



SAS HIGH STRENGTH CAISSON PILES

Coupled grade 97 bar pile cages

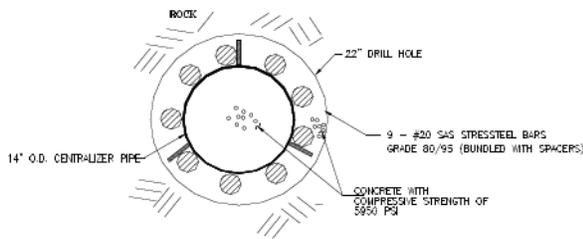
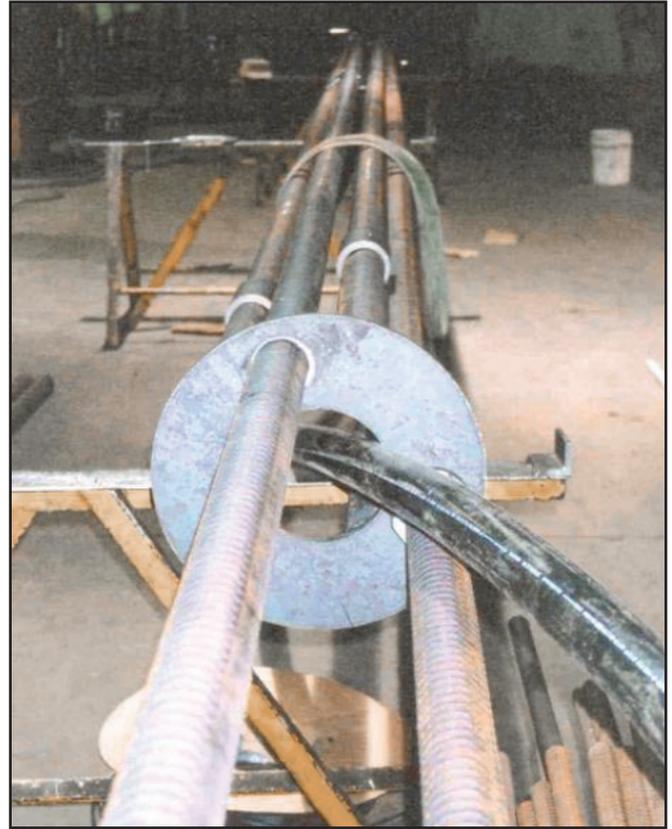


SAS SYSTEMS

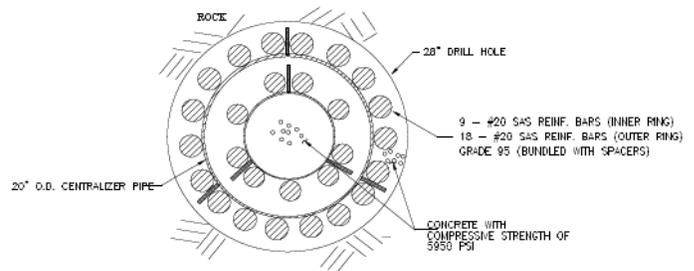
THE SAS CAISSON PILE SYSTEM

Caisson-piles are small diameter multiple bar piles. In terms of load capacity they lean towards bore piles, in terms of size, handling, and flexibility. Caisson-piles maintain the advantage of micro piles.

Since the year 1998 the SAH steel mill Annahuette Germany has been hot rolling a continuous right-hand course threaded steel bar of diameter 3/8 up to 2 1/2 inch, grade 97. Reaching a yield strength of 97 ksi, the bar has a 30 % higher load capacity than conventional reinforcement bars of the same diameter. The SAS thread-bar matches the corrosion resistance characteristics of common reinforcement bars. This thread-bar system is forms the basis for a wide variety of applications in reinforced concrete and geotechnical field, including caisson-piles.



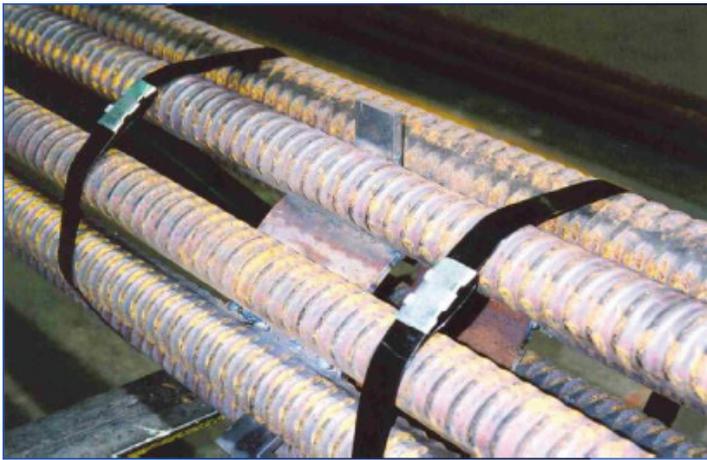
TYPICAL FOR 1700 KIP CAISSON



TYPICAL FOR 4800 KIP CAISSON

The reinforcement cages are made of pre-assembled multiple diameter 63.5 mm bars that allow the cage to be installed in single sections, or in multiple sections, coupled together to any desired length.

Using SAS grade 97 thread bars of diameter 63.5 mm in bundles as principal load carrying element, the capacity of caisson piles may range from 70 up to 4,800 kips. Beyond the capability to transfer high compression load, the caisson-pile is able to be loaded for tension.

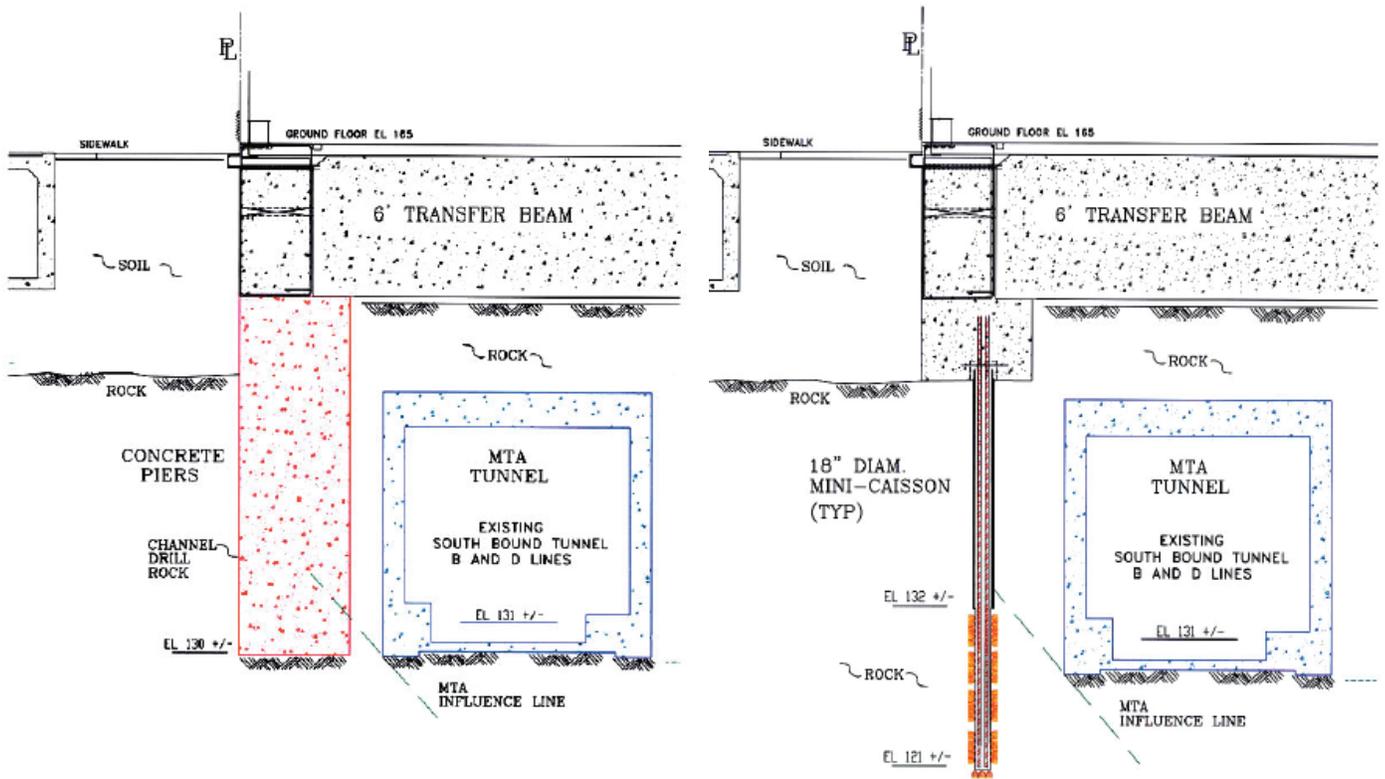


The bars are bundled by welding and strap-tying to steel centralizers.

The small bore holes in range of approximately 10 to 28 inch diameter can be drilled with compact drilling equipment at narrow locations.

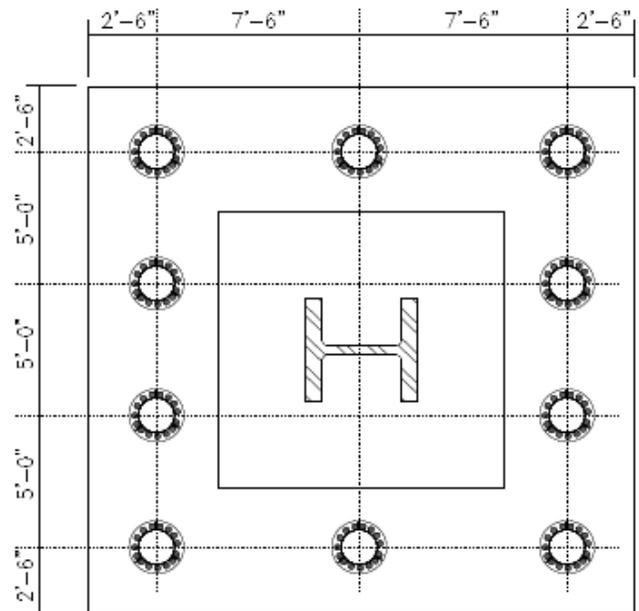


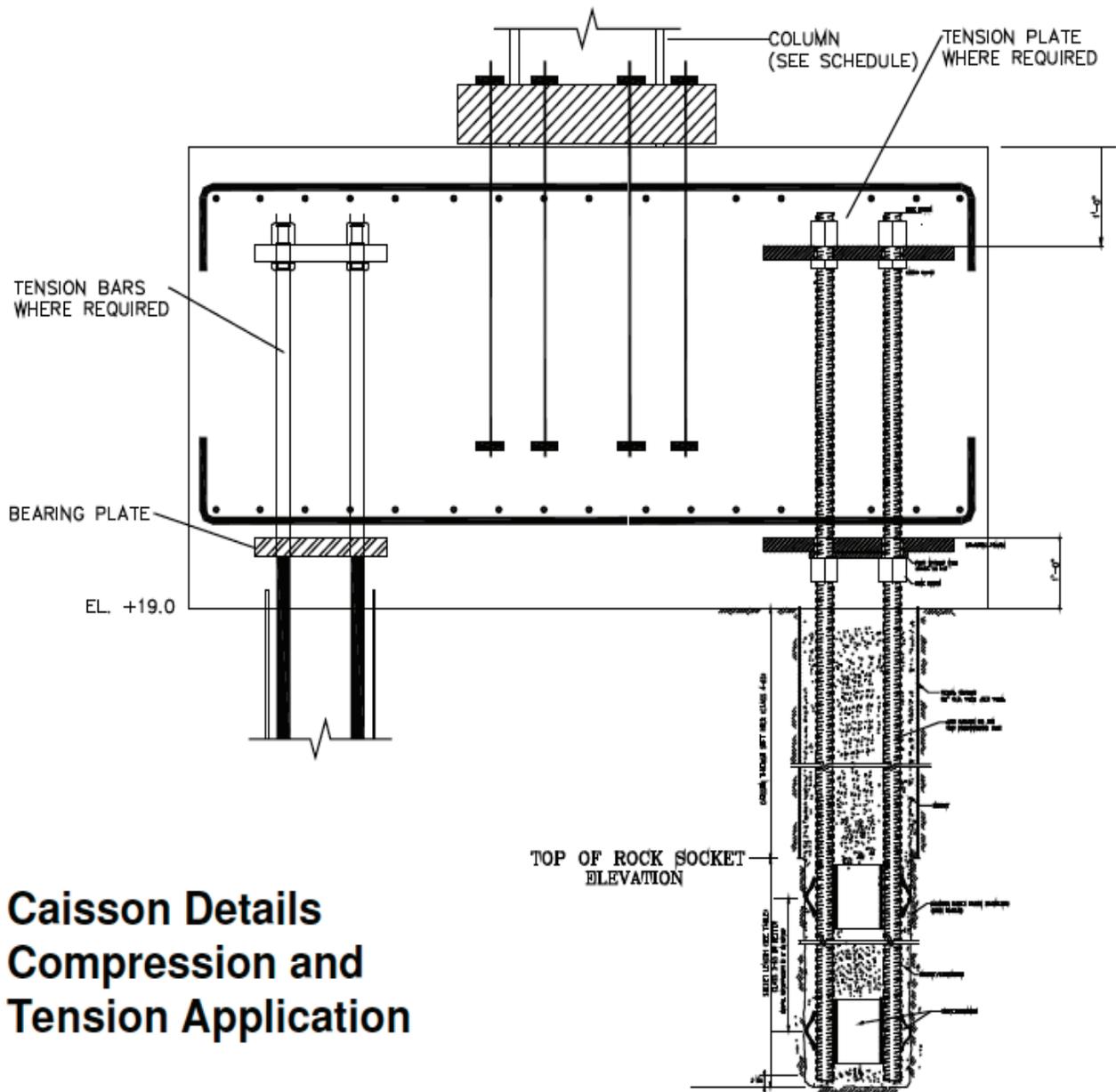
Caisson-piles may consist of multiple circular reinforcement bar layers, hence increasing load transfer capacity while maintaining a slender shape. This small pile diameter combined with short reinforcement bar cage sections, yet high load capacity, makes caisson-piles an ideal application where site access and space are limited..



The above illustration is a redesign of a base slab foundation from conventional concrete bore to caisson-pile in order to save construction time and cost. The vertical dead- and life load of the transfer beam shall pass by the existing MTA tunnel and be transferred into the ground below the tunnel.

Shown to the right is a column foundation. A number of grouped caisson-piles are supporting the foundation of the structure. A combined 10 caisson-piles, in this case with 12 SAS grade 97, diameter 63.5 mm bars per pile, are able to transfer a load of 100,000 KN into the surrounding ground.





Caisson Details Compression and Tension Application

The above schematic is a cross section example of a foundation slab at the New York Times Building. The column is loading the Caisson piles through the concrete slab. Compression load is transferred into the ground through the lower bearing plate. Tension load is transferred through the upper tension plate into the extended caisson-pile bars and subsequently anchored into the ground.



Working Load Capacity of SAS Caisson Piles

# 20 Bars [no. per caisson]	Working Load Capacity ¹⁾		Working Load Capacity ²⁾		Casing OD • Socket Ø [inch]
	grade 75, # 20 bars		grade 97, # 20 bars		
	[ton]	[ton]	[ton]	[ton]	
3	395		531		12" • 10 1/2"
4	465		647		
5	535		762		
6	605		877		
7	833		1151		18" • 10 1/2"
8	903		1266		
9	973		1382		
10	1043		1497		
11	1314		1813		24" • 22 1/2"
12	1384		1929		
13	1454		2044		
14	1524		2160		
15	1594		2275		30" • 28"
16	1664		2390		
17	2102		2874		
18	2172		2990		
19	2242		3105		
20	2312		3220		
21	2382		3336		
22	2452		3451		
23	2522		3566		
24	2592		3682		
25	2662		3797		
26	2732		3913		
27	2802		4028		
28	2872		4143		

¹⁾ As per current NYC Building code.

²⁾ Requires a variance to the NYC Building code, i.e. use $0.5 f_{tg}$, where $f_{tg} = 97$ KSI.