outs shall be extended a minimum of 10' from transformer or pedestal. End of stub out shall be marked with a 6'- 6" T-Post painted red to denote electric.

Page 10

runs in excess of 500' shall have aluminum elbows installed at all ditch line ocations.

> amps and three phase services may require onsult with BTU Line Design on these vice and secondary to any meter shall not

ound at https://www.3m.com/

PROPOSED TRENCH DETAIL FOR UNDERGROUND DRY UTILITIES

N.T.S.

Local Lines of the series of t										
	JANUARY 2023	Drawn Bv: IB. TF. SB	Checked By: VJBM							
Prepared For:	PVD Development Co, LLC	5222 Enchanted Oaks Dr. College Station TV 77845	College Station, 17 7 7 945 (979) 225-3222							
Revisions										
	MISCELLANEOUS DETAILS		PHASE 5 - COMMERCIAL BUILDING	SH30 - REVAN						
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GENERAL REQUIREMENTS OSHA STANDARD 29 CFR PART 1926, SUBPART P shall be used for design of trench safety requirements. Should there be any conflict between this drawing and CFR 1926, SUBPART P, the OSHA Standard shall prevail. Protection of employees in excavations against cave-ins and against falling rock, soil or material by use of an "adequate" system. An exception being when the excavation is in stable rock or when the excavation is less than 5 feet deep and

examination by a competent person provides no evidence that a cave-in should be expected. Protection from falling rock, soil or material includes scaling to remove loose rock or soil, installation of protective barricades and other "equivalent protection." Material or equipment which might fall or roll into an excavation must be kept at least two feet from the edge of excavations, or have retaining devices, or be prevented from falling with a combination of both precautions. Daily inspections of excavations, adjacent areas, and

protective systems by a competent person and the removal of exposed employees if evidence of possible cave-ins, failure of protective systems, hazardous atmospheres, or other hazardous conditions until necessary precautions have been taken. A "competent person" should remain at the worksite continually while employees are within an open excavation where protective systems are being used.

Removal of or neutralization of surface encumbrances which may create a hazard.

Estimate location of underground installations (sewer. telephone, electrical, fuel and other lines; storage tanks, etc.) prior to digging; pinpoint actual locations as estim locations are approached.

Ramps, runways, ladders or stairs as means of access/egress must be within 25 feet of an employee work area if a trench is four feet or more deep.

Warning systems for mobile equipment including barricades. hand or mechanical signals, or stop logs.

Testing and Controls for hazardous atmosphere including emergency rescue equipment and daily inspections for potentially hazardous conditions by a "competent person." Controls include individually attended lifelines during descent into bell-bottom

Support systems such as shoring, bracing, or underpinning to ensure the stability of adjacent structures such as buildings, walls or sidewalks.

pier holes or similar excavations.

x A to Subpart P. OSHA 29 CFR Part 1926 TYPE A Type A means cohesive soils with an unconfined compressive strength of 1.5 tsf (144kPa) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, no soil is Type A if: 1) The soil is fissured; or 2) The soil is subject to vibration from heavy traffic, pile driving, or similiar effects; or 3) The soil has been previously disturbed; or 4) The soil is part of a sloped, lavered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or 5) The material is subject to other factors that would require it to be classified as a less stable material.

SOIL CLASSIFICATION

1) Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa); or 2) Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silty loam, sandy loam and in some cases, silty clay loam and sandy clay loam. 3) Previously disturbed soils except those which would otherwise be classed as Type C soil. 4) Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration: or 5) Dry rock that is not stable; or 6) Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the

TYPE C

TYPE B

1) Cohesive soil with an unconfined compressive strength of 0.5 tsf (48kPa) or less; or 2) Granular soils including gravel, sand and loamy sand; or

material would otherwise be classified as Type B.

3) Submerged soil or soil from which water is freely seeping; or 4) Submerged rock that is not stable: or 5) Material in a sloped, layered system where the layers dip into

the excavation on a slope of four horizontal to one vertical (4H:1V) or steeper.

REQUIREMENT FOR PROTECTIVE SYSTEMS

SLOPING AND BENCHING SYSTEMS (FOUR OPTIONS) 1) A slope of 34 degrees or less, in lieu of soil classification. A slope of this gradation or less is considered safe for any type of soil. 2) Maximum allowable slopes and allowable configurations manufacturers' tabulated data is not available. for sloping and benching systems will be determined through use of Appendices A (Soil classification) and B (Sloping and Benching) of 29CFR Part 1926, Subpart P. 3) Designs of sloping or benching shall be selected from, and be in accordance with, data provided in written form. The text to identify: Criteria that affect the selection, the limits of use of the data, and sufficient explanatory data as necessary to assist in making a correct choice of a protective system. At least one copy of the tabulated data identifying the Registered Professional Engineer who approved the information shall be maintained at the jobsite during the time the work is being carried out. 4) Excavations can be designed by a Registered Professional Engineer, put in written form and kept at the worksite, but must include, at least, the magnitude and configuration of the slopes determined to be safe for the project and the name of the RPE who approved the plan

TABLE OF MAXIMUM ALLOWABLE SLOPES

SOIL OR ROCK TYPE	MAXIMUM ALLOWABLE SLOPES (H:V) FOR EXCAVATIONS LESS THAN 20 FEET DEEP	NOTES: 1. Numbers shown in parenthese in degrees from the horizontal 2. A short-term maximum allow Type A soil that are 12 feet (3.6)
STABLE ROCK TYPE A TYPE B TYPE C	VERTICAL (90 deg) 3/4:1 (53 deg) 1:1 (45 deg) 1 1/2:1 (34 deg)	for excavations greater than 12 3. Sloping or benching for excav Registered Professional Enginee 4. For acceptable slope and ber Part 1926, Subpart P.

Douglas fir or equiv. w/bending strength not less than 1500 psi

TIMBER TRENCH SHORING - MINIMUM TIMBER REOUIREMENTS

Donth

Mixed oak or equiv. w/bending strength not less than 850 psi SIZE (ACTUAL) AND SPACING OF MEMBERS **

	/													
		Cross	Braces				Wales		Uprights					
Horizontal Spacing	Width			ench (F	eet)	Vert.	Size	Vert.	Maximum allowable horizontal spacing					
opaoling	Up to	Up to	Up to	Up to	Up to	Spacing		spacing	(feet)					
(Feet)	4	6	9	12	15	(Feet)	(In)	(Feet)	Close	4	5	6	8	
Up To 6	4 x 4	4 x 4	4 x 6	6 x 6	6 x 6	4	Not Reg'd					2 x 6		
Up To 8	4 x 4	4 x 4	4 x 6	6 x 6	6 x 6	4	Not Req'd						2 x 8	
Up To 10	4 x 6	4 x 6	4 x 6	6 x 6	6 x 6	4	8 x 8	4			2 x 6			
Up To 12	4 x 6	4 x 6	6 x 6	6 x 6	6 x 6	4	8 x 8	4				2 x 6		
Up To 6	4 x 4	4 x 4	4 x 6	6 x 6	6 x 6	4	Not Req'd					3 x 8		
Up To 8	4 x 6	4 x 6	6 x 6	6 x 6	6 x 6	4	8 x 8	4		2 x 6				
Up To 10	6 x 6	6 x 5	6 x 6	6 x 8	6 x 8	4	8 x 10	4			2 x 6			
Up To 12	6 x 6	6 x 6	6 x 6	6 x 8	6 x 8	4	10x10	4				3 x 8		
Up To 6	6 x 6	6 x 6	6 x 6	6 x 8	6 x 8	4	6 x 8	4	3 x 6					
Up To 8	6 x 6	6 x 6	6 x 6	6 x 8	6 x 8	4	8 x 8	4	3 x 6					
Up To 10	8 x 8	8 x 8	8 x 8	8 x 8	8 x 10	4	8 x 10	4	3 x 6					
Up To 12	8 x 8	8 x 8	8 x 8	8 x 8	8 x 10	4	10x10	4	3 x 6					
	Horizontal Spacing (Feet) Up To 6 Up To 8 Up To 10 Up To 12 Up To 6 Up To 8 Up To 10 Up To 12 Up To 12 Up To 6 Up To 8 Up To 8 Up To 8	Horizontal Spacing (Feet) Up to 4 Up To 6 4 x 4 Up To 8 4 x 4 Up To 10 4 x 6 Up To 6 4 x 4 Up To 12 4 x 6 Up To 6 4 x 4 Up To 12 4 x 6 Up To 10 6 x 6 Up To 10 6 x 6 Up To 12 6 x 6 Up To 6 6 x 6 Up To 8 6 x 6 Up To 8 6 x 8 Up To 10 8 x 8 Up To 12 8 x 8	Horizontal Spacing (Feet) Widt Up to Widt Up to Up To 6 4 x 4 4 x 4 Up To 8 4 x 4 4 x 4 Up To 10 4 x 6 4 x 6 Up To 12 4 x 6 4 x 6 Up To 6 4 x 4 4 x 4 Up To 12 4 x 6 4 x 6 Up To 6 4 x 6 4 x 6 Up To 12 6 x 6 6 x 5 Up To 10 6 x 6 6 x 6 Up To 12 6 x 6 6 x 6 Up To 10 6 x 6 6 x 6 Up To 8 6 x 6 6 x 6 Up To 10 8 x 8 8 x 8 Up To 10 8 x 8 8 x 8	Cross Braces Horizontal Spacing Width of Tre Up to Width of Tre 0 Up to Up to Up to Up to Up To 6 4 x 4 4 x 4 4 x 6 Up To 8 4 x 4 4 x 4 4 x 6 Up To 10 4 x 6 4 x 6 4 x 6 Up To 112 4 x 6 4 x 6 6 x 6 Up To 12 4 x 6 4 x 4 4 x 6 Up To 12 4 x 6 4 x 6 6 x 6 Up To 12 6 x 6 6 x 6 6 x 6 Up To 10 6 x 6 6 x 6 6 x 6 Up To 12 6 x 6 6 x 6 6 x 6 Up To 10 8 x 8 8 x 8 8 x 8 Up To 10 8 x 8 8 x 8 8 x 8	Cross Braces Horizontal Spacing (Feet) Width of Trench (F Up to Up to Example Example Example Example Example Example Example Example Up to Up to Up to Example Example Example Example Example Example Example Example Example <thexample< th=""> Example <the< td=""><td>Cross Braces Horizontal Spacing Width of Trench (Feet) Up to Up to Up to Up to Up to Up To 6 4 x4 4 x4 4 x6 6 x6 6 x6 Up To 6 4 x4 4 x4 4 x6 6 x6 6 x6 Up To 8 4 x4 4 x4 4 x6 6 x6 6 x6 Up To 10 4 x6 4 x6 4 x6 6 x6 6 x6 Up To 12 4 x6 4 x6 6 x6 6 x6 6 x6 Up To 12 4 x6 4 x4 4 x6 6 x6 6 x6 Up To 12 4 x6 4 x6 6 x6 6 x6 6 x6 Up To 12 6 x6 6 x6 6 x6 6 x8 6 x8 Up To 10 6 x6 6 x6 6 x6 6 x8 6 x8 Up To 12 6 x6 6 x6 6 x6 6 x8 6 x8 Up To 10 6 x6 6 x6 6 x6 6 x8 6 x8 Up To 10 8 x8<</td><td>Cross Braces Horizontal Spacing (Feet) Width of Trench (Feet) Vert. 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SIZE (ACTUAL) AND SPACING OF MEMBERS *

 4
 6
 9
 12
 15
 (Feet)
 (In)
 (Feet)
 Close
 2
 3

4x6 4x6 6x6 6x6 6x6 5 6x8 5

Wales

Vert.

Spacing

Wales

Vert. Spacing Size Vert. Spacing Spacing

Maximum allowable horizontal

2 x 6

2 x 6

2 x 6

Maximum allowable horizontal

spacing (feet)

(See Note :

2 x 6

2 x 6

2 x 6

Cross Braces

Horizonta

Spacing

(Feet)

Up To 6

See Note 1

See Note 1

See Note 1

Spacing

See Note 1

(feet) (Feet)

Up to

Up to

15

Up to 20

Over 20

(feet)

Up to

10

Up to

Over 20

Width of Trench (Feet)

Up to Up to Up to Up to Up

Up To 8 6x6 6x6 6x6 6x8 6x8 5 8x10 5

Up To 10 6x6 6x6 6x6 6x8 6x8 5 10x10 5

Up To 6 6 x 6 6 x 6 6 x 8 6 x 8 5 8 x 8 5

Up To 8 6 x 8 6 x 8 8 x 8 8 x 8 5 10 x 10 5

Up To 10 8 x 8 8 x 8 8 x 8 8 x 8 8 x 10 5 10 x 12 5

Up To 6 6 x 8 6 x 8 6 x 8 8 x 8 8 x 8 5 8 x 10 5 3 x 6

Up To 8 8 x 8 8 x 8 8 x 8 8 x 10 5 10 x 12 5 3 x 6

 Up To 10
 8x10
 8x10
 8x10
 10x10
 5
 12x12
 5
 3x6

 See Note 1

 3x6

See Note (1)

Cross Braces

Width of Trench (Feet)

Up to Up to Up to Up to Up to

SIZE (ACTUAL) AND SPACING OF MEMBERS

4 6 9 12 15 (Feet) (In) (Feet) Close

Up To 6 6x8 6x8 6x8 8x8 8x8 5 8x10 5 2x6

Up To 8 8x8 8x8 8x8 8x8 8x10 5 10x12 5 2x6

Up To 6 8 x 8 8 x 8 8 x 8 8 x 8 8 x 10 5 10 x 12 5 2 x 6

Up To 8 8x10 8x10 8x10 10x10 5 12 x 12 ⁵ 2 x 6

 Up To 6
 8 x 10
 8 x 10
 8 x 10
 8 x 10
 10 x 10
 5
 12 x 12
 5
 3 x 6

10 Up To 10 8x10 8x10 8x10 10x10 5 12x12 5 2x6

See Note (1)

(2 ft Surcharge)

Soil Type A

Pa=25xH+72 psf

of			Cross	Braces		Wales		Uprights					
Trench	Horizontal Spacing		Widt	h of Tre	ench (F	eet)	Vert. Spacing	Size	Vert.	Мах	imum al	owable spacing	horizonta
(feet)	(Feet)	Up to 4	Up to	Up to	Up to	Up to	(Feet) (Ir	(In)	(Feet)	Close	4	(feet)	6
. ,	Up To 6	4 x 4	4 x 4	4 x 4	4 x 4	4 x 6	4	Not Rea'd	Not Rea'd	0036			4 x 6
5	Up To 8	4 x 4	4 x 4	4 x 4	4 x 6	4 x 6	4	Not Req'd	Not Regid				
Up to 10	Up To 10	4 x 6	4 x 6	4 x 6	6 x 6	6 x 6	4	8 x 8	4			4 x 6	
	Up To 12	4 x 6	4 x 6	4 x 6	6 x 6	6 x 6	4	8 x 8	4				4 x 6
	Up To 6	4 x 4	4 x 4	4 x 4	6 x 6	6 x 6	4	Not Req'd	Not Req'd				4 x 10
10	Up To 8	4 x 6	4 x 6	4 x 6	6 x 6	6 x 6	4	6 x 8	4		4 x 6		
Up to 15	Up To 10	6 x 6	6 x 6	6 x 6	6 x 6	6 x 6	4	8 x 8	4			4 x 6	
	Up To 12	6 x 6	6 x 6	6 x 6	6 x 6	6 x 6	4	8 x 10	4		4 x 6		4 x 10
	Up To 6	6 x 6	6 x 6	6 x 6	6 x 6	6 x 6	4	6 x 8	4	3 x 6			
15 Un to	Up To 8	6 x 6	6 x 6	6 x 6	6 x 6	6 x 6	4	8 x 8	4	3 x 6	4 x 12		
20	Up To 10	6 x 6	6 x 6	6 x 6	6 x 6	6 x 8	4	8 x 10	4	3 x 6			
	Up To 12	6 x 6	6 x 6	6 x 6	6 x 8	6 x 8	4	8 x 12	4	3 x 6	4 x 12		
Over 20				Note	(1)								

SIZE (ACTUAL) AND SPACING OF MEMBERS *

		SIZE (ACTUAL) AND SPACING OF MEMBERS **													
Depth			Cross	Braces				w	ales		Uprights				
Trench	Horizontal	1	Nidth o	f Trend	ch (Feet	t)	Vert.	Sizo	Vert.	Maximum allowable horizontal					
	Spacing	Up to Up to		Up to	Up to Up to		Spacing	5120	Spacing	(feet)					
(feet)	(Feet)	4	6	9	12	15	(Feet)	(In)	(Feet)	Close	2	3	4		
	Up To 6	4 x 6	4 x 6	4 x 6	6 x 6	6 x 6	5	6 x 8	5			3 x 12 4 x 8		4)	
5	Up To 8	4 x 6	4 x 6	6 x 6	6 x 6	6 x 6	5	8 x 8	5		3 x 8		4 x 8		
10	Up To 10	4 x 6	4 x 6	6 x 6	6 x 6	6 x 8	5	8 x 10	5			4 x 8			
	See Note 1														
	Up To 6	6 x 6	6 x 6	6 x 6	6 x 8	6 x 8	5	8 x 8	5	3 x 6	4 x 10				
10	Up To 8	6 x 8	6 x 8	6 x 8	8 x 8	8 x 8	5	10 x 10	5	3 x 6	4 x 10				
15	Up To 10	6 x 8	6 x 8	8 x 8	8 x 8	8 x 8	5	10 x 12	5	3 x 6	4 x 10				
	See Note 1														
	Up To 6	6 x 8	6 x 8	6 x 8	6 x 8	8 x 8	5	8 x 10	5	4 x 6					
15 Un to	Up To 8	6 x 8	6 x 8	6 x 8	8 x 8	8 x 8	5	10 x 12	5	4 x 6					
20	Up To 10	8 x 8	8 x 8	8 x 8	8 x 8	8 x 8	5	12 x 12	5	4 x 6					
	See Note 1														
Over 20				See I	Note (1)									

					SIZE	ACTUA	ACING OF MEMBERS **							
Depth	Cross Braces								ales	Uprights				
Trench	Horizontal Spacing	Width of Trench (Feet)					Vert. Spacing	Size	Vert. Spacing	Maximum allowable horizontal spacing (feet)				
(feet)	(Feet)	4	6	9	12	15	(Feet)	(In)	(Feet)	Close		(,		
	Up To 6	6 x 6	6 x 6	6 x 6	6 x 6	8 x 8	5	8 x 8	5	3 x 6				
5	Up To 8	6 x 6	6 x 6	6 x 6	8 x 8	8 x 8	5	10x10	5	3 x 6				
up to 10	Up To 10	6 x 6	6 x 6	8 x 8	8 x 8	8 x 8	5	10x12	5	3 x 6				
	See Note 1													
	Up To 6	6 x 8	6 x 8	6 x 8	8 x 8	8 x 8	5	10x10	5	4 x 6				
10	Up To 8	8 x 8	8 x 8	8 x 8	8 x 8	8 x 8	5	12x12	5	4 x 6				
Up to 15	See Note 1													
	See Note 1													
15 Up to 20	Up To 6	8 x 8	8 x 8	8 x 8	8x10	8x10	5	10x12	5	4 x 6				
	See Note 1													
	See Note 1													
	See Note 1													
Over 20				See N	Note (1))								

VERTICAL SHORES FOR SOIL TYPES A & B

	HYDRAULIC CYLINDERS										
Depth of	Maximun	Maximun	Width of Trench (Feet)								
Trench (feet)	Horizontal Spacing (Feet)	Vertical Spacing (Feet)	Up to 8	Over 8 Up to 12	Over 12 Up to 15						
Over 5 Up to 10	8 (Type A) 8 (Type B)										
Over 10 Up to 15	8 (Type A) 6.5 (Type B)	4	2 inch Diameter	2 inch Diameter Note(2)	3 inch Diameter						
Over 15 Up to 20	7 (Type A) 5.5 (Type B)										
Over 20		Note (1)	II.								

ALUMINUM HYDRAULIC SHORING

WALER SY	STEMS FOR SC	IL TYPE B											WALER SY	STEMS FOR SO	OIL TYPE C		
	WAL	WALES		HYDRAULIC CYLINDERS TIMBER U						TIMBER UPRIGHTS			WALES		H. H.		
of Trench Shoring	Martinal	• ··· *	Width of Trench (Feet)						Max. Horiz. Spacing (On Center)				Depth	Manthaal	*		
	Shoring	Section	Up	to 8	Over 8 UP TO 12		Over 12 Up to 15		Solid			Trench	Shoring	Modulus	Up to 8		
(feet)	(Feet)	(I n3)	Horiz. Spac.	Cylinder Dia	Horiz Spac.	Cylinder Dia	Horiz Spac.	Cylinder Dia	Sheet	2 Ft	3 Ft.		(feet)	(Feet)	(In3)	Horiz. Spac.	Cylinde Dia
Over		3.5	8.0	2 in	8.0	2 in Note(2)	8.0	3 in					Ovor		3.5	6.0	2 in
5 Up to	4	7.0	9.0	2 in	9.0	2 in Note(2)	9.0	3 in]		3x12		5 Un to	4	7.0	6.5	2 in
10	14.0	12.0	3 in	12.0	3 in	12.0	3 in				10		14.0	10.0	3 in		
Over	0.402	3.5	6.0	2 in	6.0	2 in Note(2)	6.0	3 in					Over	4	3.5	4.0	2 in
10 Lin to	4	7.0	8.0	3 in	8.0	3 in	8.0	3 in]—	3x12			10		7.0	5.5	3 in
15	15	14.0	10.0	3 in	10.0	3 in	10.0	3 in						14.0	8.0	3 in	
Over 15 4 Up to 20		3.5	5.5	2 in	5.5	2 in Note(2)	5.5	3 in				Over 15 Up to 20	4	3.5	3.5	2 in	
	4	7.0	6.0	3 in	6.0	3 in	6.0	3 in	3x12	—				7.0	5.0	3 in	
		14.0	9.0	3 in	9.0	3 in	9.0	3 in					20		14.0	6.0	3 in
Over 20		Ν	Note (1)										Over 20			lote (1)	

* Consult product manufacturer and/or qualified engineer for Section Modulus of available wales.

Soil Type B
Pa=45xH+72 pst
(2 ft Surcharge)

]
 -

Soil Type C
Pa=80xH+72 psf
 (2 ft Surcharge)

CEMENT STABILIZED SAND BACKFILL/BEDDING SPECIFICATIONS:

DESCRIPTION:

This item shall govern the mixing and placement of cement stabilized sand as a trench backfill material or bedding material. Placement shall be in conformity with the typical sections shown on the Plans or as described in the Special Provisions.

MATERIALS:

A. SAND- Clean durable sand meeting grading requirements for fine aggregates of ASTM C33, and the following requirements: 1. Classified as SW, SP or SM by the United Soil Classification System of ASTM D2487.

- 2. Deleterious materials:
- (a) Clay lumps, ASTM C142; less than 0.5 percent. (b) Lightweight pieces, ASTM C123; less than 5.0 percent
- (c) Organic impurities, ASTM C40; color no darker than the standard color. (d) Plasticity index of 4 or less when tested in accordance with ASTM D4318.
- B. CEMENT- Type I Portland Cement conforming to ASTM C150.

C. WATER- Potable water, free of oils, acids, alkalies, organic matter or other deleterious substances, meeting requirements of ASTM C94.

REQUIREMENTS FOR DESIGN:

Design sand-cement mixture to produce a minimum unconfined compressive strength of 50 pounds per square inch in 48 hours and 100 pounds per square inch in 7 days. All compaction shall be to 95% in accordance with ASTM D558. All curing shall be in accordance with ASTM D1632 and tested in accordance with ASTM D1633

Mix shall contain a minimum of 1-1/2 sacks of cement per cubic yard for general purposes. Mix for use as sanitary sewer embedment within 9 feet of waterlines shall contain 2 1/2 sacks of cement per cubic yard. All mixes shall have a moisture content between 0% to 2% above optimum. MIXING

A. Thoroughly mix sand, cement and water according to the mix design using a pugmill-type mixer. The plant shall be equipped with automatic weight controls to ensure correct mix proportions. B. Stamp batch ticket at plant with time of loading directly after mixing. Material not placed and compacted within 4 hours after mixing shall be rejected.

PLACING CEMENT STABILIZED SAND:

A. Place cement stabilized sand mixture in 8-inch lifts and compact to 95% of ASTM D558, unless otherwise specified. The moisture content during compaction shall be between 0% to 2% above optimum. Perform and complete compaction of cement stabilized sand mixture within 4 hours after mixing at the plant.

FIELD QUALITY CONTROL:

A. The cement content will be checked on samples obtained in the field whenever there are apparent changes in the mix properties. B. Mixing plant inspections will be performed periodically. Material samples will be obtained and tested if there is evidence of change in material characteristic. C. Random samples of delivered product will be taken in the field at point of delivery for each day of placement in a work area. Specimens will be prepared in accordance with ASTM D1632 and tested for 48-hour compressive strength in accordance with ASTM D1633.

MEASUREMENT AND PAYMENT:

No direct payment will be made for cement stabilized sand under this item. Payment for cement stabilized sand should be included in the unit price for the applicable utility or structure installation.

TYPICAL RCP STORM DRAIN TRENCH DETAIL TRENCH AND EMBEDMENT TO BE SUBSIDIARY TO UNIT PRICE OF PIPE.

UNDER NORMAL CIRCUMSTANCES THE CONTRACTOR SHALL USE NOTE 1: TYPE "B" MATERIAL FOR BEDDING AND IN THE HAUNCH ZONE. ONLY WITH THE PERMISSION AND AT THE DIRECTION OF THE ENGINEER SHALL THE CONTRACTOR USE TYPE "D" MATERIAL AS SHOWN

BACKFILL OF STRUCTURES- WHEN STRUCURES (MANHOLES, INLETS, JUNCTION BOXES, ETC.) ARE WITHIN STRUCTURAL NOTE 2: AREAS (AS DEFINED ON THIS SHEET) CEMENT STABILIZED SAND BACKFILL SHALL BE REQUIRED. USE CLASS III MATERIAL IN ALL OTHER AREAS.

NOTE 3: DETECTOR TAPE IS NOT REQUIRED ON DIP OR CMP.

	NON-STRUCTURAL
R	85% MAX. PER
D	ASTM DI557 @
OF	O TO 4% WET OF
RE	OPT. MOISTURE
R	85% MAX. PER
D	ASTM DI557 @
OF	O TO 4% WET OF
RE	OPT. MOISTURE
R OF RE	95% MAX. PER ASTM D558 @ O TO 2% WET OF OPT. MOISTURE
R	85% MAX. PER
D	ASTM DI557 @
OF	O TO 4% WET OF
RE	OPT. MOISTURE
NE TEST PI	ER 200' OF
RENCH PER	? 2' FILL

ASTM D2321-89 CLASSES OF EMBEDMENT & BACKFILL MATERIALS

Class IA: Angular, Crushed Rock, no fines.

Class IB: Angular, Crushed Rock and sand, well graded to minimize migration of adjacent soils. Little or no fines.

Class II: Coarse Grained Soils, Clean. Native soils from the trench generally do not meet this requirement. The contractor may use native materials from the trench only after providing soils laboratory test demonstrating compliance.

Class III: Coarse Grained Soils with Fines. Native soils from the trench generally do not meet this requirement. The contractor may use native materials from the trench only after providing soils laboratory test demonstrating compliance. Bank run sand generally meets this requirement

Class IV A: Select Material from the Trench consisting of Fine-Grained Soils (inorganic). Inorganic clays of low to medium plasticity, gravely clays, sandy clays, silty clays, lean clays. This material must have a liquid limit >50 and a Plasticity Index >7 and > "A" Line. See specification (ASTM D2321-89) for details.

Class IV B: Select Material from the Trench consisting of Fine-Grained Soils (inorganic). Inorganic clays of medium to high plasticity, fat clays, inorganic silts, fine sandy or silty soils, elastic silts.

Class V: Organic Soils. Material from the Trench which does not meet the requirements above. All rocks, lumps, and clods must be removed from this material prior to placement in the trench. This material is only appropriate for topsoil in the non-structural trench.

*I*ORGA T.979.260.6963 F.979.260.3564 TX. FIRM # F-1443 3204 EARL RUDDER FWY. S. COLLEGE STATION, TX 77845 PLAN & DESIGN SPECIALISTS IN CIVIL ENGINEERING HYDRAULICS HYDROLOGY UTILITIES STREETS SITE PLANS SUBDIVISIONS www.mitchellandmorgan.com Ë, Ë щŸ rawn By: Checked 22 Enchanted Oaks lege Station, TX 778 (979) 225-3222 Ш LL S S ENCH BUIL IERCIA. - BRYA. TR COMA SH30 ઝ --Z 5 ш SE EDM MB Ш

