

MAIN CONDUIT
LAYING SOAPSTONE CONDUIT

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1. GENERAL

1.01 This section replaces G41.902, Issue A, and is reissued for the purpose of expanding and revising certain instructions contained in the previous issue on placing Soapstone Conduit made necessary by a change in the conduit design. The new conduit which is designated Type B Soapstone Conduit is supplied in 4 foot lengths, having an irregular octagonal exterior, a 3-1/2 inch round bore and beveled ends.

1.02 This conduit is intended for use in multiple runs where encasement is necessary from a strength or protection standpoint. Because of the ease of placing, the cost in place may be less than other types of

conduit and its use will in some cases be found economical despite the encasement. The irregular octagon shaped conduit is used by close stacking without interspacers, but provision must be made for either base spacers or a preplaced concrete base.

1.03 Sections of the soapstone conduit are joined by means of a type B paper coupling, one of which is furnished with each section of conduit. The collar furnishes a concrete-tight seal so that there will be no leakage of the concrete encasement into the conduit, but does not afford a water tight seal.

1.04 Soapstone conduit is relatively fragile so it should not be handled roughly or dropped. Its strength is sufficient however to withstand normal handling incident to installation.

2. MATERIAL

Conduit, Soapstone, Type B	Furnished in 4 foot lengths with type B paper coupling.
Coupling, Conduit, SA	For extending soapstone conduit with steel pipe, C cement conduit, or C.I. or C cement bends.
Coupling, Conduit, SZ	For use in extending subsidiary conduit from main conduit runs in new or existing structures.
Spacer, Base, Conduit, Soapstone	PLAIN - For supporting structure where base reinforcing is not required. SLOTTED - For supporting structure where base reinforcing is required.

3. TRENCHING

3.01 The minimum trench width for Soapstone Conduit should be 6 inches greater than the width of the conduit structure to allow for the side concrete encasement.

3.02 All other phases of trench work for Soapstone Conduit, such as depth, excavation, grading, etc., should follow the general recommendations given in the G41. division of practices on "Main Conduit - Trench Work."

4. CONCRETE

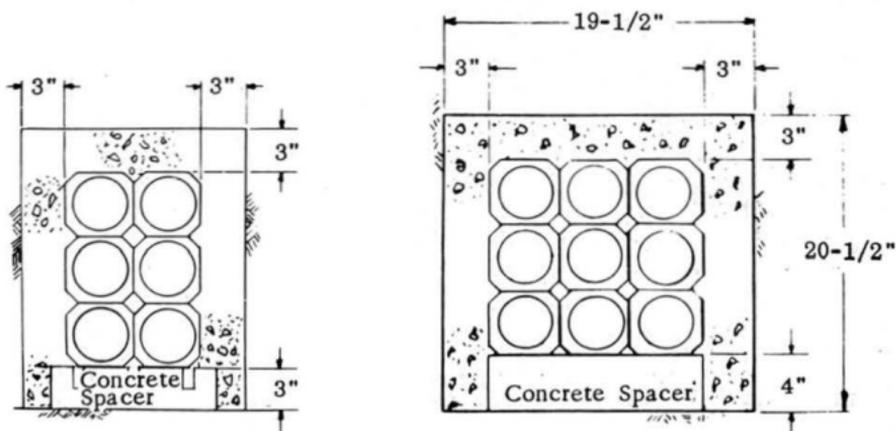
4.01 The concrete employed for encasing soapstone conduit should be of a very plastic consistency in order to run freely under the formation and form a completely sealed envelope. This can be obtained by employing Class 2A concrete for the encasement modified by the addition of Pozzolith. The Class 2A (modified) concrete shall conform to the requirements indicated in the G45. division of practices on "Concrete and Mortar" except that it shall be modified by the addition of 4/10ths pound of Pozzolith per sack of cement and the water adjusted to increase the delivered slump to approximately 6 to 8 inches.

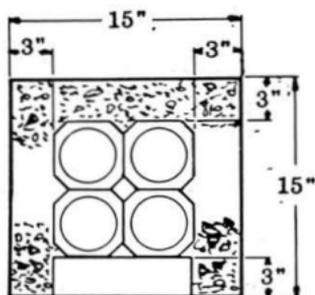
4.02 The approximate quantities of concrete required for encasement of various conduit formations are listed below. These quantities are based on 3 1/2-inch conduit with minimum thickness of encasement as shown in the illustrations of Part 5. Allowance should be made for any excess required because of trench irregularities, conduit of different size, etc.

Number of Conduits	Cu. Yds. of Concrete per 100 Feet of Trench
4	3.81
6	4.55
8	5.29
9	6.30
10	6.07
12	6.95
15	7.70
16	8.37
18	8.90
20	9.10

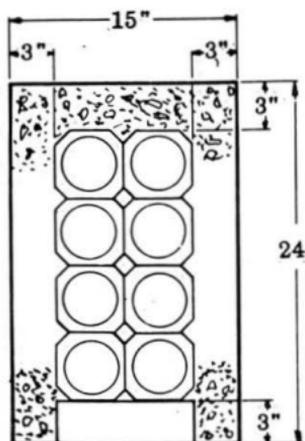
5. CONDUIT FORMATIONS

5.01 Unless trench conditions require otherwise, the formations of the conduit for various complements are as follows: When other combinations are employed, modifications of the indicated formations should be used.

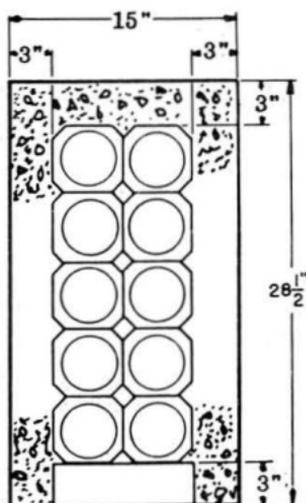




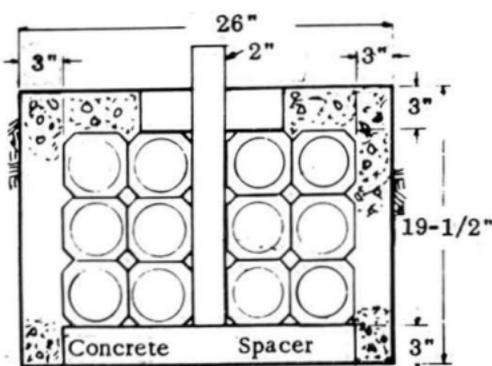
4 CONDUITS



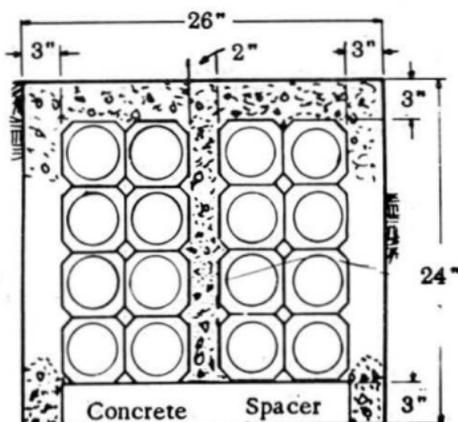
8 CONDUITS



10 CONDUITS

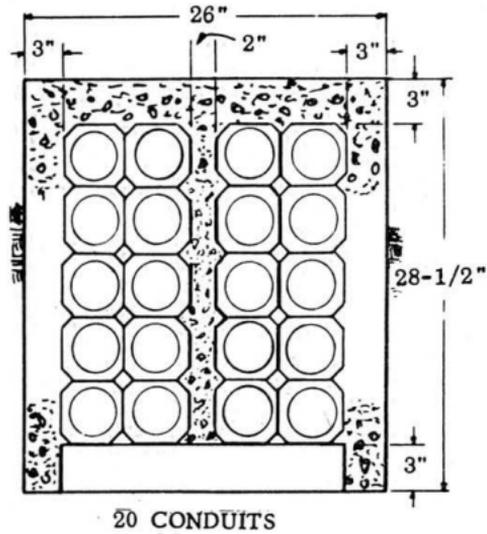
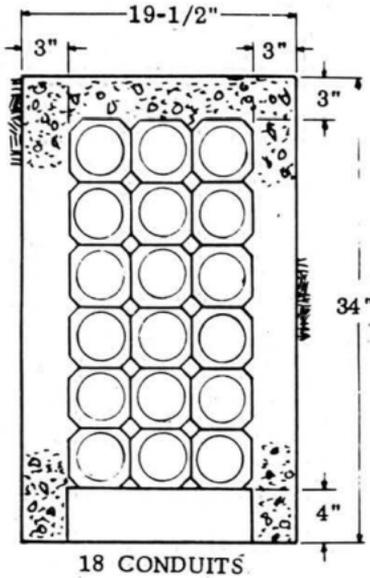


12 CONDUITS



16 CONDUITS

Temporary 1" x 2" Separator placed on 4-ft. centers approximately. Length according to depth of structure.



6. PLACING CONDUIT

6.01 The conduit should be delivered to trench side and stacked at intervals along the line of the trench. The size of each stack should be governed by the number of pieces required per trench foot, but should not be over 10 conduits high. Alternate layers should be stacked at right angles (criss-cross) allowing about 1-inch separation between each piece, thus simplifying the attachment of the coupling on each piece while in the stack.

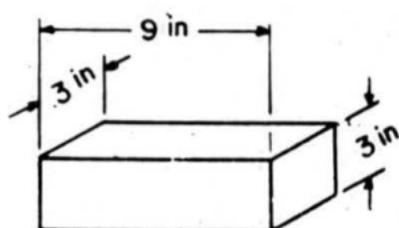


6.02 Where conditions permit, the stacks may be located close to the trench so rehandling can be avoided, as one man can attach the couplings and hand pieces from the stack directly to the man in the trench. Where this is not practicable it may be necessary to lay the conduit with couplings attached along the trench just before laying. In such cases, if the trench is shallow, the man in the trench can reach the conduit without assistance, otherwise it will require another man to hand each piece down to the installer.

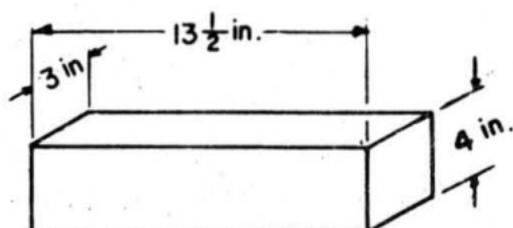
6.03 As each length of Soapstone Conduit is laid, inspect it for smoothness and cleanliness of bore. Discard any lengths showing cracks that might result in breakage during assembly of the structure or pouring of concrete.

6.04 Soapstone conduit shall be installed by the close stacked method with the bottom layer of conduit placed on spacer blocks that hold the conduit 3 or 4 inches above the bottom of the trench depending on the width of the conduit run and the presence or absence of reinforcing steel in the base. Illustrations of the plain base spacer blocks are shown in the following sketch.

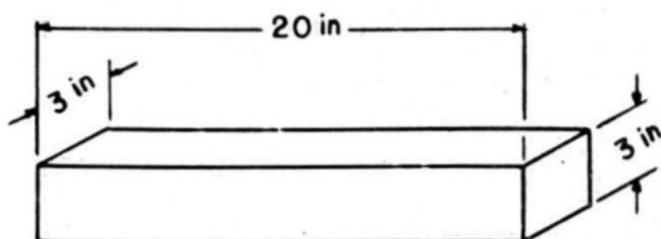
CONCRETE SPACER BLOCKS



2 Ducts



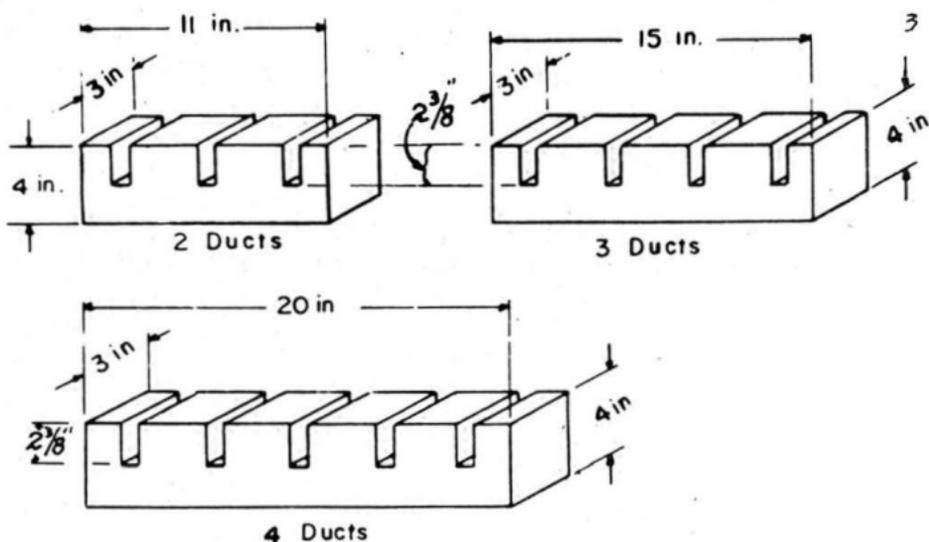
3 Ducts



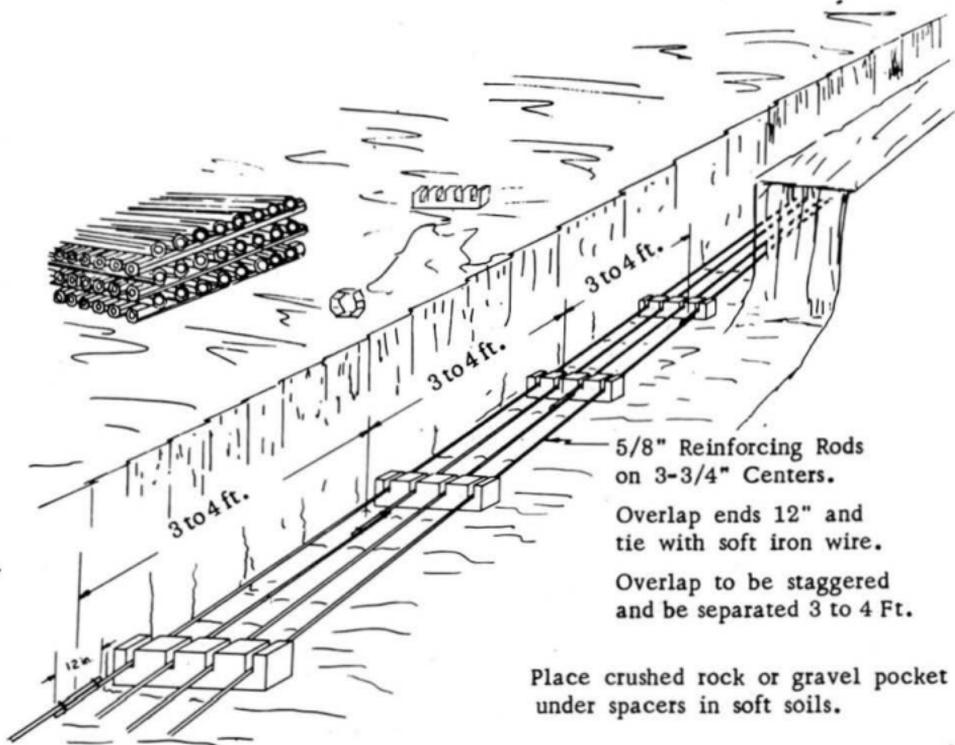
4 Ducts

6.05 When required, spacer blocks may be obtained having slots that allow $\frac{5}{8}$ -inch reinforcing bars to be placed on 3- $\frac{3}{4}$ -inch centers, as shown in the following sketch.

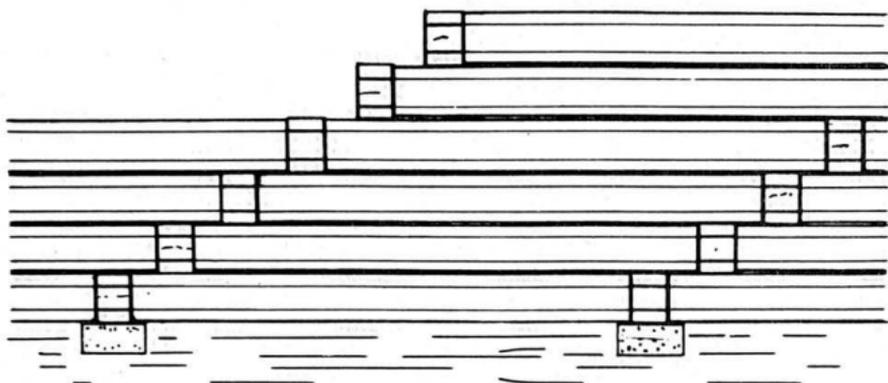
CONCRETE SPACER BLOCKS



6.06 Where it becomes necessary to place reinforcing bars, the arrangement shall be as illustrated on page 10.



6.07 The joints should be staggered so that one does not lie above another. The bottom layer of conduit is placed with the joints resting on the base spacers. In each succeeding layer the joints should be set back 6 to 8 inches from those on the layer below. This improves the rigidity and alignment of the structure during erection. It is not necessary to stagger joints horizontally. Soapstone conduit may be sawed readily and sections with chipped or broken ends should be salvaged for manhole entrances, finishing out sections etc.



6.08 The couplings should be placed on one end of each length of conduit before it is handed into the trench. This can be done if desired while the conduit is still in stacks.

6.09 Before placing a coupling on a section of soapstone conduit, bend the irregular shaped tab on the inside of the coupling to a vertical position, then slide the coupling onto the conduit until the perpendicular end of the tab contacts the end of the conduit. This will prevent the coupling from telescoping onto the first section of conduit when the end of the adjoining section is inserted into the coupling. The tab is forced to a flat position as the adjoining section slides against the rounded back of the tab permitting the ends of each conduit section to be butted firmly against that of the other.

6.10 Conduit runs 4 ducts wide are separated laterally by 2-inch by 1-inch temporary wooden separators of the required length. These separators are spaced at about 4 foot intervals and are removed as indicated below during encasement. Tie wires are then placed around the whole structure about every four feet. These wires should be so placed that they do not occur at a joint. The ties can be started by hand, then twisted tight with pliers.

6.11 The tie wires are recommended to keep conduit from floating when concrete is poured. Tie wires should be set in position while the bottom layer is being laid. These are lengths of .065 annealed iron wire or

equivalent. It is much easier to place them across the bottom of the trench before the structure is erected than to attempt to fish them under afterwards. The wire ends are stuck into the trench wall so that they do not interfere with the work until ready to be tied. Precut wire lengths should be laid out alongside the trench at about 4 foot intervals.

6.12 Where reinforcing bars are placed in the bottom encasement the tie wires shall be placed across the top of bars, thus preventing the bars from being pulled up under the conduit when the wires are drawn tight about the structure.

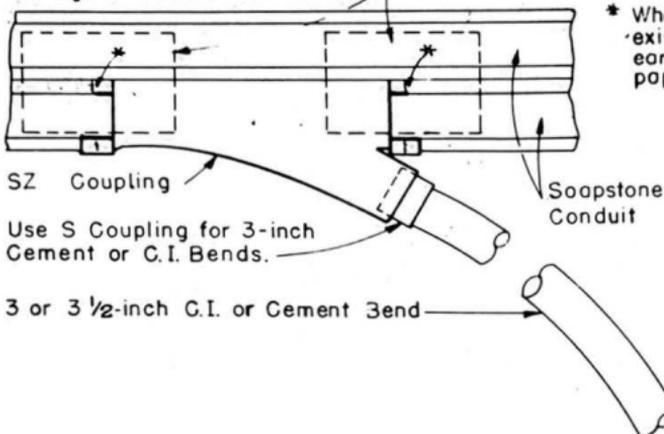
6.13 When soapstone conduit is to be placed inside of a casing under a railroad, highway, etc., where the formation is to be clamped to a sheet metal sled for skidding into place after assembly, the special procedures and precautions covered in other sections of the practices should be followed.

7. CURVES AND OTHER ATTACHMENTS

7.01 Curves in conduit runs may be made with straight sections of conduit placed at a slight angle to each other. The type B paper couplings used for joining the sections are sufficiently flexible to allow approximately three degree angular off-set between sections. Bends of 80 feet or greater radius can be made with four foot conduit sections, while bends of less than 80 feet radius will require using pieces of conduit less than four feet long depending on radius of bend desired. In main conduit runs the radius of curvature of bends using soapstone conduit should preferably exceed 100 feet radius and shall not be less than 50 feet.

7.02 Either 3, 3-1/2 inch C cement conduit or cast iron bends may be used in the construction of lateral or subsidiary runs. The method of making these connections is shown below:

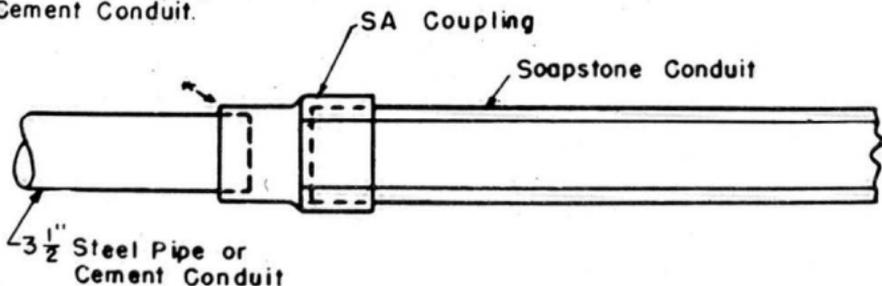
Place burlap bandages over top of coupling and conduit as shown and wedge down firmly into the V groove to prevent leakage of encasement mortar.



* When placing SZ Coupling on existing structures, knock off ears as required and use a paper collar to close gaps.

7.03 In cases where it becomes necessary to extend soapstone conduit with a section of steel pipe, C cement conduit, or cast iron or C cement bends, a type SA coupling may be used as shown below.

* Use S Coupling for 3-inch steel pipe or Cement Conduit.



8. CONDUIT ENTRANCES TO MANHOLE

8.01 No special construction is required where soapstone conduit terminates in a manhole. It may be finished flush with the wall or recessed. The little spaces between ducts should be plugged with mortar or grout.

8.02 Unless the conduit structure encasement and manhole are poured monolithic the manhole conduit entrance should be two inches larger than the conduit structure to insure adequate bonding between the conduit encasement and the manhole end wall. Except when precast manholes or conduit reinforcement is involved a monolithic type pour is preferable.

9. PLACING ENCASEMENT

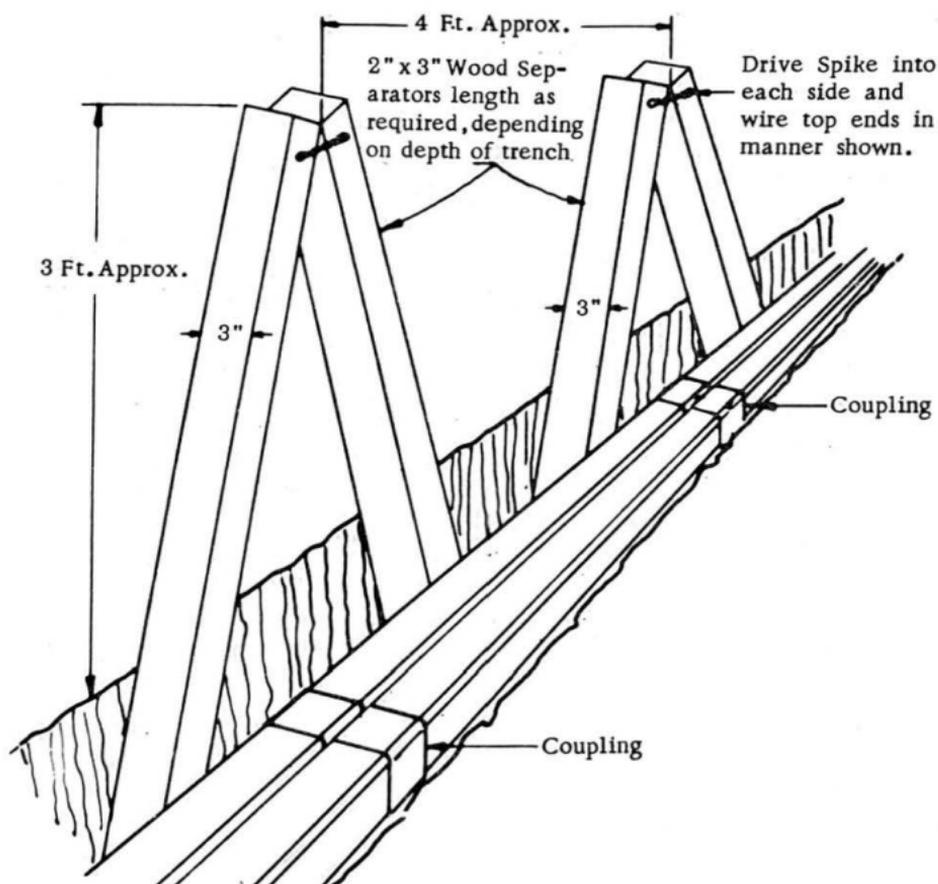
9.01 All main runs of soapstone conduit shall be encased in concrete. In general, runs 2 and 4 conduits in width shall have not less than a 3-inch base spacer and runs 3 conduits in width shall have at least a 4-inch base spacer. All soapstone conduit runs shall have a side and top encasement of at least 3 inches of concrete.

9.02 All subsidiary runs, other than those in protected locations such as under sidewalks, shall also be encased. Where the runs are not encased, mortar bandages shall be placed over the paper couplings.

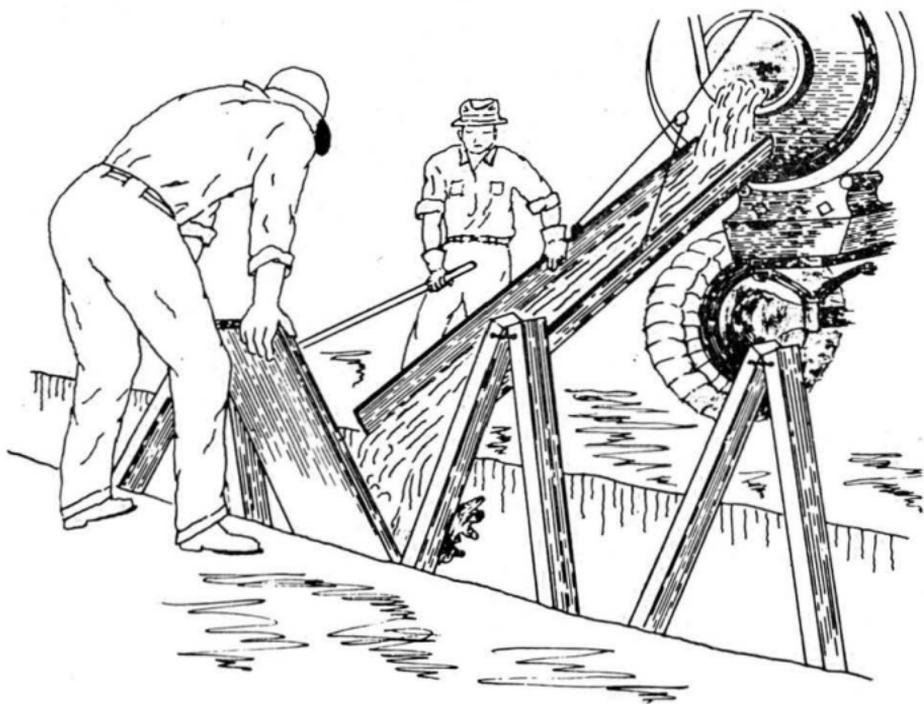
9.03 In placing the concrete, which may be poured in one operation, work it thoroughly between the separation of conduits and between the conduit and the trench walls in order to insure the complete encasement of the whole structure. The use of base spacers facilitates the working of the concrete under the conduit structure. Special attention should be given to tamping at or close to the spacer blocks to insure a good bond and sealed joints at this point.

9.04 When pouring concrete in stable soil and with a normal width trench, 2" x 3" wooden separators should be placed on one side between the conduit structure and the trench wall as shown in the following illus-

tration. These separators are withdrawn and moved to a forward position as the pouring operations advance. If the trench is not straight or in proper relative alignment on curves, the 2" x 3" wooden separators should be blocked out so that when the conduit is finally held against the separators by the encasing concrete, the conduit formation is in proper alignment. This method is generally feasible only where the trench alignment is relatively accurate and is maintained 6 inches wider than the conduit formation so as to provide a minimum uniform 3 inch encasement.



9.05 Concrete should not be poured directly onto the conduit structure but should be directed by a splash board so that the side of the trench opposite the 2" x 3" separators absorbs the shock as illustrated below. This forces the conduit tightly against the separators and holds the entire structure firmly in place and in alignment when the separators are previously aligned as indicated in Paragraph 9.04. Care should be taken that the conduit structure, separators and trench wall (and blocking if necessary) are generally in contact so that the sudden weight of concrete does not cause the conduit structure to shift more than that which can be corrected by a minor adjustment of alignment between the 2" x 3" separators and the trench wall. Tamping should now proceed until concrete is worked under conduit structure to the separator side of trench. Care should be exercised in tamping to avoid breaking or displacing the paper couplings.



9.06 When it is observed that concrete has flowed transversely under the conduit structure, the side having the 2" x 3" separators is then filled with concrete and the top encasement poured to a thickness of 3 inches, or to the top level of the crosspiece of the 1" x 2" separators when they are used. All separators are then removed and the resulting holes tamped full.

9.07 Where soil conditions are unstable and the width of the trench cannot be accurately controlled, form work shall be constructed to the required width. In such cases the 2" x 3" separators shall be used in the same manner as described in the preceding paragraphs.

10: BACKFILLING

10.01 The first backfill layer, not to exceed 1 foot, should be placed as soon as the concrete encasement has taken its initial set. This is easily gauged when the concrete surface will support a workman's weight without making an impression.

10.02 Tamping of the initial backfill in accordance with the G41. division of these practices "Main Conduit Trench Work", should follow in about 24 hours.

10.03 In hot, dry weather a 1 inch to 2 inch layer of fine backfill should be placed on top of the concrete encasement within a few minutes after pouring to prevent excessively fast evaporation of moisture. Care should be exercised in placing this layer to prevent large clods or rocks from making deep impressions in the top encasement.

11. PROVING DUCTS IN MULTIPLE FORMATIONS

11.01 Soapstone conduit formations should be proven for alignment and freedom from mortar after backfilling but before repaving. During conduit construction it is generally advisable to pull a length of construction wire through each of the ducts to be tested for later use in making the mandrel test. In general, a top and bottom duct of each formation of six or less ducts and a minimum of two additional ducts from each additional unit of six ducts in the formation should be tested. For additional units of less than six ducts, in all formations with more than six ducts, one extra duct should be tested. For example: In a nine duct formation, three ducts should be proven.

11.02 Although the above method does not prove the entire structure, it will provide a sampling basis for finding the most usual occurrences of floating and broken bottom and top ducts of the structure. If a duct is found through which the mandrel cannot be drawn all of the ducts of the formation within the section should be tested.

11.03 Conduits through which the mandrel cannot be drawn are defective and must be corrected. After repairs are made, redraw the mandrel through the repaired ducts as a check.

11.04 The test mandrel should be constructed as follows:

TEST MANDREL FOR ROUND BORE CONDUIT

