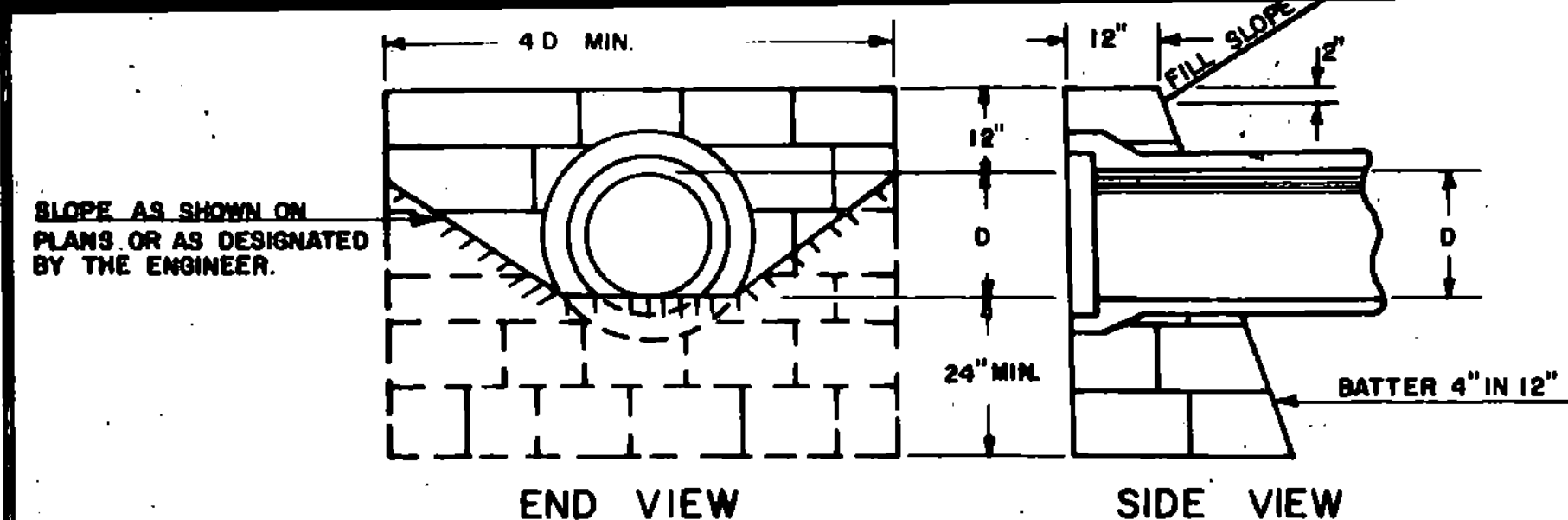


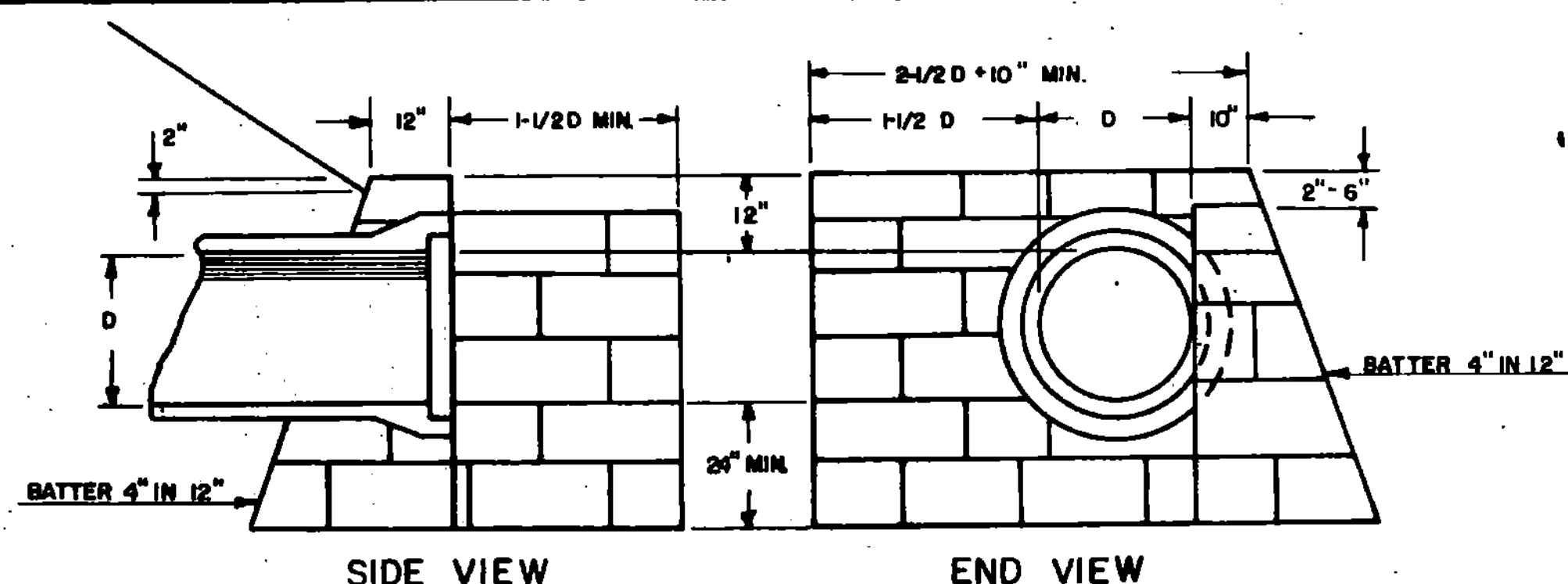


QUANTITY SCHEDULE FOR CEMENT RUBBLE MASONRY

PIPE DIAMETER	12"	15"	18"	24"	30"	36"	42"	48"	54"	60"
C.R.M. QUANTITY	1.0	1.3	1.8	2.7	3.5	4.9	6.4	8.0	10.0	12.3

C.R.M. QUANTITIES EXCLUDE PIPE DIAMETERS FOR 30" AND OVER.
SAME DEDUCTION MADE FOR CONCRETE PIPE AS IS FOR METAL PIPE.

CEMENT RUBBLE MASONRY STRAIGHT HEADWALL

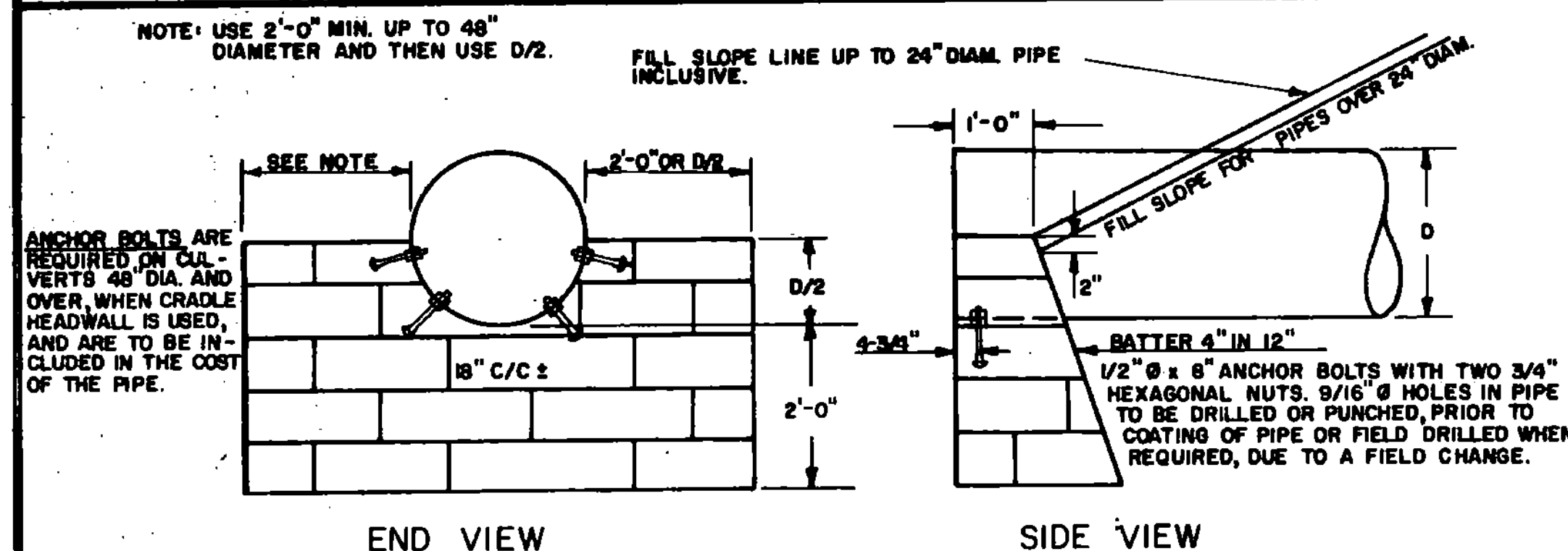


QUANTITY SCHEDULE FOR CEMENT RUBBLE MASONRY

PIPE DIAMETER	12"	15"	18"	24"	30"	36"	42"	48"
C.R.M. QUANTITY	1.3	1.7	2.1	3.2	4.1	5.5	7.1	8.9

C.R.M. QUANTITIES EXCLUDE PIPE DIAMETERS FOR 30" AND OVER.
SAME DEDUCTION MADE FOR CONCRETE PIPE AS FOR METAL PIPE.

CEMENT RUBBLE MASONRY "L" TYPE HEADWALL



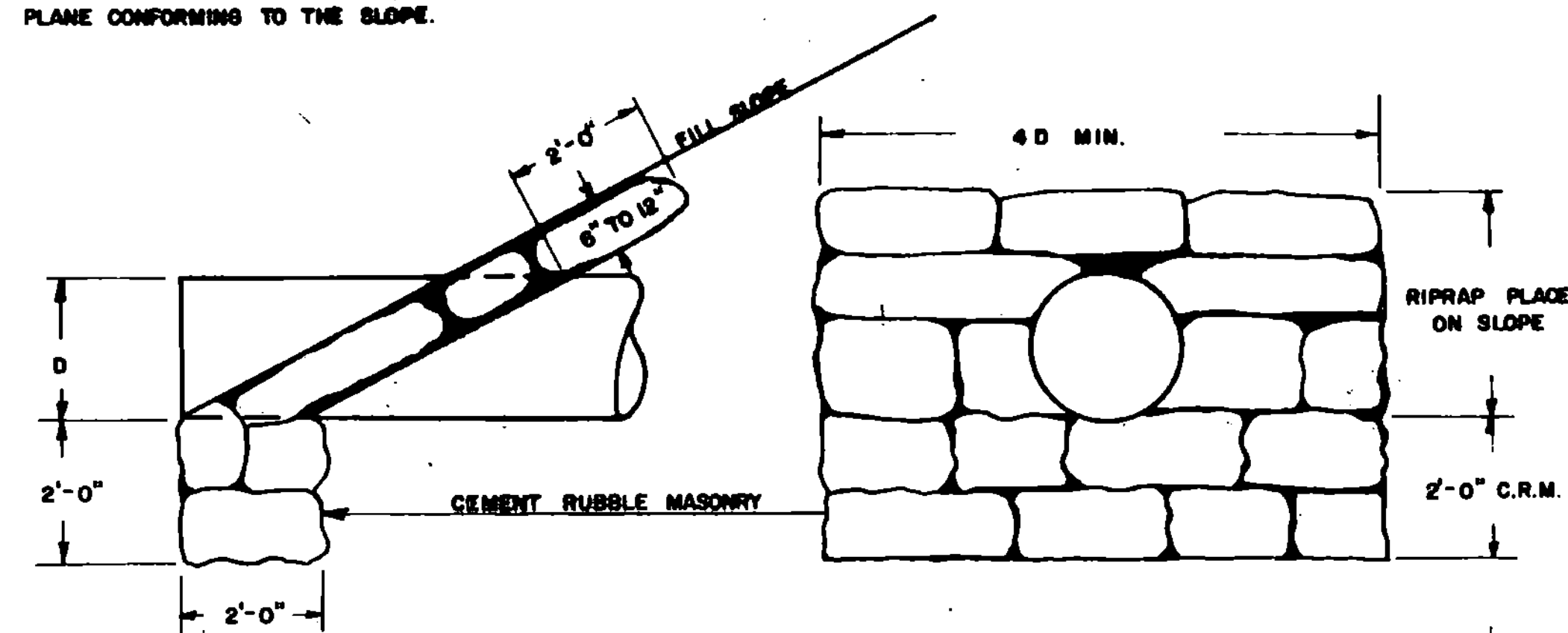
QUANTITY SCHEDULE FOR CEMENT RUBBLE MASONRY

PIPE DIAMETER	18"	24"	30"	36"	42"	48"	54"	60"	66"	72"
C.R.M. QUANTITY	0.8	1.0	1.2	1.4	1.5	1.7	2.0	2.4	2.8	3.3

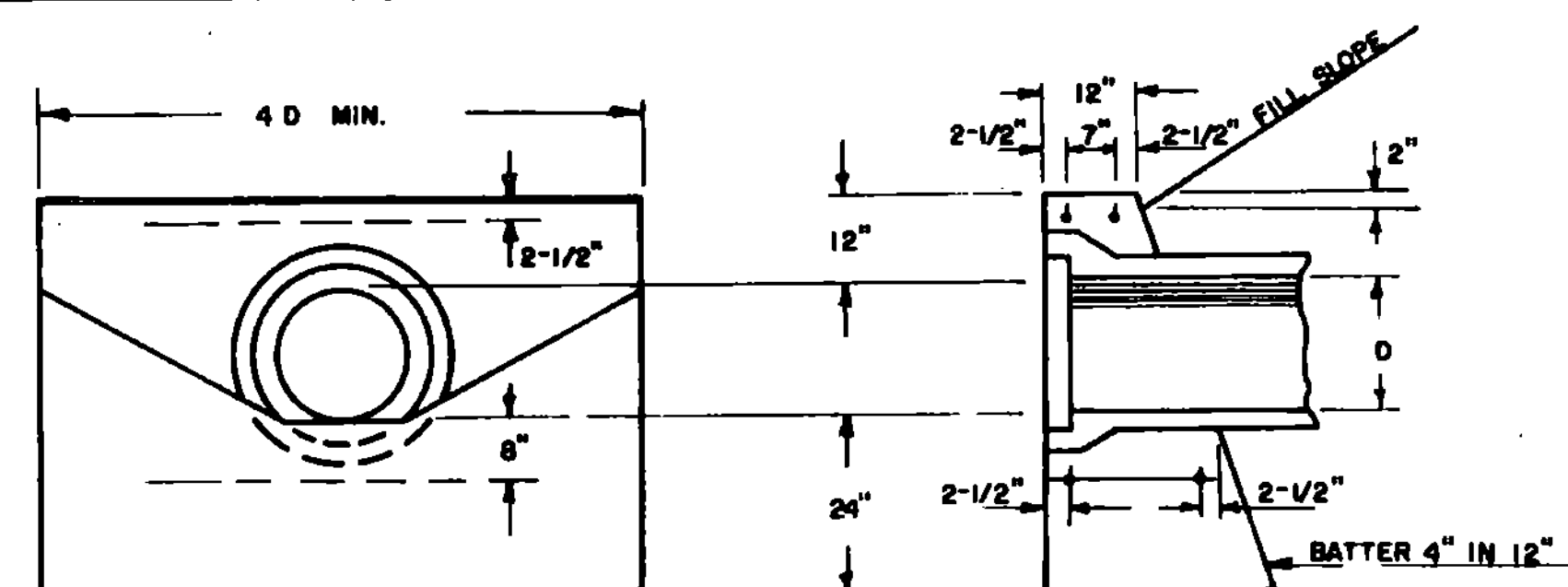
C.R.M. QUANTITIES ARE DEDUCTED WHEN PIPE DIAMETER 42" OR LARGER.
SAME DEDUCTION MADE FOR CONCRETE PIPE AS FOR METAL PIPE.

CEMENT RUBBLE MASONRY CRADLE HEADWALL

EXPOSED SURFACE OF RIPRAP TO BE A PLANE CONFORMING TO THE SLOPE.



RIPRAP LIGHT TYPE SLOPE HEADWALL WITH CEMENT RUBBLE MASONRY FOOTING



QUANTITY SCHEDULE FOR REINFORCED CONCRETE HEADWALL, CLASS B

PIPE DIAMETER	12"	15"	18"	24"	30"	36"	42"	48"	54"	60"
CONCRETE QUANTITY	1.0	1.3	1.8	2.7	3.5	4.9	6.4	8.0	10.0	12.3

STEEL SCHEDULE FOR REINFORCED CONCRETE HEADWALL

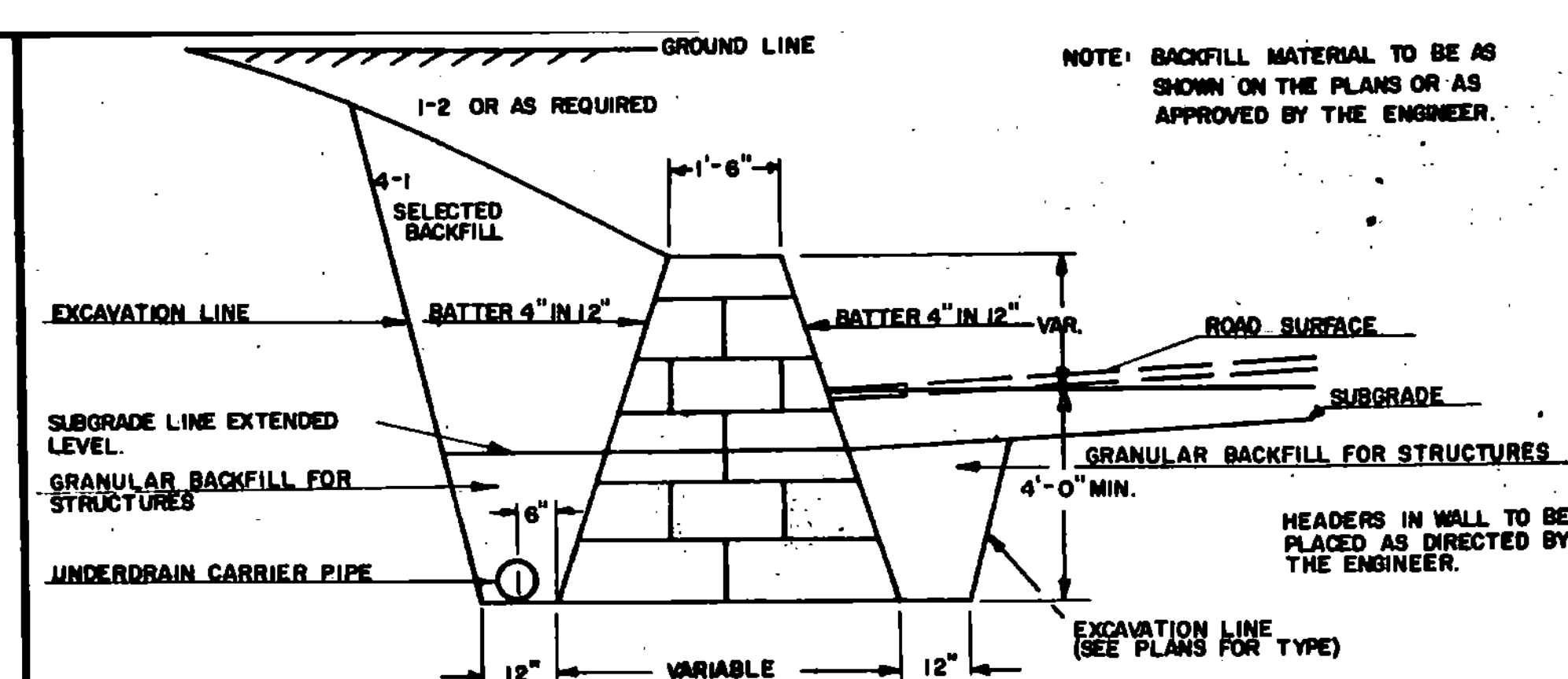
PIPE DIAMETER	12"	15"	18"	24"	30"	36"	42"	48"	54"	60"
NUMBER	4	4	4	4	4	4	4	4	4	4
LENGTH OF BARS	3'-0"	3'-0"	3'-0"	3'-0"	4'-0"	4'-0"	5'-0"	5'-0"	6'-0"	6'-0"

ALL REINFORCING STEEL TO BE 5/8" DIAMETER DEFORMED BARS.
CONCRETE QUANTITIES EXCLUDE PIPE DIAMETERS FOR 30" AND OVER.
SAME DEDUCTION MADE FOR CONCRETE PIPE AS IS MADE FOR METAL PIPE.

REINFORCED CONCRETE STRAIGHT HEADWALL

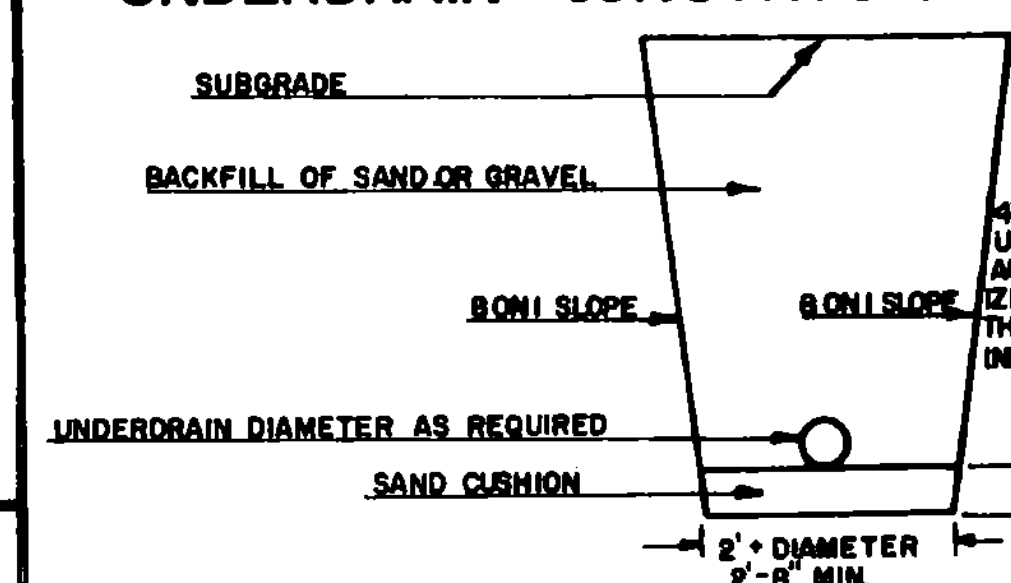
GENERAL NOTES - HEADWALLS:

1. THE HEIGHT OF HEADWALLS ON DRIVEWAY PIPES IS TO BE REDUCED TO 6" ABOVE THE TOP OF PIPE.
2. BELL AND SPIGOT PIPE IS TO BE LAID WITH THE BELL UPSTREAM.
3. HEADWALL QUANTITIES, FOR THE SAME TYPE HEADWALLS ON PIPES OF EQUAL DIAMETER, ARE THE SAME FOR BOTH CONCRETE AND METAL PIPE. LENGTH OF HEADWALLS ARE BASED ON INSIDE DIAMETER OF PIPES.
4. THE NECESSITY OF CONSTRUCTING A FLOOR AT THE ENTRANCE TO AN L TYPE HEADWALL SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER AND ANY INSTALLATION THEREOF SHALL BE AT HIS DIRECTION.

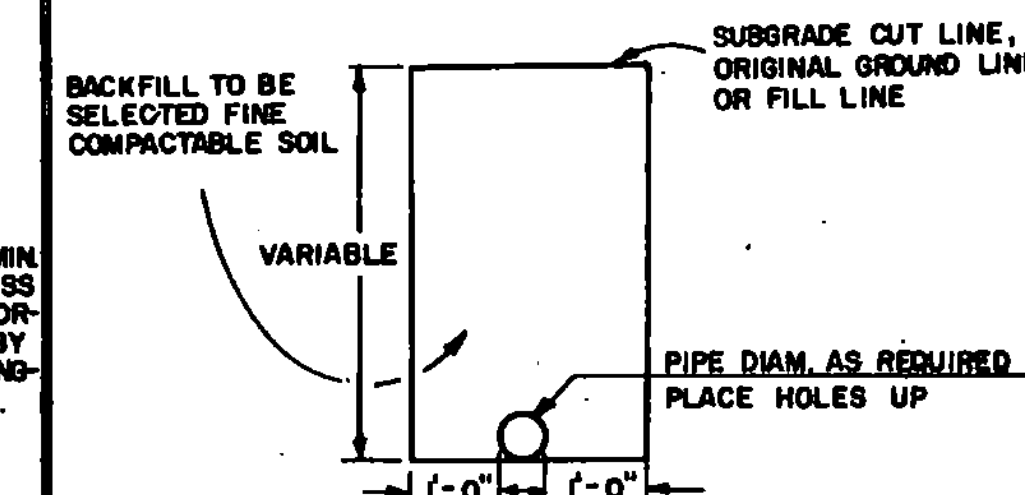
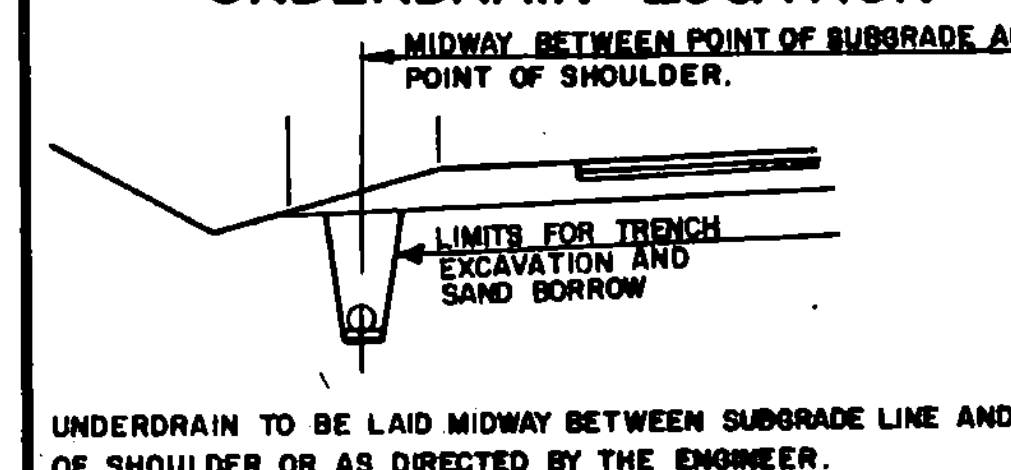


CEMENT RUBBLE MASONRY RETAINING WALL

UNDERDRAIN CONSTRUCTION



UNDERDRAIN LOCATION



UNDERDRAIN CARRIER PIPE CONSTRUCTION

- GENERAL NOTES - UNDERDRAIN:
1. GRADE FOR UNDERDRAIN PIPE SHALL BE PARALLEL WITH THE GRADE OF THE ROAD UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
 2. A FLUSHING BASIN IS TO BE INSTALLED AT INLET WHEN LESS THAN 3% GRADE IS USED OR AS ORDERED BY THE ENGINEER.
 3. THE UNDERDRAIN SHALL BE TAKEN TO A PROPER OUTLET AND PROTECTED WITH A HEADWALL OF CEMENT RUBBLE MASONRY IF SHOWN ON THE PLANS OR DIRECTED BY THE ENGINEER.
 4. ELBOWS, T, AND OTHER JUNCTION UNITS NECESSARY FOR PROPER INSTALLATION OF UNDERDRAIN, AS DIRECTED BY THE ENGINEER, ARE TO BE INCLUDED IN THE UNIT BID PRICE FOR UNDERDRAIN OR CARRIER PIPE.

REVISIONS AND CORRECTIONS

MAR. 8, 1972: CHANGED ANCHOR BOLTS FROM 10" "L" TO 8" CARRIAGE BOLTS

DEC. 16, 1976: NOTE ADDED ON REINFORCING STEEL FOR CRADLE HEADWALLS

OCT. 30, 1988: REVISED TO CONFORM TO 1986 SPECIFICATIONS.

APPROVED: DATE: Dec. 6, 1971

R. N. Crandall
CHIEF ENGINEER

E. H. Stinchey
ASST. CHIEF ENGINEER

L. M. Lane
HIGHWAY ENGINEER

CEMENT RUBBLE MASONRY HEADWALLS & RETAINING WALL RIPRAP LIGHT TYPE SLOPE HEADWALL REINFORCED CONCRETE HEADWALL UNDERDRAIN & CARRIER PIPE CONSTRUCTION DETAILS



STANDARD

D-2