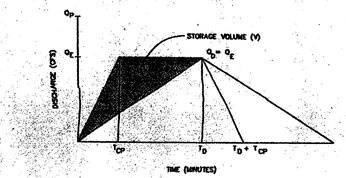
DETENTION CALCULATIONS

DRAINAGE DESIGN METHODOLOGY

DRAINAGE RUN-OFF FROM THIS TRACT WILL BE COLLECTED IN TWO SEPARATE UNDERGROUND STORM DRAINAGE SYSTEMS. ONE OF THE SYSTEMS (LINE 'A') WILL OUTFALL INTO A DETENTION POND DESIGNED AND SIZED TO DETAIN THE DIFFERENCE BETWEEN THE RUNOFF GENERATED FROM A 100 YEAR STORM AND A 25 YEAR STORM. THE OUTFALL FROM THE DETENTION SYSTEM WILL BE INTO THE EXISTING STORM DRAIN SYSTEM WITHIN ARAPAHO ROAD.

THE OTHER STORM DRAIN SYSTEM (LINE 'B') WILL OUTFALL INTO A PROPOSED STORM DRAIN SYSTEM TO BE CONSTRUCTED AS A PART OF THE NEW ARAPAHO ROAD IMPROVEMENTS. NO DETENTION WILL BE PROVIDED ON THIS SYSTEM, SINCE THE PROPOSED STORM DRAIN (WITHIN ARAPAHO ROAD) HAS SUFFICIENT CAPACITY, AND A DETENTION POND WOULD INTERFERE WITH THE TOWN OF ADDISON'S LANDSCAPE PLANS FOR THE INTERSECTION.

DETENTION CALCULATION METHODOLOGY



$$V = \left(\frac{60}{43560}\right)\left[(Q_D[T_D - T_{CP}) + (T_D + T_{CP})/2) - (Q_E[T_{CP} + T_D)/2\right]$$

in acre - feet

Where:

- Q_D = Peak discharge in cfs for developed watershed using storm duration equal to T_{CP}
- Q_E = Peak discharge in cfs for existing watershed, assuming full residential development and corresponding T_C
- Q_D = Peak discharge in cfs for developed watershed based on a storm duration that yields the existing discharge for C_P and A:
- T_{CP} = Time of concentration in minutes for proposed development.
- T_D = Storm duration in minutes corresponding to I_D
- I_D = Rainfall intensity (inches/hour) for a storm duration that produces Q_D and is calculated using the following formula:

$$I = \frac{Q_D}{(C_P\ A)}$$

Where:

- C_P = Rational "C" for developed condition.
- A = Drainage area in acres.

DETENTION BASIN 'A'

REQUIRED DETENTION VOLUME CALCULATIONS

Contributing drainage areas = A
$Q_P = Q_{100}$ =1.00(0.9)8.82 = 7.94 cfs
$Q_E = Q_{25}$ =1.00(0.9)7.32 = 6.59 cfs

Thus $Q_E = Q_D$ = 6.59 cfs

$$I_D = \frac{Q_D}{(C_P\ A)} = 6.59/((0.90)(1.00)) = 7.32 \text{ in/hr}$$

for I_D = 7.32 in/hr T_D = 16.7 minutes

Thus, Detention Volume Required = 1,325 cubic feet

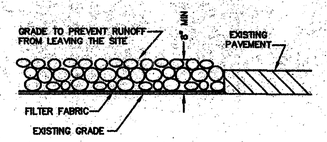
The dtention volume provided in detention pond 'b' with a maximum detention ponding (surface) = 625.50 = 1,700 cubic feet

ORIFICE CALCULATION FOR OUTLET PIPE

$$Q = CA\sqrt{2gh}$$

Where
- Q = Flow through orfice in (cfs)
- C = Coefficent for orifice with tube outlet = 0.80
- A = Area of orifice opening in (ft^2)
- g = acceleration due to gravity = 32.2 ft/sec^2
- h = head or orifice in feet

Solve by trial and error
For detention pond elevation (surface) at maximum ponding = 629.5 and flowline of outlet structure = 627.50
For 12" Diameter Outlet 12" PVC
A = 0.7854 ft^2
Thus Q = $0.8(0.7854)\sqrt{2(32.2)(2-0.5)}$
Q = 6.18 cfs < 6.59 cfs allowed

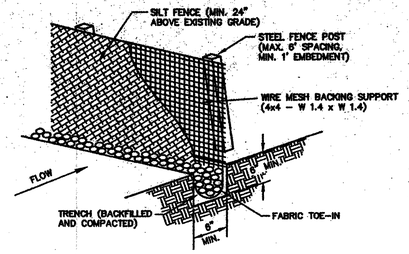


NOTES:

1. STONE SIZE - 3 TO 5 INCHES CRUSHED ROCK.
2. LENGTH - AS EFFECTIVE, BUT NOT LESS THAN 50', UNLESS DEPTH OF LOT IS LESS THA 150' FROM THE EDGE OF PAVEMENT WHERE LENGTH MUST ONLY BE 30'.
3. THICKNESS SHALL NOT BE LESS THAN 8".
4. WIDTH SHALL NOT BE LESS THAN FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS.
5. WASHING - WHEN NECESSARY, WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC ROADWAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE WHICH DRAINS INTO AN APPROVED TRAP OR SEDIMENT BASIN. ALL SEDIMENT SHALL BE PREVENTED FROM ENTERING ANY STORM DRAIN, DITCH OR WATERCOURSE USING APPROVED METHODS.
6. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC ROADWAYS. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND, AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC ROADWAY, MUST BE REMOVED IMMEDIATELY.
7. DRAINAGE - ENTRANCE MUST BE PROPERLY GRADED OR INCORPORATE A DRAINAGE SWALE TO PREVENT RUNOFF FROM LEAVING THE CONSTRUCTION SITE.

STABILIZED CONSTRUCTION ENTRANCE

NOT TO SCALE

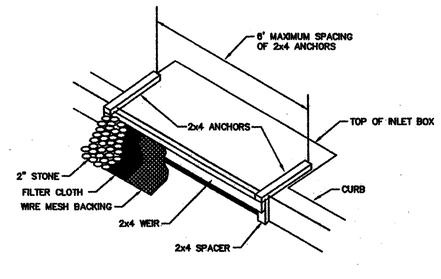


SILT FENCE NOTES:

1. STEEL POSTS WHICH SUPPORT THE SILT FENCE SHALL BE INSTALLED ON A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE. POST MUST BE EMBEDDED A MINIMUM OF ONE FOOT.
2. THE TOE OF THE SILT FENCE SHALL BE TRENCHED IN WITH A SPADE OR MECHANICAL TRENCHER, SO THAT THE DOWNSLOPE FACE OF THE TRENCH IS FLAT AND PERPENDICULAR TO THE LINE OF FLOW. WHERE FENCE CANNOT BE TRENCHED IN (e.g. PAVEMENT), WEIGHT FABRIC FLAT WITH BANKED GRAVEL ON UPHILL SIDE TO PREVENT FLOW UNDER FENCE.
3. THE TRENCH MUST BE A MIN. OF 6" DEEP AND 6" WIDE TO ALLOW FOR THE SILT FENCE FABRIC TO BE LAID IN THE GROUND AND BACKFILLED WITH COMPACTED MATERIAL.
4. SILT FENCE SHOULD BE SECURELY FASTENED TO EACH STEEL SUPPORT POST OR WOVEN WIRE, WHICH IS IN TURN ATTACHED TO THE STEEL FENCE POST. THERE SHALL BE A 6" OVERLAP, SECURELY FASTENED WHERE ENDS OF FABRIC MEET.
5. INSPECTION SHALL BE MADE WEEKLY OR AFTER EACH RAINFALL. REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
6. SILT FENCE SHALL BE REMOVED WHEN THE SITE IS COMPLETELY STABILIZED SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
7. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 6". THE SILT SHALL BE DISPOSED OF IN AN APPROVED SITE AND IN SUCH A MANNER AS TO NOT CONTRIBUTE TO ADDITIONAL SILTATION.

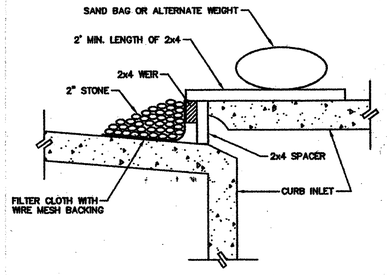
SILT FENCE DETAIL

NOT TO SCALE



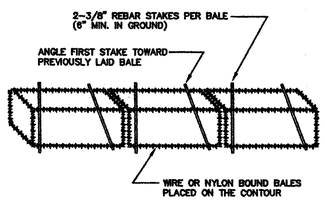
NOTES:

1. WOODEN FRAME IS TO BE CONSTRUCTED OF 2x4 CONSTRUCTION GRADE LUMBER.
2. WIRE MESH BACKING MUST BE OF SUFFICIENT STRENGTH TO SUPPORT FILTER FABRIC, AND STONE FOR CURB INLETS, WITH WATER FULLY IMPOUNDED AGAINST IT.
3. FILTER CLOTH MUST BE OF A TYPE APPROVED FOR THIS PURPOSE; RESISTANT TO SUNLIGHT WITH SIEVE SIZE, EOS, 40-85, TO ALLOW SUFFICIENT PASSAGE OF WATER AND REMOVAL OF SEDIMENT.
4. STONE IS TO 2" IN SIZE AND CLEAN, SINCE FINER WOULD CLOG THE CLOTH.
5. THE ASSEMBLY SHALL BE PLACED, SO THAT THE ENDS OF THE SPACERS ARE A MINIMUM OF 1" BEYOND ENDS OF THE THROAT OPENING.

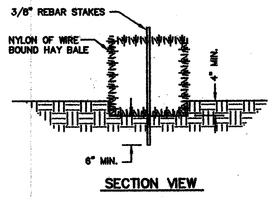


6. FORM THE WIRE MESH AND FILTER CLOTH TO THE CONCRETE GUTTER AND AGAINST THE FACE OF CURB ON BOTH SIDES OF THE INLET. PLACE CLEAN STONE OVER THE FILTER CLOTH IN SUCH A MANNER AS TO PREVENT WATER FROM ENTERING THE INLET UNDER OR AROUND THE CLOTH.
7. THIS TYPE OF INLET PROTECTION MUST BE INSPECTED FREQUENTLY AND THE FILTER CLOTH AND STONE REPLACED WHEN CLOGGED WITH SEDIMENT.
8. ASSURE THAT STORM FLOW DOES NOT BYPASS INLET BY INSTALLING TEMPORARY EARTH OR ASPHALT DIKES DIRECTING FLOW INTO INLET.

CURB INLET PROTECTION DETAIL



ANCHORING DETAIL



SECTION VIEW

GENERAL NOTES:

1. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF FOUR INCHES.
2. BALES SHALL BE SECURELY ANCHORED IN PLACE BY A 3/8" REBAR STAKE DRIVEN THROUGH THE BALE. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.
3. INSPECTION SHALL BE WEEKLY OR AFTER EACH RAINFALL EVENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED BY THE CONTRACTOR.
4. WHEN SILT REACHES A DEPTH OF SIX INCHES, IT SHALL BE REMOVED AND DISPOSED OF IN AN APPROVED SITE AS TO NOT CREATE A SILTATION PROBLEM.
5. AFTER THE DEVELOPMENT SITE IS COMPLETELY STABILIZED, THE BALES AND ACCUMULATED SILT SHALL BE REMOVED AND DISPOSED OF AT AN APPROVED SPOIL DISPOSAL SITE.

HAY BALE DIKE DETAILS

JDJR ENGINEERS & CONSULTANTS, INC.
ENGINEERS - LAND PLANNERS - CAD DESIGNS
2535 Texal Drive - Suite 109 - Irving, Texas 75062
TX 972.252-JDJR (5375) Fax: 972.273-3866

STATE OF TEXAS — JAMES BENNEY, JR. — 81480 — REGISTERED PROFESSIONAL ENGINEER

PROJECT: WINGATE INN
ARAPAHO ROAD AT QUORUM DRIVE
LOT 2 BLOCK "A"
WINGATE INN OF ADDISON ADDITION
ADDISON, TEXAS

REVISIONS:	
DATE	REVISION
6/22/98	CITY COMMENTS
7/08/98	CITY COMMENTS
7/20/98	REVISE LINE 'A'
8/3/98	UPDATE SET

SHEET TITLE
DETENTION CALCULATIONS AND EROSION CONTROL DETAILS

DATE: 5-22-98
SCALE: 1" = 20'
DRAWN BY: J.N.M.
CHECKED BY: JDJR
SHEET NO.
C8 OF 9
JDJR FILE NO. 98-022