Bureau of Engineers
Sewer Engineering Division
June 23, 1988

SOIL EROSION CONTROL PLAN
(SEWER INSTALLATION IN PAVED, RURAL CROSS-SECTION; PEDESTRIAN WAYS, AND UNPAVED AREAS, OTHER THAN CHANNELS)

GENERAL

The control of soil erosion will be a dynamic process requiring flexibility to accommodate changing conditions as the sewer project progresses. The general erosion control measures are described on the plan and in this specification. Inlet Protection and Adjacent Area Protection, Section A, shall be paid at a unit bid price. All other work under Sections B. and C. shall be included in the unit bid price for sewers. Any additional requirements for Inlet Protection or Adjacent Area Protection ordered by the representative of the Commissioner of Public Works shall be paid at the unit bid price. All control measures protruding above the normal paved and/or ground surface shall be marked by barricades and flashers.

SECTION A. Control of surface runoff.

1. Storm water inlet or catch basin, hereinafter called inlet protection

Generally, inlets may be protected in one of two ways. Alternatives may be used, subject to approval by the Commissioner of Public Works. Protection shall be installed prior to disturbing any pavement or earth, and shall remain in place and maintained until the disturbed areas are restored.

a. Inlet Screen (Not Paved) (Type R)

(1.) Protection of inlets on non-paved surfaces shall conform to Figure 5, "Inlet Screen (Not Paved)", unless a modification is approved by the Commissioner of Public Works' representative.

(2.) Inlet screens shall be installed at all inlets that will receive runoff from the construction site.

(3.) Inlet screens shall be a minimum of 18 inches and not more than 24 inches in height above the ground surface.

(4.) Filter fabric shall be supported by a minimum 14 gauge welded wire support fence with a maximum 4 inch x 2 inch mesh opening; or with industrial polypropylene netting with a maximum mesh spacing of 3/4 inch and a heavy duty nylon top support cord. The support fence shall extend a minimum of 4 inches below the ground surface.

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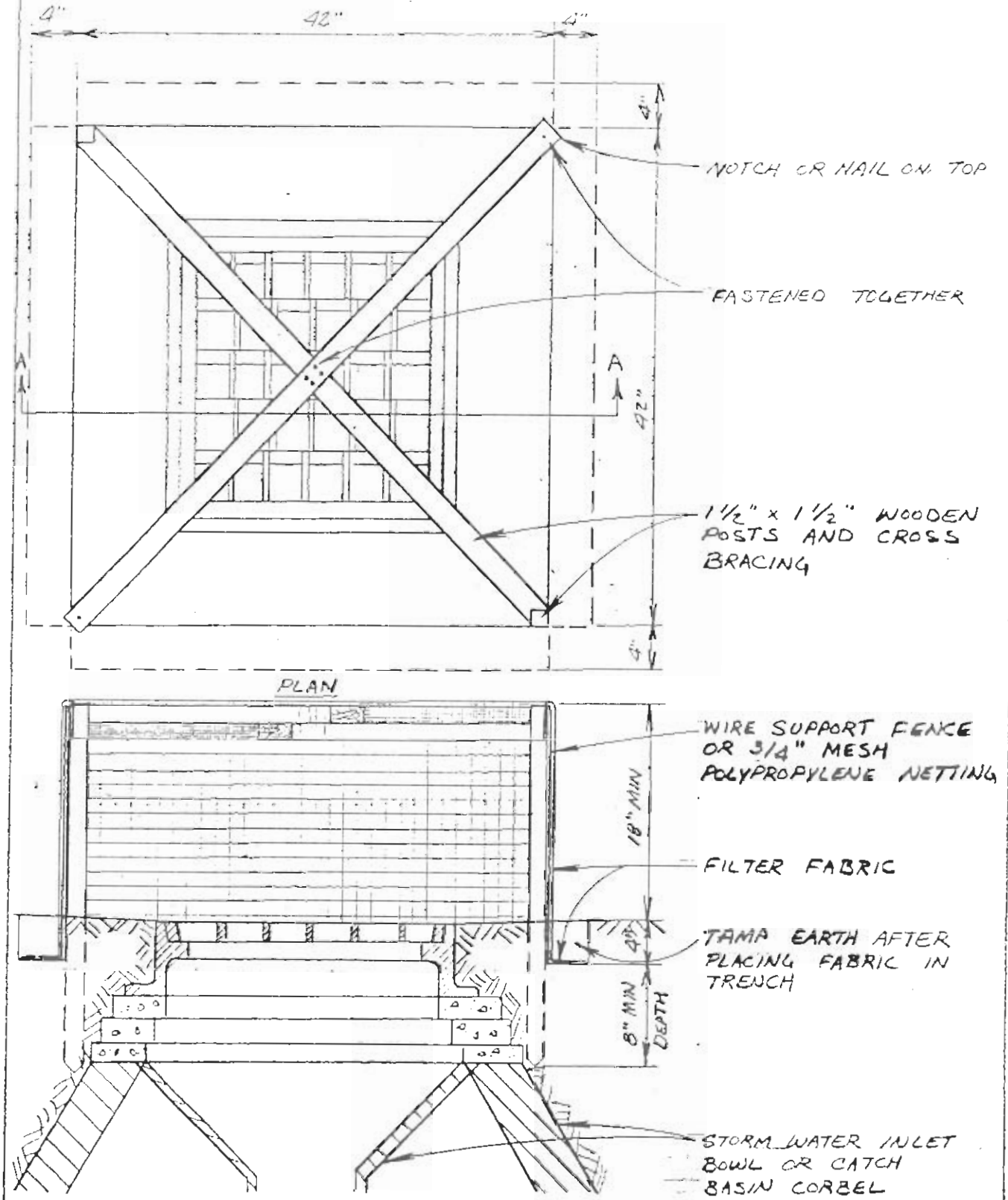

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INLET SCREEN (NOT PAVED)
(TYPE R)

FIGURE 5

JUNE 23 1988 SCALE: 1"=1'-0"

(5.) Wood support posts shall be a minimum of 1-1/2 inches x 1-1/2 inches, or 2 inches in diameter, driven at least 12 inches into the ground at all four corners. Crossbracings of a minimum 1-1/2 inches x 1-1/2 inches shall be attached to the top of the support posts for stability.

(6.) The filter fabric shall be buried along the side and bottom of a 4 inch x 4 inch trench dug around the outside perimeter of the filter barrier. After installation of filter fabric, the earth shall be tamped back in place.

(7.) If filter fabric is being placed over a welded wire support fence, it shall overlap at least 2 inches and be wired in place or fastened with wire rings, 12-inches on center.

(8.) The filter fabric shall be a geo-textile fabric; polyester, polypropylene, stabilized nylon, polyethylene or polyvinylidene chloride meeting the following specifications:

Grab Strength: 45 lb. minimum in any principal direction (ASTM D1682)

Mullen Burst Strength: Minimum 60 psi (ASTM D774)

The fabric shall have an opening no greater than a number 20 U.S. Standard Sieve, and a minimum permeability of 120 gpm/sq.ft. (Multiply Permittivity in $Sec.^{-1}$ determined by ASTM D4491-85 Constant Head Test by conversion factor of 74.)

(9.) Inlet screens shall be inspected within 24 hours after each rainfall or daily during extended periods of precipitation. Repairs shall be made immediately, as necessary, to prevent particles from reaching the sewerage system and/or causing surface flooding.

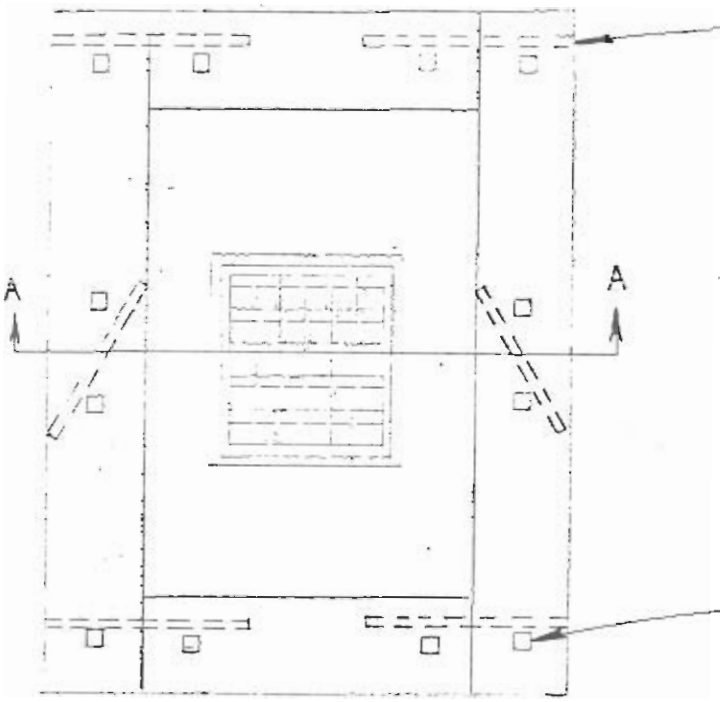
(10.) Sediment deposits shall be removed after each storm event, or when reaching a maximum depth of 3 inches.

b. Inlet Screen (Alternate) (Type S)

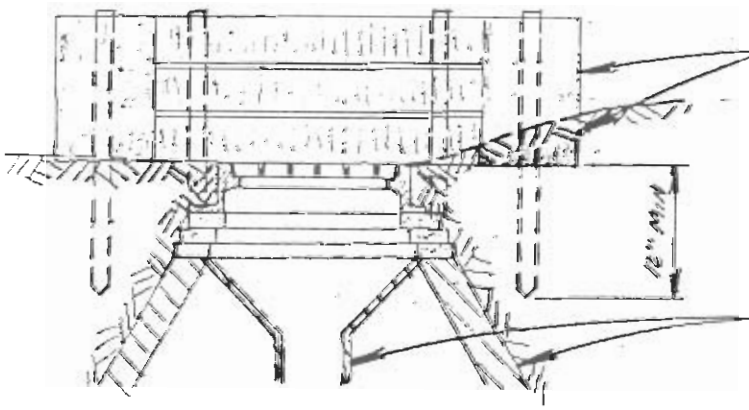
An alternative method of inlet protection may be permitted. Prior approval must be obtained from the Commissioner of Public Works' representative.

(1.) Protection of inlets may be as shown in Figure 6, "Inlet screen (Alternate)", in non-paved area. Comments from Section A 1.a. sub (2), (9) and (10) shall apply.

(2.) Six or more straw bales shall be positioned to completely surround the inlet.



PLAN



SECTION A-A

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INLET SCREEN ALTERNATE (TYPE S)

FIGURE 6

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SCALE 1"=2'-0"

(3.) The bottom of the bales shall be flush with the ground. If depressions exist, it may be necessary to bury the bales up to 4 inches into the ground. If buried, the earth shall be tamped solidly in place around outside edges.

(4.) Stakes or other effective means shall be used to fasten the bales together.

(5.) Two wood 1-1/2 inch x 1-1/2 inch stakes or hooked reinforcing bars shall be used to anchor each bale securely to ground. The anchor material shall be long enough to penetrate 12 inches into ground, unless the anchor is in a very soft soil or a disturbed trench area, where the minimum depth shall be 2 feet.

2. Adjacent Area Protection

Roadside ditches and/or adjacent downslope land need to be protected from water born sediment originating in the construction area. Such protection will be accomplished by use of Filter Fences.

a. Downslope land

(1.) The contractor shall erect Filter Fences (Type W) conforming to the typical configuration shown in Figures 7 and 7A along all downslope sides of the work site.

(2.) Protection shall be installed as the project progresses and shall remain in place and be maintained until the disturbed areas are restored or protected so as to prevent erosion. During dry weather, the protection may be temporarily removed immediately adjacent to the trench area to facilitate construction.

(3.) Filter Fences shall be a minimum of 18 inches and not more than 24 inches in height.

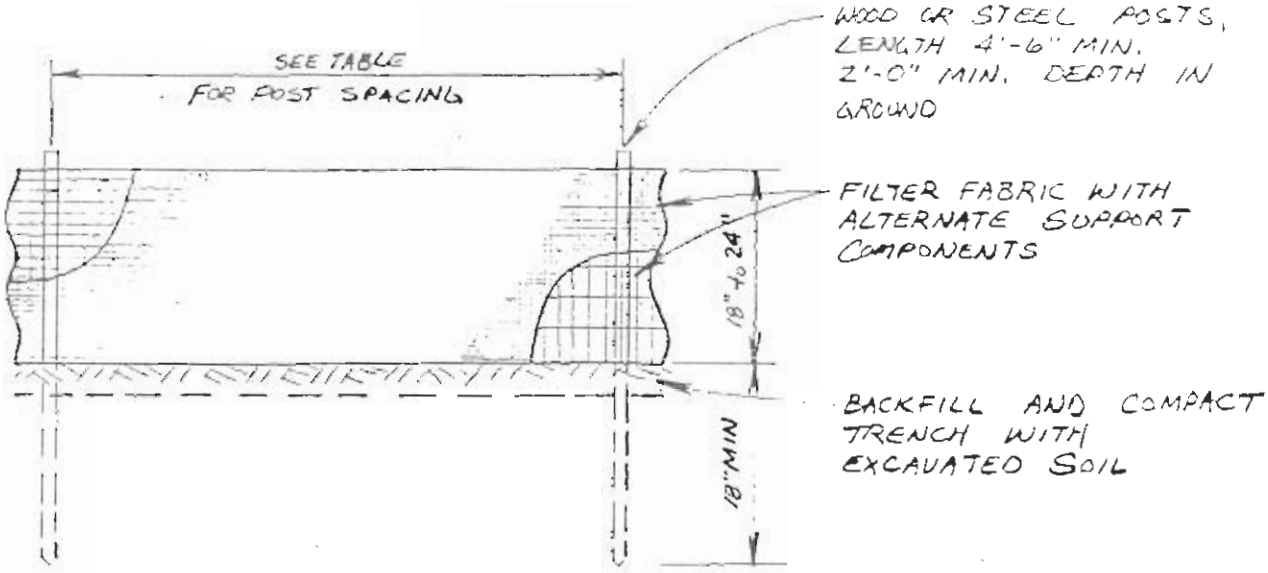
(4.) Fences shall be supported by 1-1/2 inch x 1-1/2 inch wooden posts or equivalent driven at least 18 inches into the ground unless the post is in a very soft soil or a disturbed trench area, where the minimum depth shall be 3 feet.

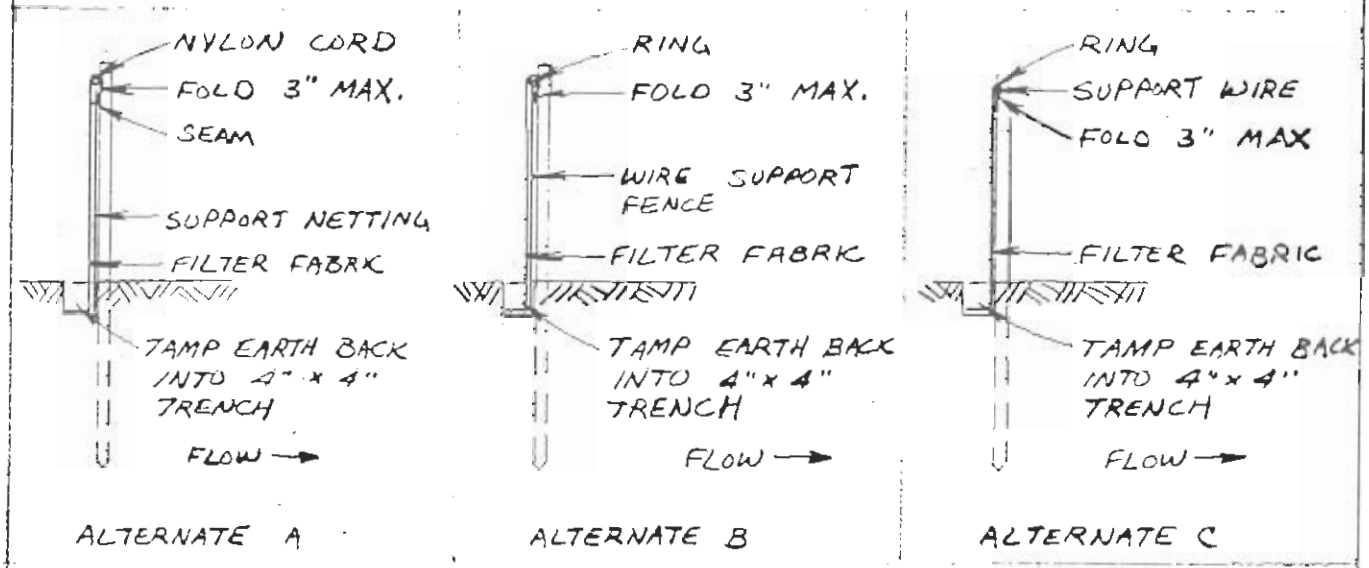
(5.) In soft soil or high load situations, the contractor may be required by the Commissioner of Public Works' representative to install additional support for the wooden posts by installing tie backs as shown in Figure 7 on the upstream side of the Filter Fence.

(6.) Support Spacing

a. Fabric only.

Maximum post spacing shall be 3 feet with fabric only. A top support wire or cord is required. Fabric shall fold over the wire 3 inches and be wired or held with wire rings.

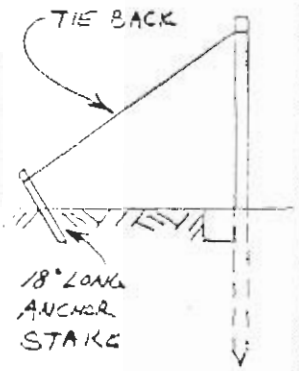




ALTERNATE A ALTERNATE B ALTERNATE C

ALTERNATE FILTER FENCE SYSTEMS

ALTERNATE	FILTER MATERIAL	SUPPORT MATERIAL	POST SPACING
A	FABRIC	3/4" NETTING	8' MAX.
B	FABRIC	4"x2" WIRE FENCE	8' MAX.
C	FABRIC	NONE	3' MAX.



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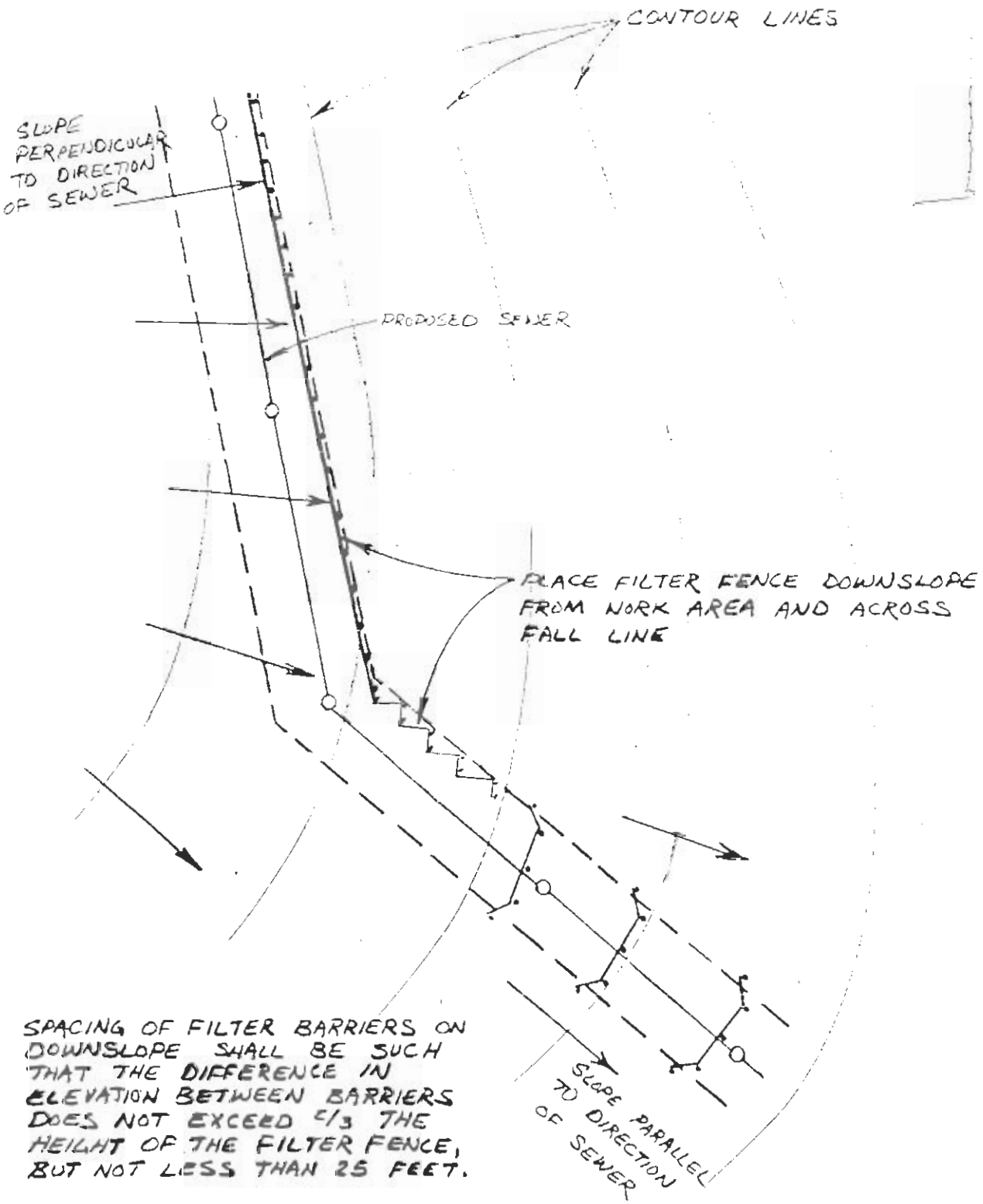
FILTER FENCE (TYPE W)

FIGURE 7

JUNE 23 1988 SCALE: 1"=2'0"



SPACING OF FILTER BARRIERS ON DOWNSLOPE SHALL BE SUCH THAT THE DIFFERENCE IN ELEVATION BETWEEN BARRIERS DOES NOT EXCEED 1/3 THE HEIGHT OF THE FILTER FENCE, BUT NOT LESS THAN 25 FEET.

——→ DOWNSLOPE OF LAND

— — — EASEMENT LINE

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FILTER FENCE INSTALLATION

FIGURE 7A

JUNE 23 1988 SCALE: NONE

b. Support Fence

The maximum post spacing is 8 feet, if the support fence is made of a maximum 4 inch by 2 inch mesh, 14 gauge welded wire or industrial polypropylene netting with a maximum mesh spacing of 3/4 inch or equal is used.

(7.) Filter fabric is fastened to the upslope side of the support posts and securely held in place with staples or equivalent.

(8.) The filter material shall be buried along the side and bottom of a 4 inch by 4 inch trench dug along the upslope side of the support posts. After installation of filter fabric, the earth shall be tamped back in place.

(9.) The filter fabric shall be a geo-textile fabric; polyester, polypropylene, stabilized nylon, polyethylene or polyvinylidene chloride meeting the following specifications:

Grab Strength: 45 lb. minimum in any principal direction (ASTM D1682)

Mullen Burst Strength: Minimum 60 psi (ASTM D774)

The fabric shall have an opening no greater than a number 20 U.S. Standard Sieve and a Minimum Permeability of 120 gpm/sq. ft. (Multiply Permittivity in $Sec.^{-1}$ determined by ASTM D4491-85 Constant Head Test by conversion factor of 74.)

(10.) Filter Fences should be positioned to follow a particular contour, which in most cases is not parallel to the sewer trench. When the direction of the trench is perpendicular to the contours of the land, filter fences shall be spaced such that the difference in elevation between barriers does not exceed 2/3 the height of the filter fabric. (For example: 24 inch high barriers placed on land sloping at a 2% grade requires the barriers to be placed at 67 foot intervals). The minimum barrier spacing, however, shall not be less than 25 feet. The barriers shall extend 6 feet in each direction from the disturbed area of the trench to a corner and then extend 3 additional feet on a 45 degree diagonal in the upslope direction to form a wing.

(11.) If a channel, or area of concentrated runoff, passes through the site, filter fences shall be placed along the channel edges to prevent sediment from reaching the channel.

b. Roadside Ditch

(1.) Methods of Protection

a. Small ditch option.

1. Where the roadside ditch is not over 400 feet long and the runoff contributing area is mostly unpaved land less than 200 feet deep, the filter barriers may be placed across the ditch at intervals such that the difference in elevation between barriers does not exceed 2/3 the height of the filter material. The minimum spacing shall not be less than 25 feet.

2. The filter barrier shall be constructed as shown in Figure 8, "Ditch Barrier" (Type X).

b. All ditch option

When construction occurs in a paved rural cross-section roadway, a filter fence as shown in Figure 7, shall be constructed along the shoulder area on both sides of the roadway to prevent sediment from reaching the ditch area.

(2.) Comments from Sec. A.2.a sub.(2), (3), (4), (5), (6), (7), (8) and (9) shall apply.

(3.) Filter Fences and Ditch Barriers shall be inspected within 24 hours after each rainfall or daily during extended periods of precipitation. Repairs shall be made immediately, as necessary, to prevent particles from reaching the sewerage system and/or causing surface flooding.

(4.) Sediment deposits shall be removed after each storm event, or when reaching a maximum depth of 3 inches.

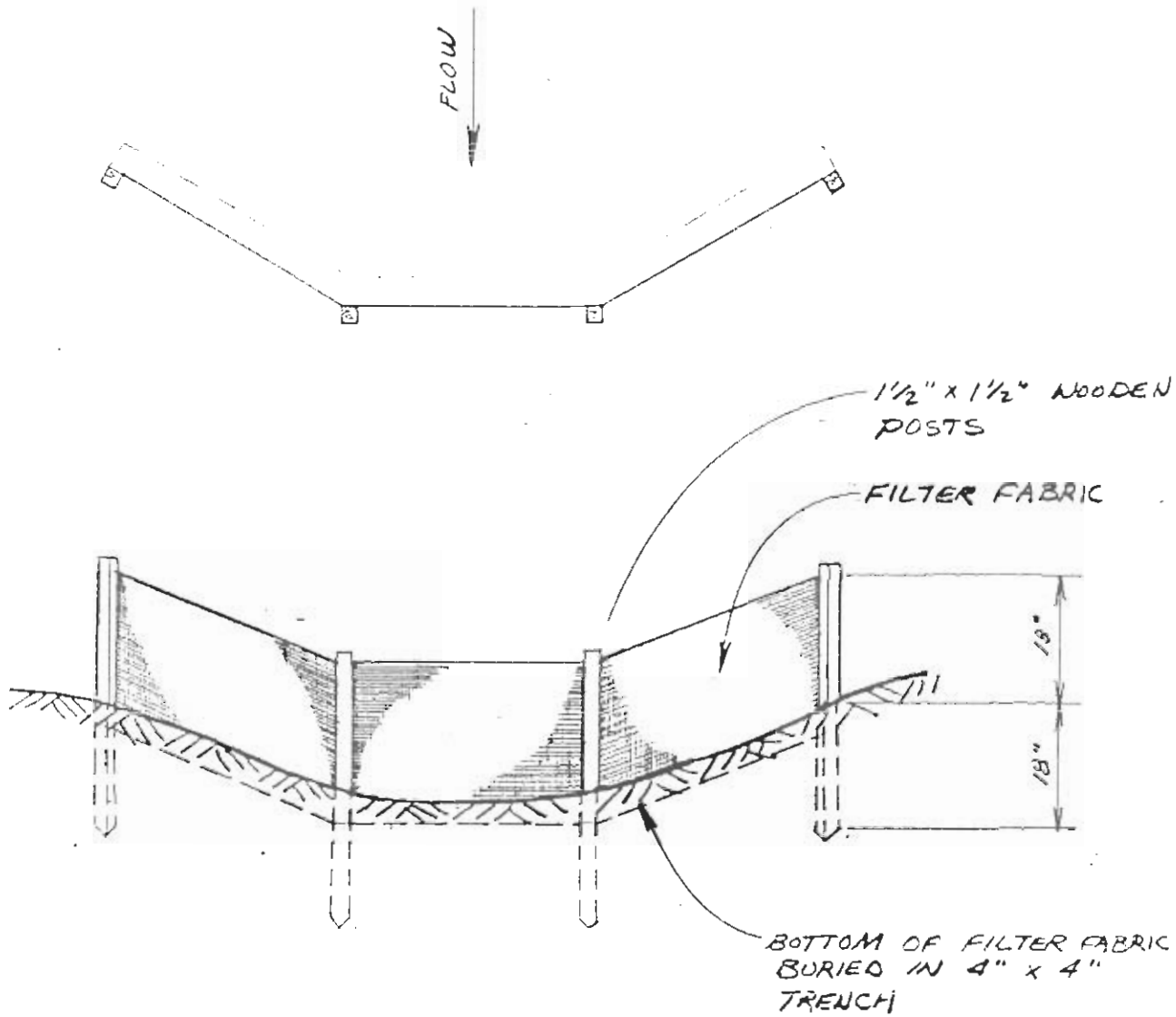
SEC. B Control of Trench Sediment

1. Dewatering

a. If it becomes necessary to pump water from any trench or excavation, it shall be the contractor's responsibility to remove particles greater than 100 microns. To demonstrate that settling or filtering is not required, all particles must pass through a U. S. Standard No. 140 sieve.

b. Methods of Removal

1. Pumped water requiring particle removal may be settled in portable tanks. The tank capacity must be large enough to allow for sufficient settling time to remove particles greater than 100 microns. The contractor may add a flocculation substance to enhance the settlement process.



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DITCH BARRIER (TYPE X)
FIGURE 8 JUNE 23, 1988 SCALE: 1"=2'-0"

2. A second method of treating pumped water may be as shown in Figure 4, "Temporary Settling Basin". If a temporary settling basin is to be left unattended, it shall be covered with a half inch plywood or similar safety cover. Due to space and traffic constraints, this method must have prior approval from the Commissioner of Public Works' representative.

3. The fabric shall be geo-textile fabric; polyester, polypropylene, stabilized nylon, polyethylene or polyvinylidene chloride meeting the following specifications:

Grab strength: 400# minimum in any principal direction (ASTM D1682)

Mullen Burst Strength: Minimum 600 psi (ASTM D774)

The fabric shall have an opening no greater than a number 140 U. S. Standard Sieve, and a minimum permeability of 25 gpm/sq. ft. (Multiply the Permittivity in $Sec.^{-1}$ from ASTM. D4491-85 Constant Head Test using the conversion factor of 74.)

4. Other methods demonstrated to produce the desired results may be submitted for approval by the Commissioner of Public Works' representative.

2. Downstream Sewer Protection

a. Relay Sewer Work

At the end of each work day, the contractor shall cover the entire annular space at both ends of the flume with a sheet of filter fabric. The fabric shall be of sufficient width so as to be tightly banded around the sewer pipes and the flume pipe. The fabric shall be geo-textile fabric; polyester, polypropylene, stabilized nylon, polyethylene or polyvinylidene chloride meeting the following specifications:

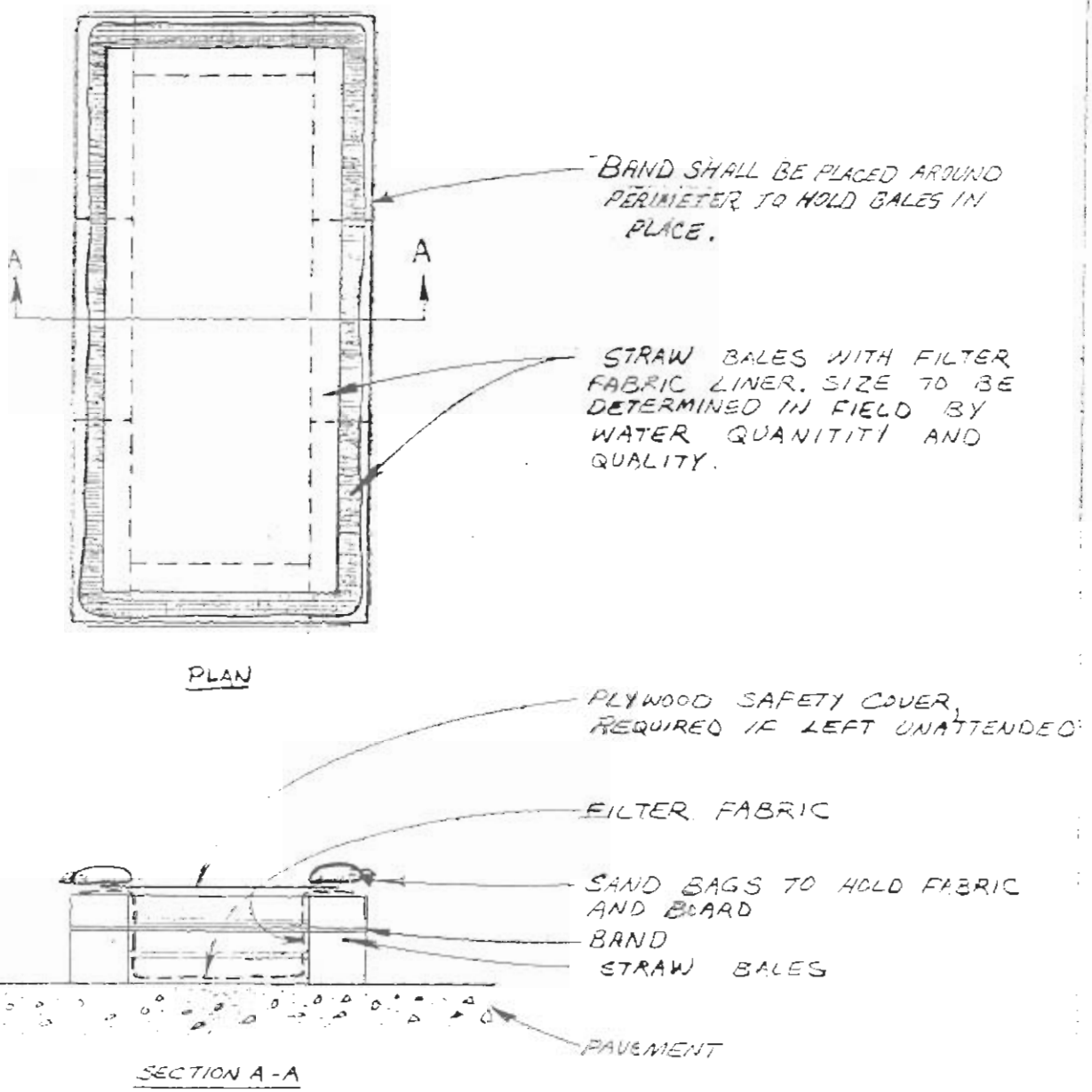
Grab strength: 400 lb. minimum in any principal direction (ASTM D1682)

Mullen Burst Strength: Minimum 600 psi (ASTM D774)

The fabric shall have an opening no greater than a number 140 U. S. Standard Sieve, and a minimum permeability of 25 gpm/sq. ft. (Multiply the Permittivity in $Sec.^{-1}$ from ASTM. D4491-85 Constant Head Test using the conversion factor of 74.)

b. New Sewer Work

During construction of new sewers, material used to cover the open end of the last pipe placed, as required in Sec. 5.3.21 of the Sewer and Building Service Specifications, shall conform to the requirements of Sec. 8.2.a. of this specification.



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TEMPORARY SETTLING BASIN

FIGURE 4

JUNE 23 1988

SCALE: 1" = 5.0'

3. Stabilization of Disturbed Ground

a. All disturbed ground, not to be restored with pavement and left inactive for 10 days or more, shall be stabilized by seeding, sodding, mulching erosion nets/mats, or other equivalent control measure.

b. All seeding, sodding and mulching shall be performed in accordance with the Sewer and Building Service Specifications.

c. Erosion nets and mats, including excelsior retention blankets, jute matting and polypropylene netting may be used for stabilization and shall be installed according to the manufacturer's recommendations.

SEC. C. Material Stockpiles

Material stockpile protection plan is the responsibility of the contractor as provided in Section 290-11.1.a of the Milwaukee Code of Ordinances, and must be approved by the Department of Public Works before a permit is issued.