

## Duct Bank Reinforcement



### 1. Scope

This standard covers the requirements for reinforcing new duct banks with rebar. A detailed project duct bank reinforcement design supersedes this standard if it meets or exceeds the requirements presented in this standard.

Duct bank installation is outside the scope of this standard. Refer to 0222.02.

Duct bank termination is outside the scope of this standard. Refer to 0222.06.

Communications duct banks are outside the scope of this standard.

Steel reinforcement (rebar) in duct banks provides strength and flexibility so that the duct bank can temporarily span short distances without support.

Duct banks reinforced with rebar can also sustain heavier loads. A section of duct bank can become unsupported when the soil below the duct bank settles due to vibration or washes out due to erosion. However, temporary support of the duct bank is required when the soil below the duct bank is being excavated.

### 2. Application

This standard is directed at SCL engineers, crews and contractors that will be designing and constructing duct banks.

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### 3. Industry Standards

**ACI 318**; "Building Code Requirements for Structural Concrete"

**ASTM A615**; "Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement"

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### 4. Requirements

#### 4.1 General

Reinforcement is required for the following scenarios:

- Transmission system duct banks
- Distribution system duct banks as determined by SCL engineers
- Steep-sloped areas or where potential ground settlement and/or potential landslide risk areas exist
- As part of a major construction project where excavation around the duct bank could be undertaken to install other infrastructure and/or the duct bank would be subjected to heavy construction loads or vibration; Confirm with SCL Engineering.
- Where the duct bank crosses a water, sewer, or storm pipe; in this case, reinforcement shall extend 5 feet before and after the crossing; for more details, see SCL 0214.00

#### 4.2 Construction

Steel rebar shall conform to ASTM A615, Grade 60 deformed bars. The longitudinal rebars shall be #4 or larger and tied with #3 closed stirrups spaced at 18 inches on center.

The number of longitudinal rebars per duct bank shall be the next larger even number to the number determined by the equation  $N=0.12(W+D) - 0.72$ , where N= number of bars, W= duct bank width (inches) and D = duct bank depth (inches). See Section 6 for an example using this equation.

The first four rebars shall be placed in the corners of the encasement envelope. The next two rebars shall be at top and bottom center. All rebars thereafter shall be equally spaced between the corner rebars.

Longitudinal rebars shall have 2 inches minimum concrete cover.

The minimum splice length for longitudinal rebars shall be 18 inches.

Longitudinal splices shall either be staggered by 6 inches or the splice length shall be increased to 24 inches.

Stirrups shall have a minimum splice length of 12 inches.

All concrete duct banks shall be doweled to an existing vault wall or building wall with rebars to provide a shear connection. A minimum of four rebars or 60 percent of the longitudinal bars shall be epoxy embedded 3 inches into a ring vault wall and 4-1/2 inches into a panel or cast-in-place vault wall or building wall. The duct bank longitudinal rebar shall overlap a minimum of 18 inches with the threaded rebar dowel. See 0222.06 for more details.

New ring and panel vaults shall have threaded inserts embedded around the perimeter of the duct bank knockout. Duct bank rebars shall be connected to these inserts.

The concrete encasement shall be high-strength fluidized thermal backfill (HSFTB) per SCL 7150.00.

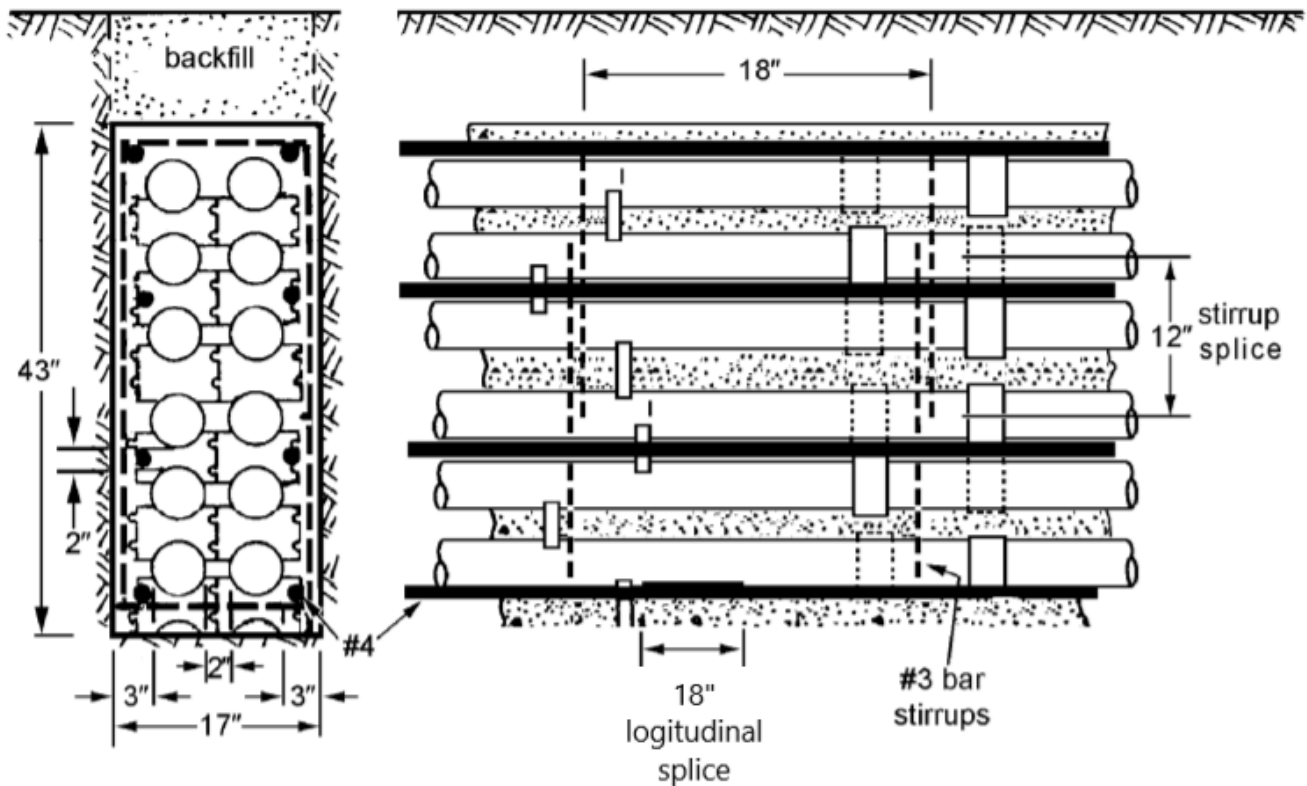
## 5. Example

The duct bank envelope is 17 inches wide and 43 inches tall as shown in Figure 5. Refer to equation in section 4.2.

$$N = 0.12 (17 + 43) - 0.72 = 0.12 (60) - 0.72 = 7.20 - 0.72 = 6.48$$

Round up the resulting number to the next larger even number. In this case, the number would be 8, indicating the use of 8 #4 bars.

Figure 5. Example Duct Bank



## 6. References

**SCL Construction Standard 0214.00**, "Clearances Between SCL Underground Structures and Other Structures"

**SCL Construction Standard 0222.02**; "Requirements for Primary Conduit and Duct Bank Installation"

**SCL Construction Standard 0222.06**; "Termination of Ducts into Vaults and Manholes"

**SCL Material Standard 7150.00**; "Fluidized Thermal Backfill"

## 7. Sources

Lu, Curtis; SCL Standards Engineer and Originator of 0222.04

**SCL Construction Standard U2-11.2/NDK-20** (canceled); "Reinforcement of Concrete-Encased Duct Runs"