

PLOT SCALE - 8000.0000001.000000

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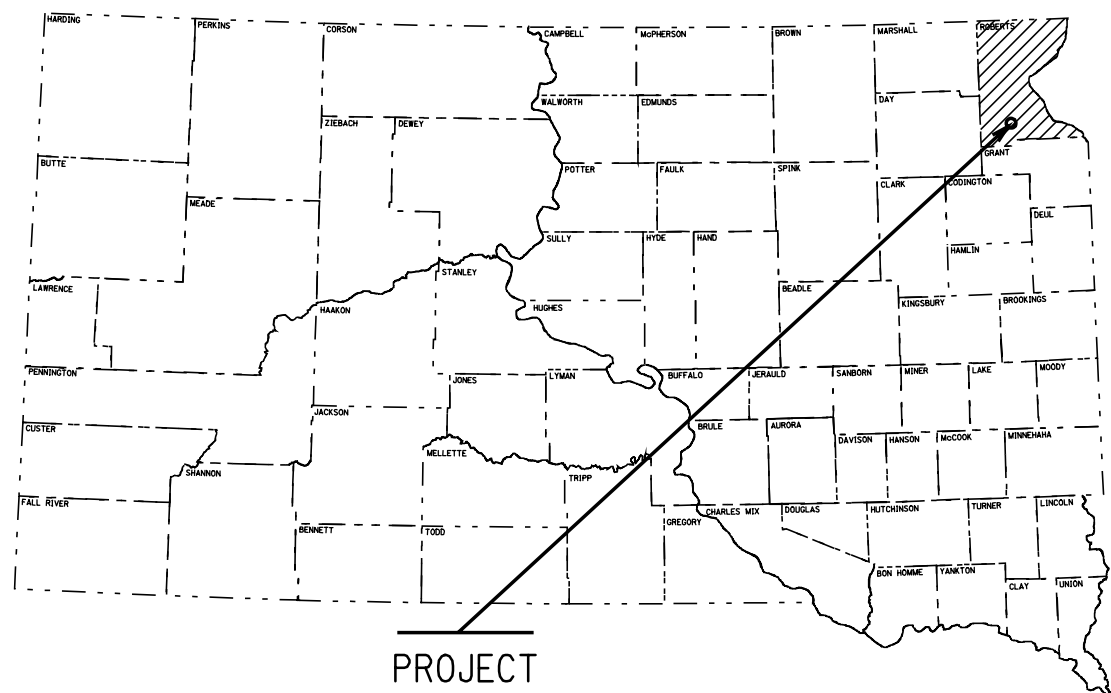
STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION
PLANS FOR PROPOSED

PROJECT 029 N-172
INTERSTATE HIGHWAY 29
ROBERTS COUNTY

WASTEWATER LAGOON REPAIR
PCN 11gz

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 N-172	1	9

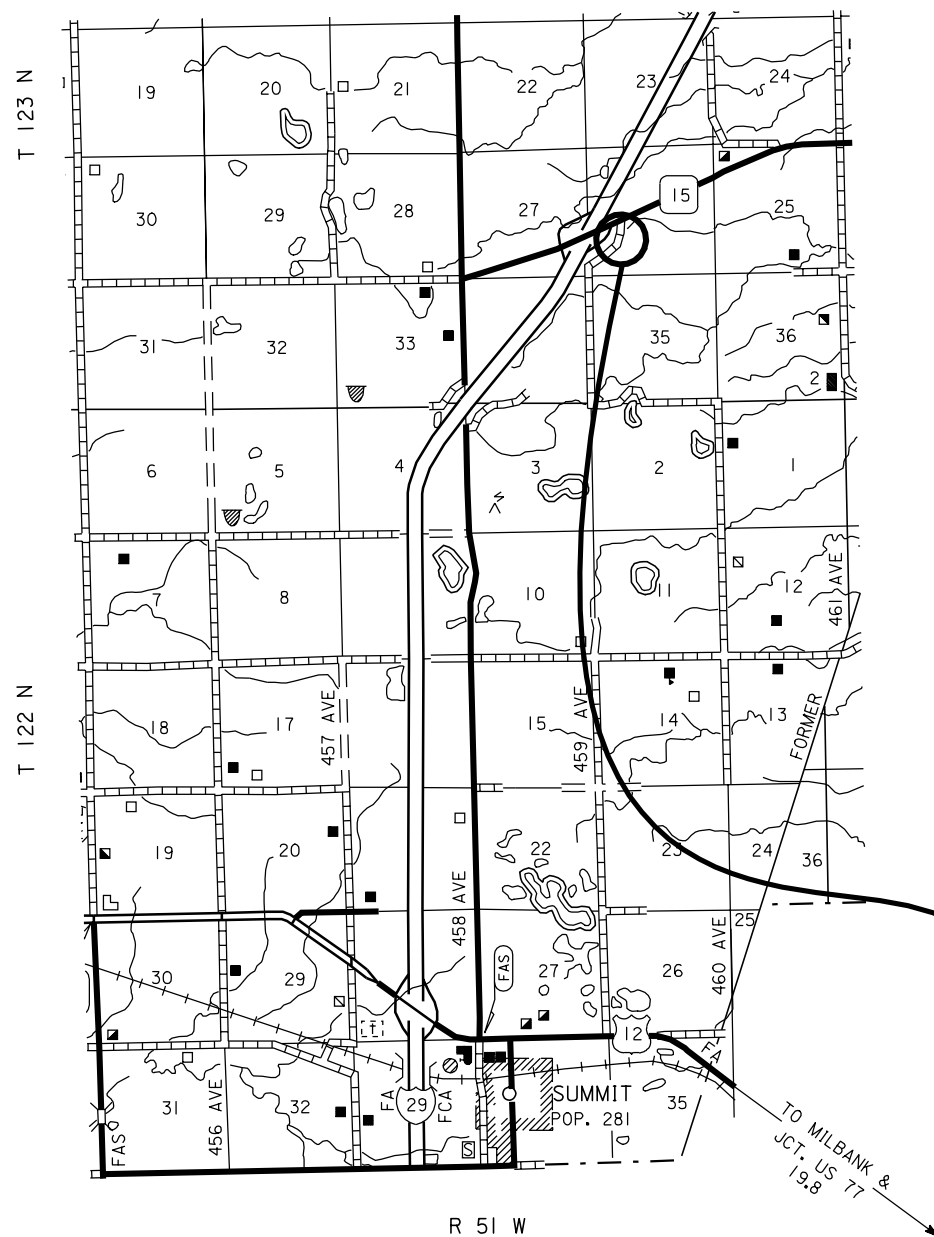
Plotting Date: 01-JUN-2009



PROJECT

INDEX OF SHEETS

- Sheet No. 1 Title Sheet and Layout Map
- Sheet No. 2-3 Estimate of Quantities and Plan Notes
- Sheet No. 4-5 Original Construction Plans
- Sheet No. 6 Existing Lagoon Detail
- Sheet No. 7 Proposed Lagoon Detail
- Sheet No. 8-9 Chain Link Fence Standard Plates



Project Location

I 29 NBL - MRM 213.8

STORM WATER PERMIT
(None Required)

R 51 W

TO MILBANK &
JCT. US 77
19.8

PLOT NAME - COVER.SHEET

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STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 N-172	2	9

ESTIMATE OF QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
120E0600	Contractor Furnished Borrow	20	CuYd
230E0020	Placing Contractor Furnished Topsoil	30	CuYd
250E0010	Incidental Work	Lump Sum	LS
700E0110	Class A Riprap	655	Ton
734E0010	Erosion Control	Lump Sum	LS
831E0110	Type B Drainage Fabric	1015	SqYd
900E2030	Miscellaneous Work	1	Site

SPECIFICATIONS

Standard Specifications for Roads and Bridges, 2004 Edition and Required Provisions, Supplemental Specifications and/or Special Provisions as included in the Proposal.

SCOPE OF WORK

The location of this project is the Whetstone Valley (Wilmot) Interstate Rest Area Exit 213. The Whetstone Valley Interstate Rest Area has a two cell wastewater lagoon system. The larger North cell is the primary cell and the smaller South cell is the secondary cell. The primary cell berms are eroding and will need to be restored with Clay, Drainage Fabric and Riprap.

The system is presently constructed so that raw wastewater may be sent to the primary cell only. During the repair of the primary cell, raw wastewater will be sent to the secondary cell.

SEQUENCE OF OPERATIONS

The following sequence of operations shall be utilized unless an alternate sequence of operations is submitted to and approved by the Engineer.

1. Remove Chain Link Fence as required
2. Clean out Primary Cell
3. Remove vegetation from repair areas and mow banks
4. Repair banks of berm of the Primary Cell
5. Install Drainage Fabric and Riprap
6. Pre-fill Lagoon
7. Place Topsoil
8. Erosion Control
9. Reset Chain Link Fence

LAGOON FENCING

The Contractor shall visit the site to determine the extent of fence removal required to complete the project.

Chain Link Fence Standard Plates are included in these plans as a guide for reconstruction of the fence upon project completion.

All costs associated with removing the existing fence and resetting the fence to the pre-disturbed location shall be incidental to the contract lump sum price for **INCIDENTAL WORK**.

CLEAN OUT PRIMARY CELL

The Contractor shall pump any remaining effluent in the existing primary cell down to the 2 foot level into the secondary cell. The size of the secondary cell is smaller than the primary and will not hold all of the effluent, the Contractor shall find and legally dispose of remaining effluent. The Contractor shall contact the SD Department of Environment and Natural Resources (DENR) to determine options available for disposing of the wastewater in the primary cell. Discharge of the wastewater to a stream or drainage will not be an option.

All costs associated with cleaning out the primary cell shall be incidental to the contract unit price per site for **MISCELLANEOUS WORK**.

No sludge may be removed from the lagoon site without prior approval from the DENR.

LAGOON BERM RESTORATION

Erosion of the banks of the berms in the primary/north cell will need to be repaired. The Contractor shall restore the berms of the primary cell with clay fill material back to the original design inslope of 3:1. The Contractor shall supply clay fill material to be used to repair any erosion of the berms before the installation of Drainage Fabric and Riprap. Included in the Estimate of Quantities is 20 cubic yards Contractors Furnished Borrow for the repair of erosion holes in the berms.

All costs to furnish and install the fill material shall be incidental to the contract unit price per cubic yard for **CONTRACTOR FURNISHED BORROW**.

The clay fill material shall be constructed of relatively impervious and stable material at 0-3% over optimum moisture content. Optimum Moisture will be determined in accordance with SD 104 (AASHTO T99). The compaction and moisture conditions shall be sufficient to limit the seepage through the berm to 1/16 inch per day. Clay shall be placed and compacted in lifts such that the depth of any lift shall not exceed 8 inches.

All vegetation and roots shall be removed from the area upon which the clay fill material is to be placed. The clay fill material must not contain any organic material, debris, frozen material, large clods or stones larger than 6 inches in diameter.

Water required for compaction shall be incidental to the various contract items.

Clay fill material placement of 12" in depth or greater shall be compacted by the Ordinary Compaction Method in accordance with Section 120 of the Standard Specifications. Clay fill material less than 12" in depth shall be compacted to the satisfaction of the Engineer.

CONTRACTOR FURNISHED CLAY AND TOPSOIL

The Contractor shall provide suitable site(s) for Contractor furnished clay and topsoil material. The Contractor is responsible for obtaining all required permits and clearances for the borrow site(s).

The material for the clay fill shall be of the CL class and meet the seepage rate requirements of less than 1/16 inch per day. (CL class as defined by the Unified Soil Classification System ASTM 0-2487.)

Restoration of the Contractor furnished borrow site(s) shall be the responsibility of the Contractor.

Clay fill material quantities are computed using the volume of embankment plus 40% for shrinkage.

Haul of clay and topsoil material on established traveled roadways shall be limited to trucks hauling legal loads and which do not sustain damage to the roadway, parking lots, or other areas of the Hidewood Interstate Rest Area, as approved by the Engineer. Hauling of material in the roadway ditches will not be allowed.

DRAINAGE FABRIC

The Contractor will be responsible to mow the banks of the cells and clear the weed debris from the berms to the satisfaction of the Engineer prior to placement of Drainage Fabric. Drainage Fabric shall be placed 2 feet above the toe to top of the freeboard and anchored by digging a 12 inch deep slot into top of berm. 12 inches of the Drainage Fabric shall be tucked in the slot and tamped shut.

Drainage Fabric shall be Type B. The fabric material shall be resistant to sunlight and organic materials typical of wastewater.

Drainage fabric installation shall be installed such that the in place concrete depth gauge and the concrete splash pad (effluent entry point into lagoon) remain unobstructed upon completion of installation.

Payment for furnishing and installing drainage fabric and clearing of all weed debris shall be incidental to the contract unit price per square yard for **TYPE B DRAINAGE FABRIC**.

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 N-172	3	9

RIPRAP

The riprap shall be provided on the interior slopes to the top of the freeboard. It shall be hard and durable and be stable after placement. Thickness of riprap placement shall be 1.25 feet.

The riprap shall meet the requirements of Section 830 of the Standard Specifications for Class A Riprap, except the minimum size of rock shall be 6 inches.

Riprap installation shall be installed such that the in place concrete depth gauge and the concrete splash pad are not damaged and remain unobstructed upon completion of installation.

WATER SOURCE

The Contractor shall not withdraw water directly from streams of the James, Big Sioux, and Vermillion watersheds without prior approval from the DOT Environmental Office, Nathan Morey at 605-773-5679. This note does not relieve the Contractor of his/her responsibility to obtain the necessary permits from other agencies such as DENR (Department of Environment and Natural Resources) and COE.

PREFILLING THE LAGOON

After placement of drainage fabric and riprap is completed, the Contractor shall be required to fill the lagoon to a minimum depth of 3'. This shall be completed before vegetation can begin to grow.

The Contractor shall be responsible for furnishing and transporting the water required to fill the lagoon.

All costs associated with pre-filling the lagoon shall be incidental to the contract unit price per site for [MISCELLANEOUS WORK](#).

PLACING CONTRACTOR FURNISHED TOPSOIL

Upon completion of the erosion repair, installation of drainage fabric and rip rap, topsoil shall be placed above the riprap at the top of the berm. Included in the Estimate of Quantities is 30 Cubic Yards of Placing Contractor Furnished Topsoil to repair the top of the berm.

SOIL STERILIZATION

SDDOT forces will be responsible for soil sterilization of the banks upon completion of the project.

EROSION CONTROL

On completion of construction and placement of topsoil, all disturbed areas above the riprap shall be seeded with Intermediate Wheatgrass (Oahe) at the rate of 1/2 pound Pure Live Seed (PLS) per 1000 square feet and fertilized with a commercial fertilizer having a minimum guaranteed analysis of 18-46-0, 11-52-0, or an approved equal at the rate of 2 pounds per 1000 square feet. Hand seeding and fertilizing devices will be allowed, as approved by the Engineer. All newly seeded and fertilized areas shall be raked to the satisfaction of the Engineer. Seeding and fertilizing will not be measured for payment but shall be incidental to the contract lump sum price for [EROSION CONTROL](#).

WASTE DISPOSAL SITE

The Contractor will be required to furnish a site(s) for the disposal of construction/demolition debris generated by this project.

Construction/demolition debris may not be disposed of within the State ROW.

The waste disposal site(s) shall be managed and reclaimed in accordance with the following from the General Permit for Highway, Road, and Railway Construction/Demolition Debris Disposal Under the South Dakota Waste Management Program issued by the Department of Environment and Natural Resources.

The waste disposal site(s) shall not be located in a wetland, within 200 feet of surface water, or in an area that adversely affects wildlife, recreation, aesthetic value of an area, or any threatened or endangered species, as approved by the Engineer.

If the waste disposal site(s) is located such that it is within view of any ROW, the following additional requirements shall apply:

1. Construction/demolition debris consisting of concrete, asphalt concrete, or other similar materials shall be buried in a trench completely separate from wood debris. The final cover over the construction/demolition debris shall consist of a minimum of 1 foot of soil capable of supporting vegetation. Waste disposal sites provided outside of the State ROW shall be seeded in accordance with Natural Resources Conservation Service recommendations. The seeding recommendations may be obtained through the appropriate County NRCS Office. The Contractor shall control the access to waste disposal sites not within the State ROW through the use of fences, gates, and placement of a sign or signs at the entrance to the site stating "No Dumping Allowed".
2. Concrete and asphalt concrete debris may be stockpiled within view of the ROW for a period of time not to exceed the duration of the project. Prior to project completion, the waste shall be removed from view of the ROW or buried and the waste disposal site reclaimed as noted above.

The above requirements will not apply to waste disposal sites that are covered by an individual solid waste permit as specified in SDCL 34A-6-58, SDCL 34A-6-1.13, and ARSD 74:27:10:06.

Failure to comply with the requirements stated above may result in civil penalties in accordance with South Dakota Solid Waste Law, SDCL 34A-6-1.31.

All costs associated with furnishing waste disposal site(s), disposing of waste, maintaining control of access (fence, gates, and signs), and reclamation of the waste disposal site(s) shall be incidental to the various contract items.

HISTORICAL PRESERVATION OFFICE CLEARANCES

To obtain SHPO clearance, a cultural resources survey may need to be conducted by a qualified archaeologist. The Contractor shall arrange and pay for this survey. In lieu of a cultural resources survey, the Contractor could request a literature search on the site and provide evidence that the site has been previously disturbed by farming, mining, or construction activities with a landowner statement that no artifacts have been found on the site. Jim Donohue, State Archaeological Research Center at 605-394-1937 shall be contacted for a literature search.

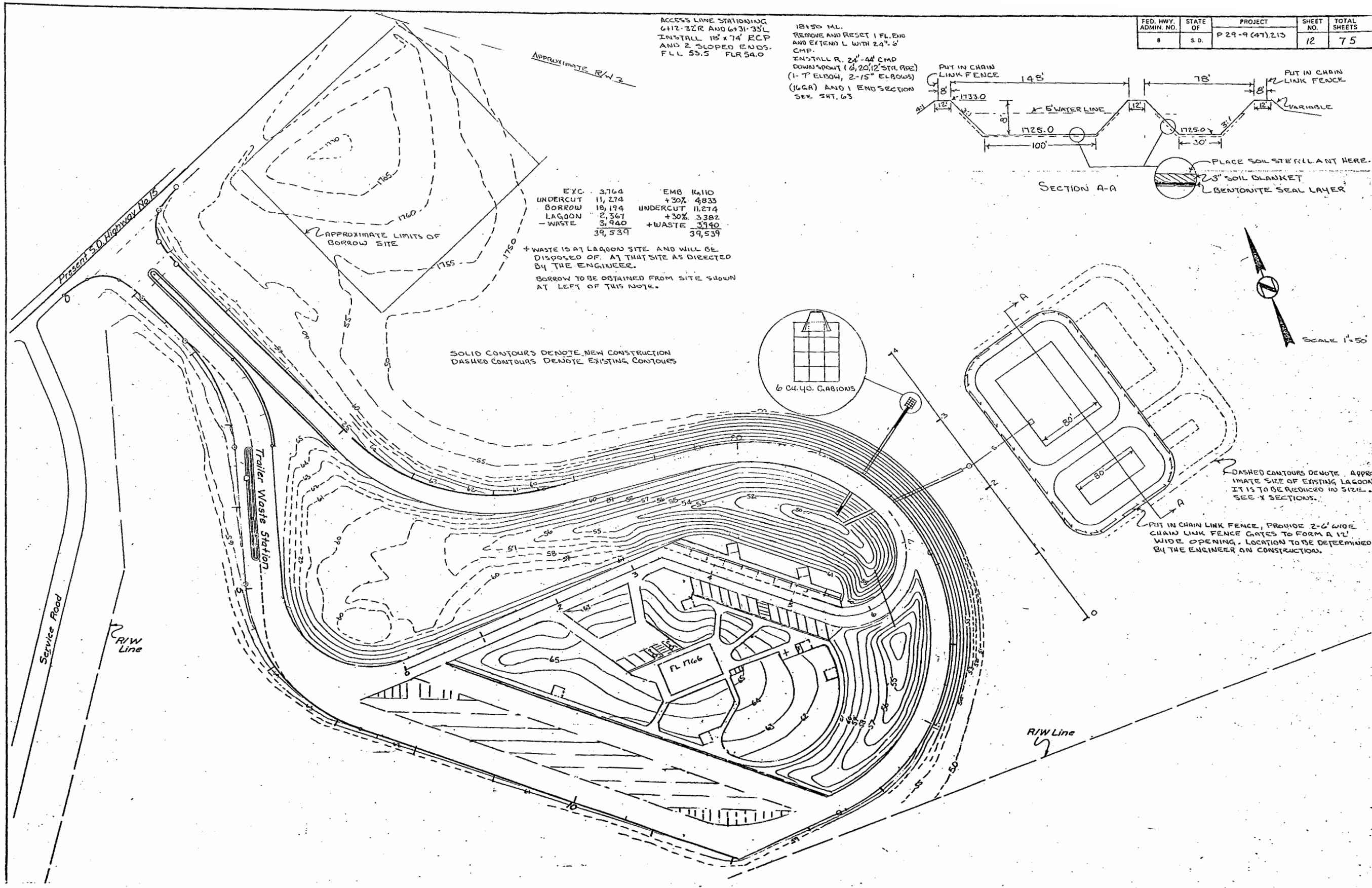
If borrow material is furnished from within the current geographical reservation boundaries or historic boundaries of the Lake Traverse, Yankton, or Flandreau-Santee reservations, the Contractor shall obtain THPO (Tribal Historical Preservation Office) clearance from the Tribal Cultural Resources Officer. This requirement is in addition to the SHPO clearance. If no Tribal contact exists, the required SHPO clearance shall suffice, with documentation of Tribal contact efforts provided to SHPO.

To facilitate SHPO and THPO responses, the Contractor should submit a cultural resources survey report or the results of the literature search along with a legal description of the site, a topographical map with the site clearly marked, and evidence of prior site disturbance to Terrence G. Keller, DOT Environmental Supervisor, 700 East Broadway Avenue, Pierre, SD 57501-2586 (605-773-3721). Allow 30 days from the date this information is submitted to the Environmental Engineer for SHPO approval. The Contractor is responsible for obtaining all required permits and clearances for the borrow and/or waste disposal site(s) prior to commencing construction activities at the borrow and/or waste disposal site(s). The Contractor shall provide the required permits and clearances to the Engineer at the preconstruction meeting.

ORIGINAL LAGOON CONSTRUCTION DETAILS

STATE OF SOUTH DAKOTA	PROJECT 029 N-172	SHEET NO. 4	TOTAL SHEETS 9
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FED. HWY. ADMIN. NO. 8	STATE OF S.D.	PROJECT P 29-9 (47) 213	SHEET NO. 12	TOTAL SHEETS 75
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ORIGINAL LAGOON CONSTRUCTION DETAILS

STATE OF SOUTH DAKOTA	PROJECT 029 N-172	SHEET NO. 5	TOTAL SHEETS 9
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FED. HWY. ADMIN. NO. 8	STATE OF S.D.	PROJECT P 29-9(47) 213	SHEET NO. 32	TOTAL SHEETS 75
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NOTE REGARDING LAGOON SEALING

MATERIALS - BENTONITE CLAY FOR SEALING SHALL BE GRANULATED, CHEMICALLY PURE BENTONITE CLAY MANUFACTURED FOR USE WITH LOCAL SOIL FOR POND SEALING. THE MATERIAL SHALL BE 90% GRANULAR HAVING APPROXIMATELY 90% BY WEIGHT PASSING THE NO. 20 SIEVE AND RETAINED ON THE NO. 70 SIEVE WITH LESS THAN 1% PASSING THE NO. 100 SIEVE, AND A WEIGHT OF APPROXIMATELY 67 POUNDS PER CUBIC FOOT WHEN DRY.

APPLICATION - WHEN WEATHER PERMITS, THE BENTONITE SHALL BE UNIFORMLY SPREAD OVER THE AREA TO BE SEALED USING AN APPROVED SPREADER. RATE OF APPLICATION OF BENTONITE SHALL BE 2.0 LBS. PER SQUARE FOOT OF AREA. BENTONITE SHALL BE PLACED IN AN EVEN UNBROKEN LAYER WHICH WILL BE LEFT INTACT WHEN OVERLYING SOIL BLANKET IS LAID. THERE WILL BE NO MIXING OF BENTONITE WITH THE UNDERLYING SOIL.

CARE SHALL BE TAKEN TO PROVIDE A CONTINUOUS BENTONITE SEAL LAYER. FOLLOWING SPREADING OF BENTONITE LAYER, 3" OF SOIL MATERIAL SHALL BE SPREAD OVER THE BENTONITE LAYER TAKING SPECIAL CARE NOT TO DISTURB OR DISPLACE ANY PORTION OF THE BENTONITE LAYER DURING THE OPERATION. THE ENTIRE AREA SHALL BE COMPACTED WITH RUBBER TIERED ROLLER OR OTHER APPROVED EQUIPMENT TO THE SATISFACTION OF THE ENGINEER.

NOTE REGARDING SOIL STERILIZATION

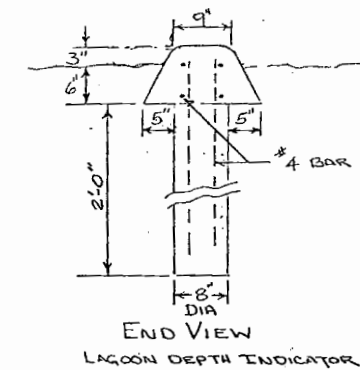
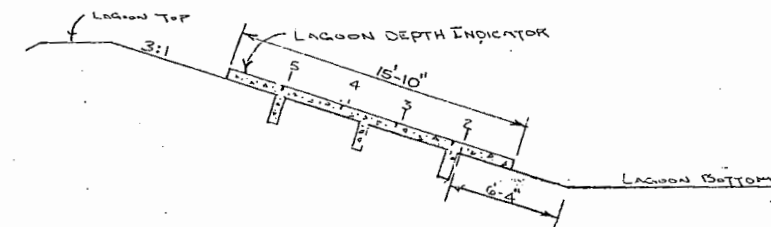
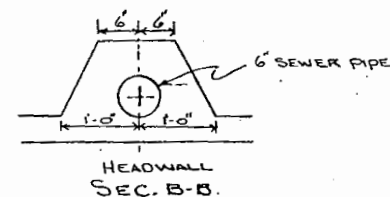
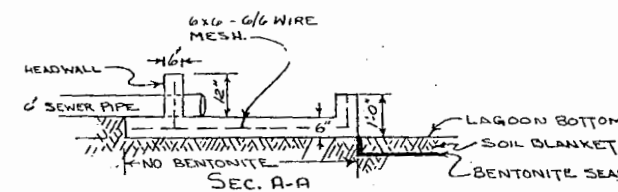
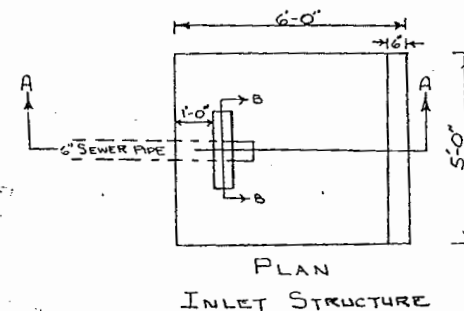
THE INTERIOR OF THE NEW LAGOON BOTTOM AND DIKES UP TO ONE FOOT ABOVE THE WATER LEVEL SHALL BE STERILIZED TO PREVENT PLANT GROWTH. ACCEPTABLE SOIL STERILANTS ARE TABULATED BELOW WITH THE RATE OF APPLICATION PER ACRE.

	GRANULAR	LIQUID
SIMAZINE	10 LBS.	30 GALS OF WATER
ATRAZINE	AS PER MANUFACTURER'S INSTRUCTIONS	
UREASOR	320 LBS.	
BENZABOR	250 LBS.	

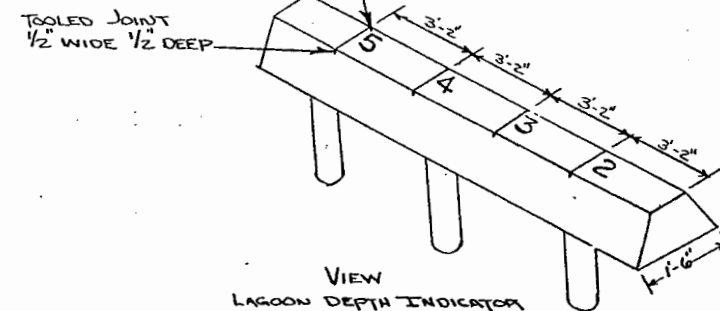
GRANULAR APPLICATION - SURFACES TO BE TREATED SHALL BE REASONABLY SMOOTH AND HARD PACKED AREAS SHALL BE WORKED TO A DEPTH OF APPROXIMATELY 1/2" WITH ALL LUMPS BROKEN DOWN. APPLICATION OF THE GRANULAR SOIL STERILANT SHALL BE DONE BY A FERTILIZER SPREADER AND CARE SHALL BE TAKEN TO APPLY THE GRANULES AT THE PROPER RATE. THE SOIL STERILANT SHALL BE DELIVERED TO THE PROJECT SITE IN SEALED BAGS OR OTHER STANDARD CONTAINERS THAT CLEARLY IDENTIFY NAMES AND AMOUNTS OF ACTIVE INGREDIENTS. THE GRANULES SHALL BE UNIFORM IN COMPOSITION, DRY AND FREE FLOWING AND ANY CAKED OR OTHERWISE DAMAGED STERILANT SHALL NOT BE ACCEPTABLE.

UPON COMPLETION OF THE APPLICATION OF THE GRANULES THE AREA SHALL BE LIGHTLY HARROWED TO A DEPTH OF 1/2".

LIQUID APPLICATION - SURFACE TO BE TREATED SHALL BE REASONABLY SMOOTH AND ALL HARD PACKED AREAS SHALL BE WORKED TO A DEPTH OF APPROXIMATELY 1/2" WITH ALL LUMPS BROKEN DOWN. A SPRAYER IN GOOD MECHANICAL CONDITION EQUIPPED WITH A SUPPLY TANK OF AT LEAST 50 GALLONS, BYPASS VALVE, PRESSURE GAUGE, SPRAY BOOM, FILTERS, AND PUMP WITH A CAPACITY OF AT LEAST 50 POUNDS SHALL BE PROVIDED. THE SPRAYER SHALL BE OPERATED AT A PRESSURE OF 30 TO 40 POUNDS WITH NOZZLE SPACING BETWEEN 16" AND 24" AND OPERATED AT APPROXIMATE PERIODS OF LOW WINDS. CARE SHALL BE TAKEN TO LAP THE APPLICATION STRIPS TO PROVIDE FULL COVERAGE.



SCISE NUMBERS INTO CONCRETE LETTERS TO BE 2" HIGH, 1 1/2" WIDE. USE TEMPLATE.



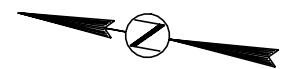
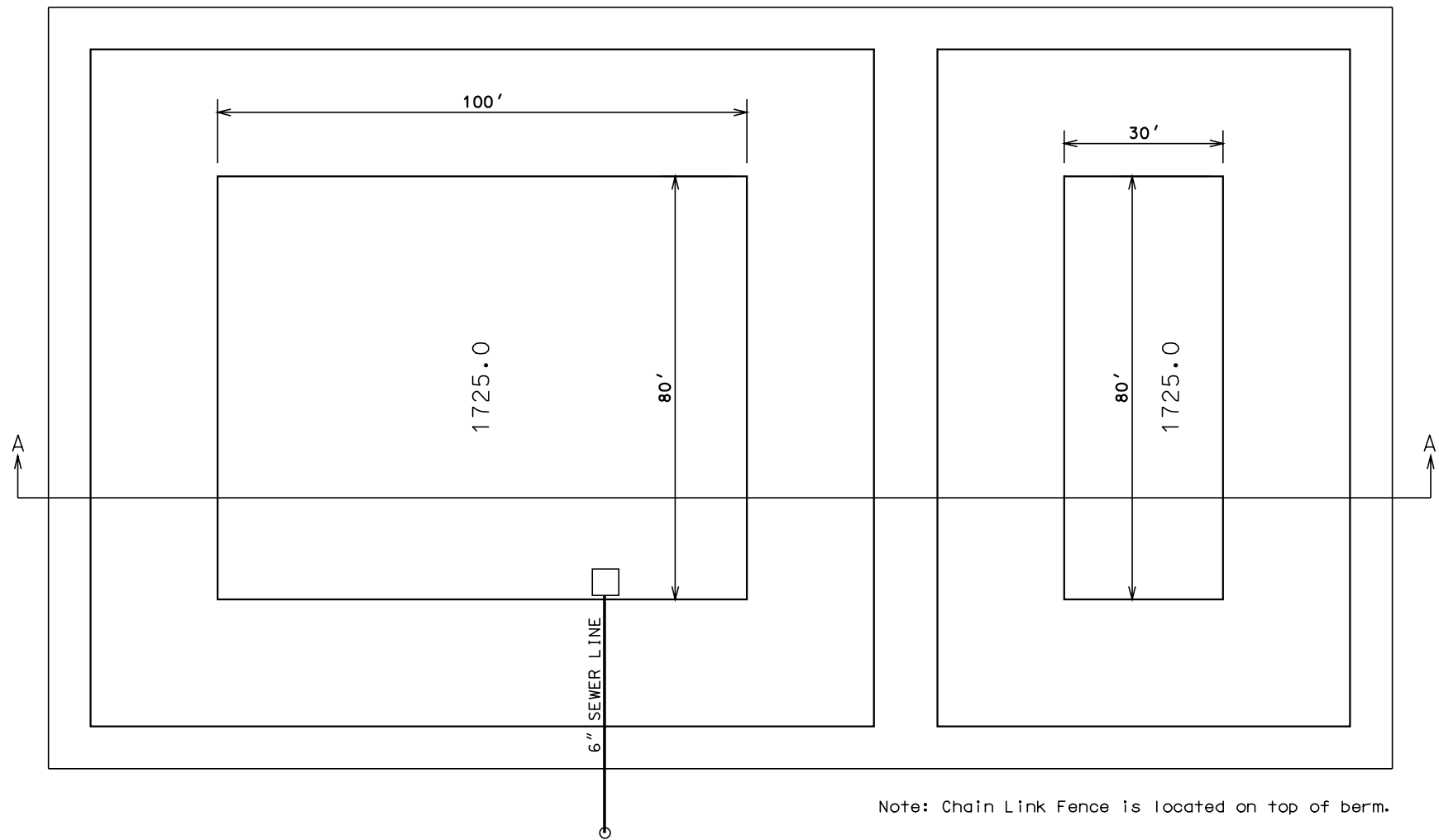
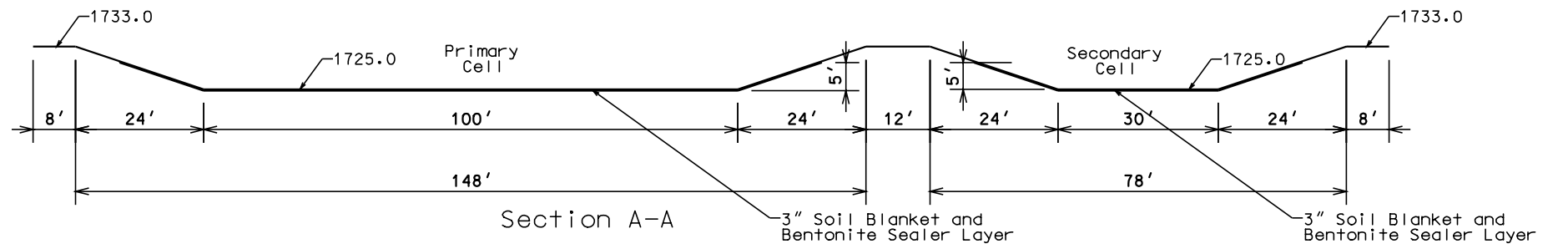
CONCRETE FOR LAGOON INLET STRUCTURE AND DEPTH INDICATOR TO BE CLASS M.S.

PLOT SCALE - 30.000000:1.000000

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EXISTING LAGOON SECTION

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 N-172	6	9
Plotting Date: 01-JUN-2009			



PLOT NAME - LAGOON.DETAIL

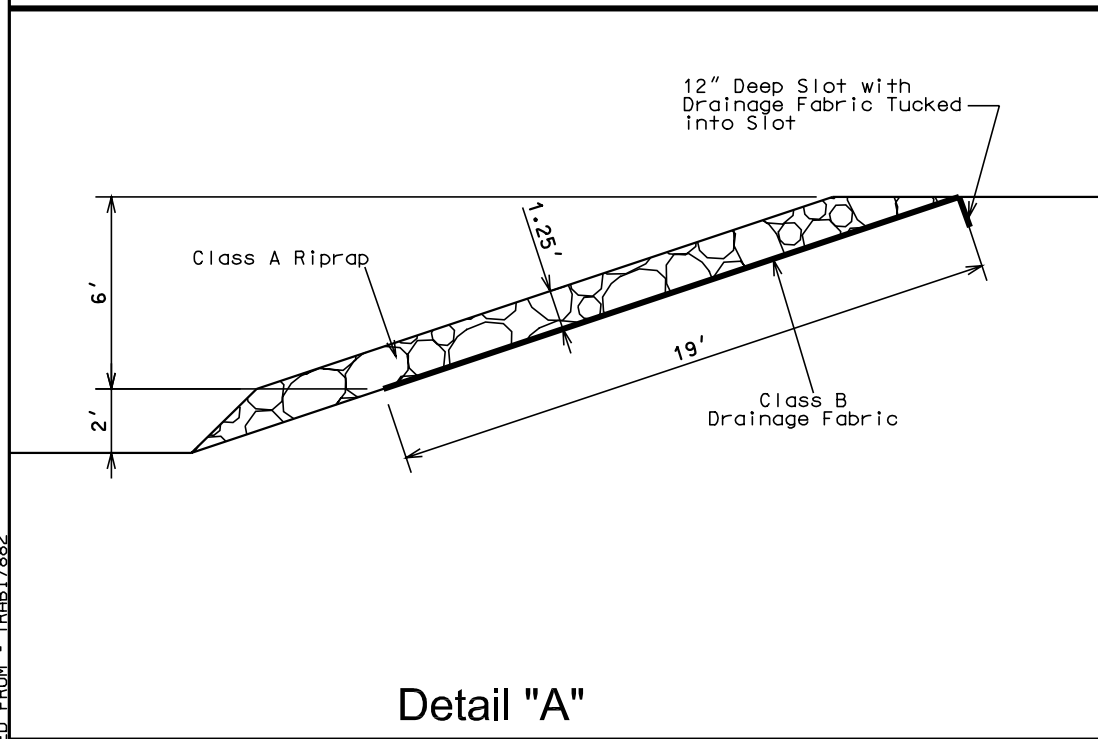
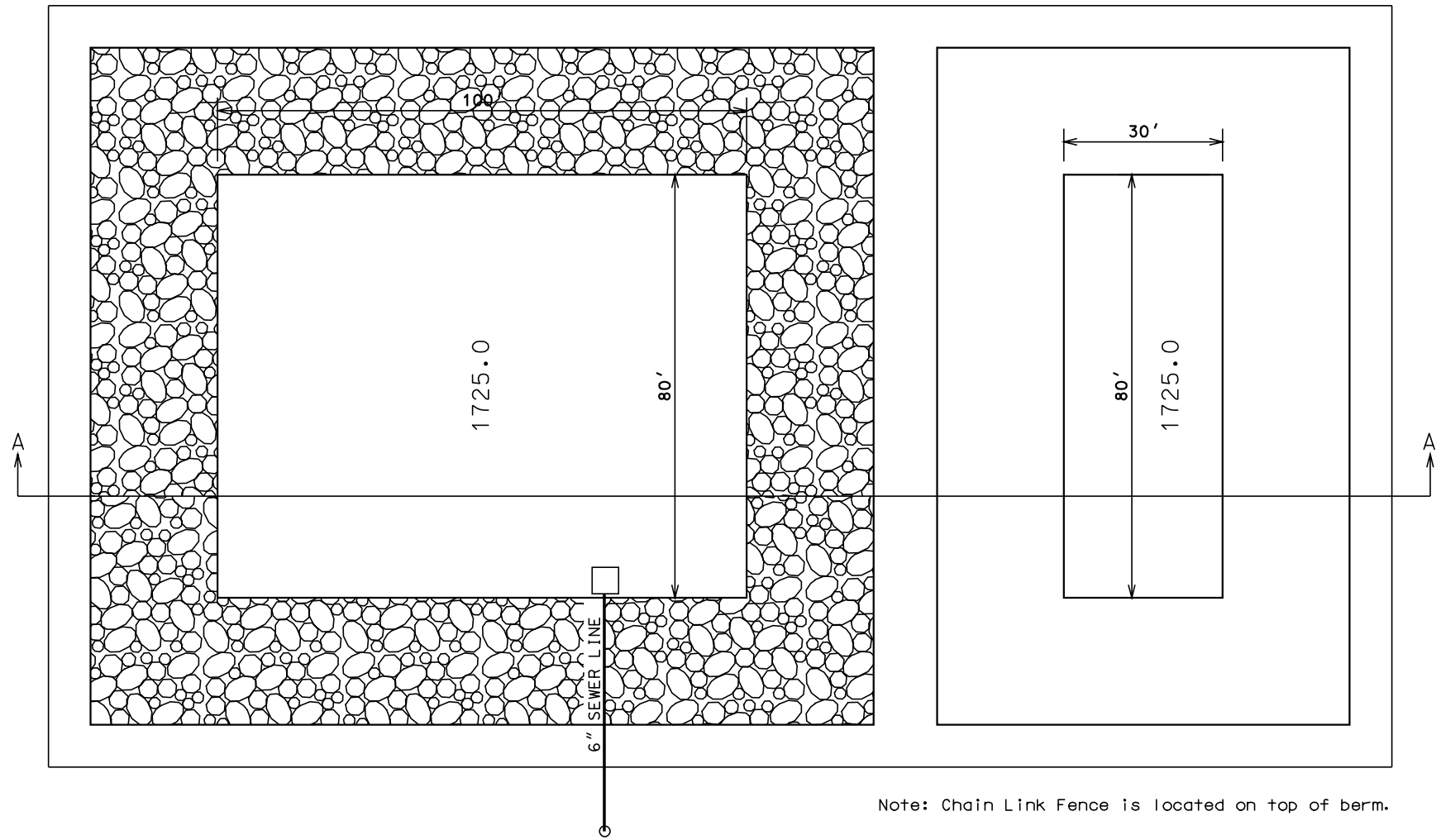
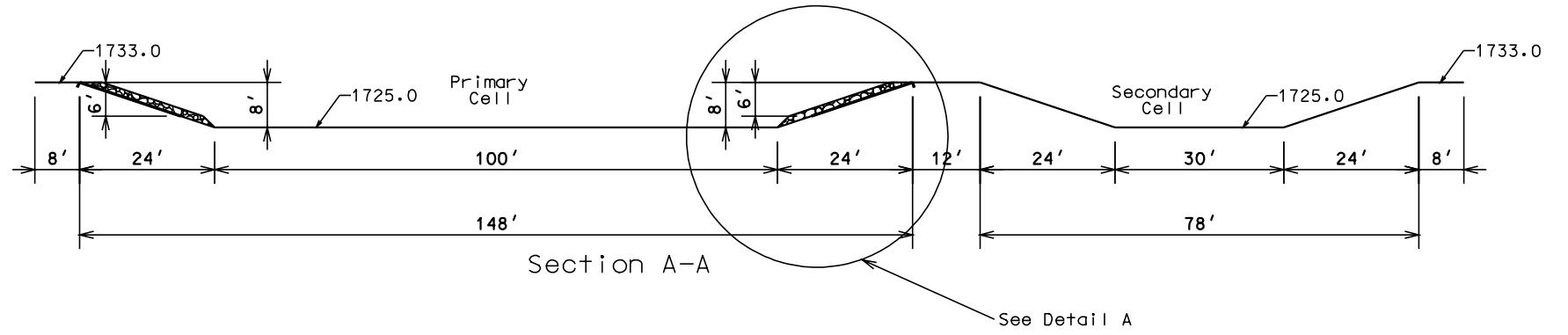
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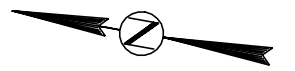
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PROPOSED LAGOON SECTION

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 N-172	7	9
Plotting Date: 01-JUN-2009			

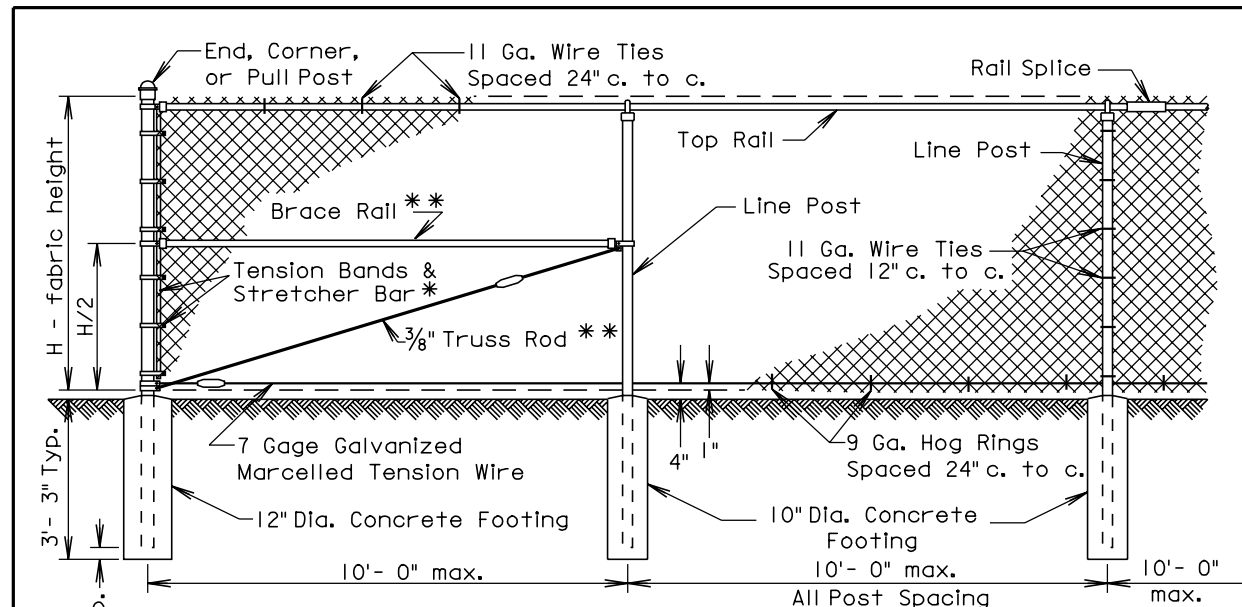


Detail "A"



PLOT NAME - LAGOON_DETAIL1 FILE - U:\REGIONAL\PROJ\ROBT116Z\LAGOON_DETAIL.DGN

Plotting Date: 04-MAY-2009



* Tension Bands shall be spaced 12" c. to c.
 ** Are not required for 3' thru 5' fences.
 ○ Tightening Device such as shown on Plate No. 621.03

Component	End, Corner & Pull Post		Line Post			Top & Brace Rail	
	Round Pipe Nominal	Roll Formed Steel	Round Pipe Nominal	"C" Section	H-Beam Steel	Round Pipe Nominal	Roll Formed Steel
Size	3.00" O. D.	3.5" x 3.5"	2.50" O. D.	1.875"x1.625"	2.25"x1.70"	1.625" O. D.	1.625"x1.25"
Weight (lb. / ft.)	5.79 or 4.64	5.14	3.65 or 3.12	2.34	3.43	2.27 or 1.84	1.35

GENERAL NOTES:

Specific details of manufacture of component parts of the complete fence construction shall be subject to the approval of the Engineer. Commercially available items produced specifically for the use intended shall be used wherever possible in the construction of the fence.

"H" (Height of Fabric) shall be as shown on the Plans. Fabric is available in the the following heights; 36", 42", 48", 60", 72", 84", 96", 108", 120", & 144". Fabric heights 60 inches and under shall be knuckled at both selvages. Fabric heights 72 inches and over shall be knuckled at one selvage and twisted at the other selvage.

Chain Link Fabric shall be 2" mesh, No. 9 gage galvanized wire securely fastened to Tension Wire, Line Post, Rails, Braces and Stretcher Bars spaced as shown hereon.

Fence may be constructed with either Round Pipe, "C" Section, "H" Beam, or roll Formed Steel components as shown in the table above. Line post may be Round Pipe, "C" Section, or "H" Beam. The Corner Post and Rails shall be either Round Pipe or Roll Formed Steel. The type of components used shall have prior approval by the Engineer before construction.

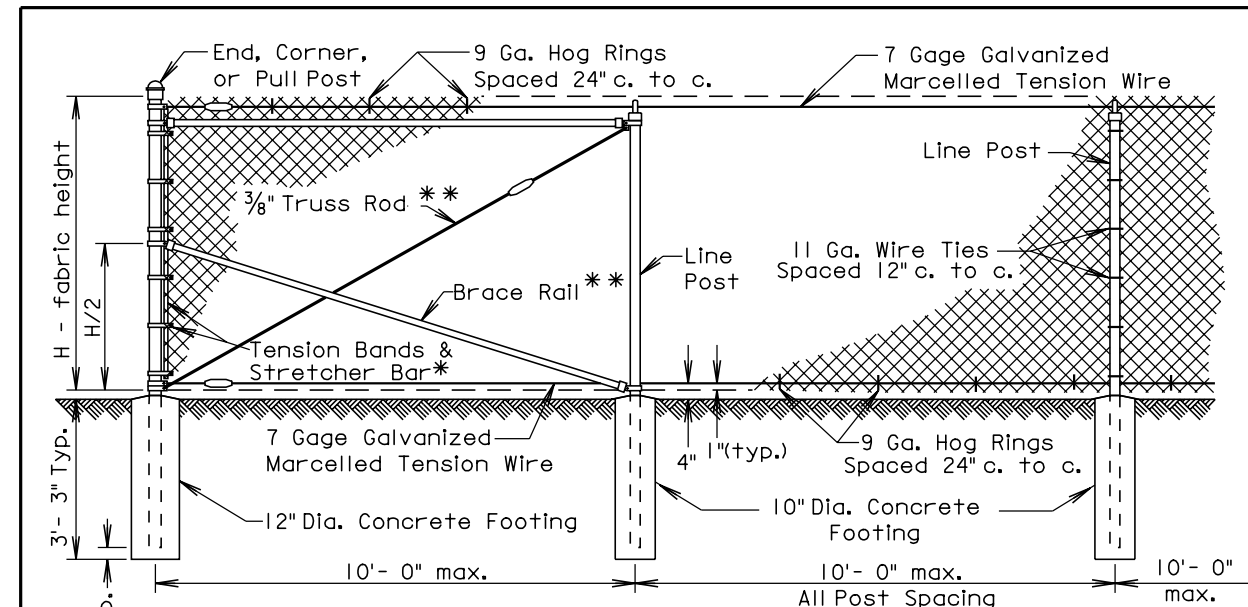
Where fence must cross small bodies of water (such as drainage areas or ponds) that could freeze during the winter, use 11 gage Hog Rings. Provide only two ties per Tension Wire and Top Rail between line posts.

A suitable method of rail splicing shall be used to allow for expansion and contraction while maintaining proper position of the Top Rail.

March 31, 2000

S D D O T	CHAIN LINK FENCE WITH TOP RAIL	PLATE NUMBER 621.01
		Sheet 1 of 1

Published Date: 2nd Qtr. 2009



* Tension Bands shall be spaced 12" c. to c.
 ** Are not required for 3' thru 5' fences.
 ○ Tightening Device such as shown on Plate No. 621.03

Component	End, Corner & Pull Post		Line Post			Top & Brace Rail	
	Round Pipe Nominal	Roll Formed Steel	Round Pipe Nominal	"C" Section	H-Beam Steel	Round Pipe Nominal	Roll Formed Steel
Size	3.00" O. D.	3.5" x 3.5"	2.50" O. D.	1.875"x1.625"	2.25"x1.70"	1.625" O. D.	1.625"x1.25"
Weight (lb. / ft.)	5.79 or 4.64	5.14	3.65 or 3.12	2.34	3.43	2.27 or 1.84	1.35

GENERAL NOTES:

Specific details of manufacture of component parts of the complete fence construction shall be subject to the approval of the Engineer. Commercially available items produced specifically for the use intended shall be used wherever possible in the construction of the fence.

"H" (Height of Fabric) shall be as shown on the Plans. Fabric is available in the the following heights; 36", 42", 48", 60", 72", 84", 96", 108", 120", & 144". Fabric heights 60 inches and under shall be knuckled at both selvages. Fabric heights 72 inches and over shall be knuckled at one selvage and twisted at the other selvage.

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Fence may be constructed with either Round Pipe, "C" Section, "H" Beam, or roll Formed Steel components as shown in the table above. Line post may be Round Pipe, "C" Section, or "H" Beam. The Corner Post and Rails shall be either Round Pipe or Roll Formed Steel. The type of components used shall have prior approval by the Engineer before construction.

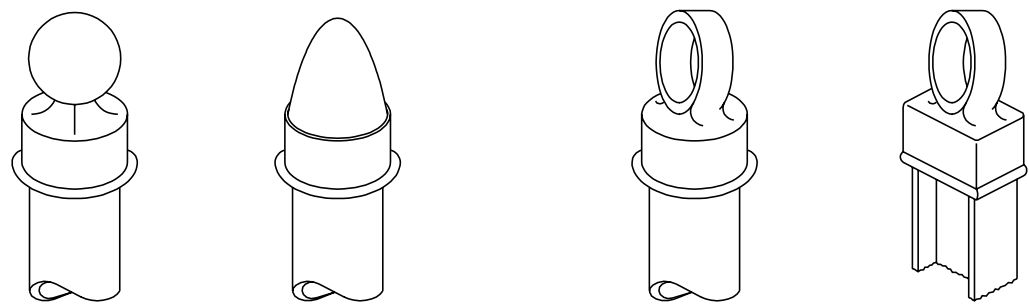
All post shall have a means to securely hold the top tension wire in position and allow for the removal and replacement of a post without damaging the top tension wire.

Where fence must cross small bodies of water (such as drainage areas or ponds) that could freeze during the winter, use 11 gage Hog Rings. Provide only two ties per Tension Wire and Top Rail between line posts.

March 31, 2000

S D D O T	CHAIN LINK FENCE WITH TENSION WIRED TOP	PLATE NUMBER 621.02
		Sheet 1 of 1

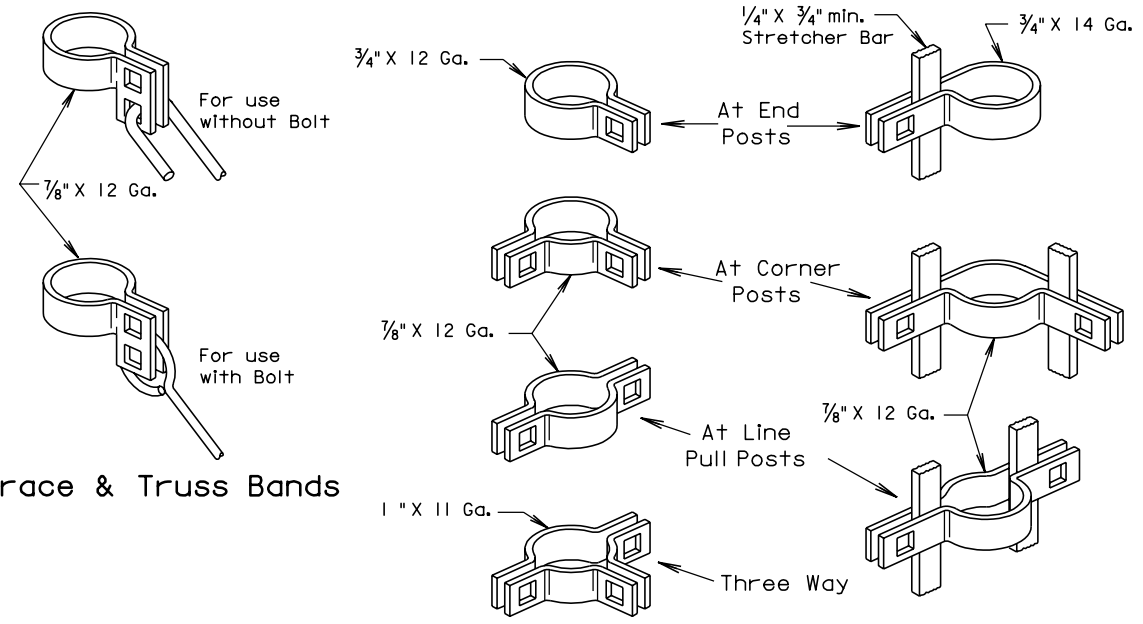
Published Date: 2nd Qtr. 2009



For End, Corner and Pull Posts

For Line Posts

Typical Post Tops
(Shown for example only)

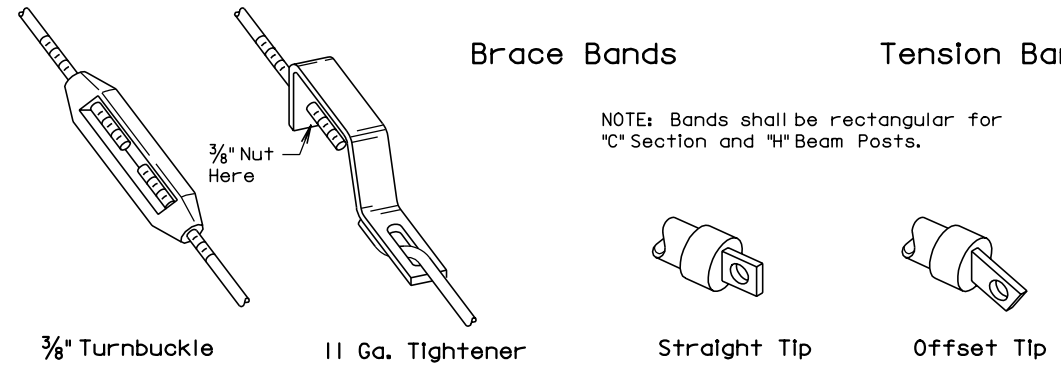


Brace & Truss Bands

Brace Bands

Tension Bands

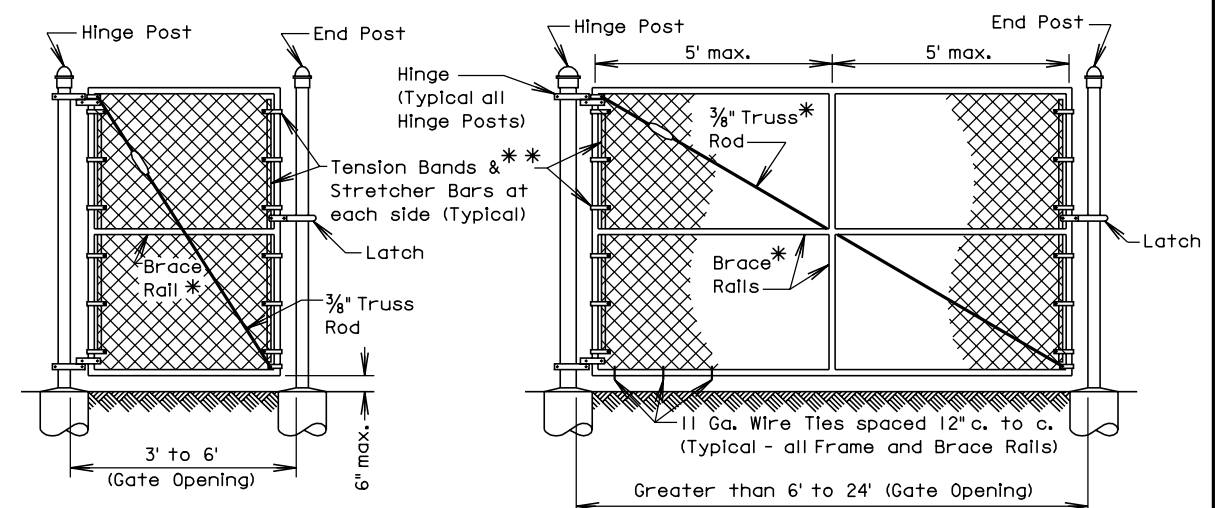
NOTE: Bands shall be rectangular for "C" Section and "H" Beam Posts.



Tightening Devices

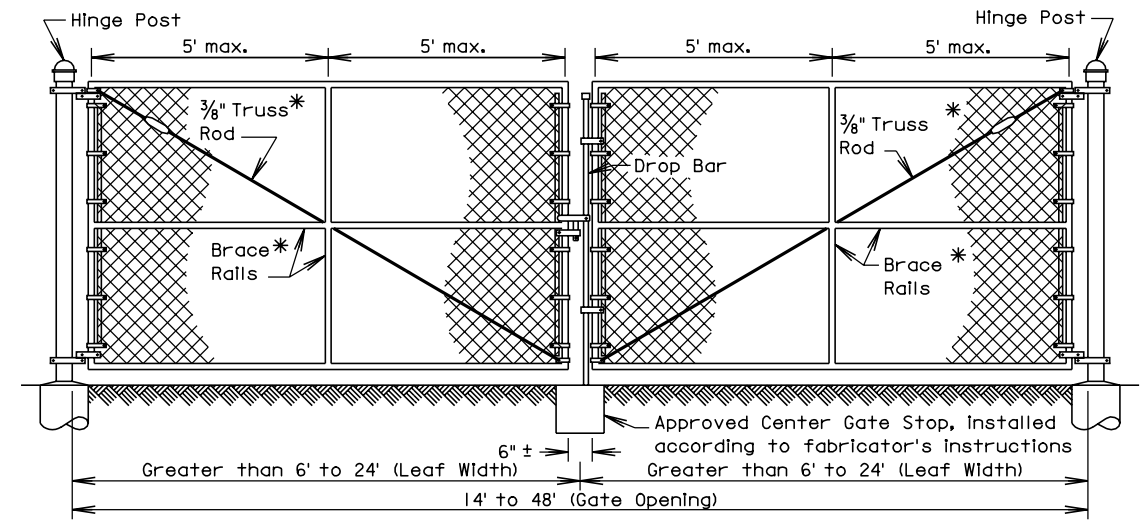
Rail Ends

March 31, 2000



PEDESTRIAN SWING GATE

SINGLE VEHICULAR SWING GATE



DOUBLE VEHICULAR SWING GATE

Gate Opening		Frame Pipe Nominal	Brace Rail - Pipe Nominal
Width ¹	Height ²		
3' to 8'	3' to 6'	1.50"	1.50"
>8' to 23'	6'	1.90"	1.50"
>8' to 23'	> 6' to 12'	1.90"	1.90"

Gate Opening Width ¹	Hinge Post		Concrete Footing	
	Round Pipe Nominal	Roll Formed Steel	Depth	Diameter
3' to 6'	3.00"	3.50"X3.50"	36"	12"
> 6' to 13'	4.00"	—	42"	12"
> 13' to 18'	6.625"	—	48"	18"
> 18' to 23'	8.625"	—	48"	24"

NOTE: Gate frames may be constructed of bent or welded steel tubing installed according to fabricator's instructions and subject to the Engineer's approval.

- * Are not required for gates 3' to 5' height or 5' or less in width.
- ** Tension Bands shall be spaced 12" c. to c.
- Tightening Device such as shown on standard plate 621.03
- ¹ Leaf width for Double Vehicular Swing Gate
- ² Shall coincide with fence height

September 14, 2001