SCHEDULE

SOLDIER BEAMS — ANCHORS

SOLDIER BEAM NUMBER & SIZE	SECT.	MIN. VERT. EMBED. BELOW LOWEST PKT. OF	EMBED. BELOW LOWEST PKT. OF	SHAFT DIA. "d"	'A' DESIGN LOAD (KIPS)	'A' 150% TEST LOAD (KIPS)	'A' 200% TEST LOAD (KIPS)	'A' NUMBER OF 0.6" DIA STRANDS	'A' ANCHOR ANGLE (DEGREES)	'A' MIN. BOND LENGTH (FEET)	'A' TOTAL SHAFT LENGTH (FEET)	'B' DESIGN LOAD (KIPS)	'B' 150% TEST LOAD (KIPS)	'B' 200% TEST LOAD (KIPS)	'B' NUMBER OF 0.6" DIA STRANDS	'B' ANCHOR ANGLE (DEGREES)	'B' MIN. BOND LENGTH (FEET)	'B' TOTAL SHAFT LENGTH (FEET)
#1 THRU #45 W14x43	1 SH-6	36'	8'	24"	100	150	200	4	20	32	48	105	158	210	4	20	33	48
#46 THRU #51 W14x43	2 SH-6	36'	8'	24"	100	150	200	4	20	32	48	100	150	200	4	20	32	48
#52 THRU #56 W16x50	2 SH-6	37'	8'	24"	105	158	210	4	20	34	50	105	158	210	4	20	34	50
#57 THRU #59 W18x55	2 SH-6	38'	8'	24"	120	180	240	5	20	38	54	105	158	210	4	20	34	50
#60 THRU #64 W18x55	2 SH-6	38'	8'	24"	120	180	240	5	20	38	54	105	158	210	4	20	34	50
#65 THRU #70 W21x73	2 SH-6	41'	8'	30"	140	210	280	5	20	45	62	120	180	240	5	20	38	53
#71 THRU #73 W21x73	2 SH-6	41'	8'	30"	140	210	280	5	20	45	62	120	180	240	5	20	38	53
#74 THRU #79 W21x73	2 SH-6	41'	8'	30"	140	210	280	5	20	45	62	120	180	240	5	20	38	53
#80 THRU #86 W18x55	3 SH-6	38'	8'	24"	120	180	240	5	20	38	54	105	158	210	4	20	34	50
#87 THRU #110 W14x43	3 SH-6	36'	8'	24"	100	150	200	4	20	32	48	100	150	200	4	20	32	48
#111 THRU #115 W14x48	5 SH-6	28'	8'	24"	125	188	250	5	20	40	55	–	–	–	–	–	–	–
#116 THRU #124 W14x30	5 SH-6	26'	8'	24"	100	180	200	4	20	32	48	–	–	–	–	–	–	–
#125 THRU#127 W14x48	5 SH-6	28'	8'	24"	125	188	250	5	20	40	55	–	–	–	–	–	–	–
#128 THRU #133 W14x48	5 SH-6	30'	8'	24"	135	203	270	5	20	43	58	–	–	–	–	–	–	–
#134 THRU #158 W14x34	4 SH-6	33'	8'	24"	75	113	150	3	20	25	40	85	128	170	4	20	27	42

–AN EXTRA STRAND, THE NEXT LARGER ROD OR TWO RODS SHALL BE ADDED/USED, AS REQUIRED, TO TEST THE ANCHORS.

Tieback Angle Variance to Length Chart

Variance	Additional Length Required
0° to 5°	+2'–0"
>5° to 10°	+4'–0"
>10° to 15°	+6'–0"
>15° to 20°	+8'–0"
>20°	Consult Shoring Engineer

WHEN SPECIFIED TIEBACK LENGTH CANNOT BE ACHIEVED INCREASE BOND LENGTH ACCORDINGLY

1"=50' 0 20' 40' 60'
1"=40' 0 20' 40' 60'
1"=30' 0 20' 40'
1"=20' 0 10' 20' 30'
1"=10' 0 10'
1/16"=1' 0 8' 16' 24'
3/32"=1' 0 8' 16'
1/8"=1' 0 6' 12'
1/4"=1' 0 3' 6'
3/8"=1' 0 1' 2' 3' 4'
1/2"=1' 0 1' 2' 3'
3/4"=1' 0 1' 2'
1"=1' 0 1'
1 1/2"=1' 0 6"

INSPECTION BY SHORING ENGINEER

1. A pre-construction meeting between the Shoring Engineer, Soils Engineer, Shoring Sub-Contractor, General Contractor and Inspectors from the City of Los Angeles Department of Building and Safety and Bureau of Public Works shall take place prior to start of shoring for the purpose of procedural review and utility identification/location.
2. The Shoring Engineer shall make periodic inspections to the job site for the purpose of observing the installation of the shoring system.
3. Observation shall include but not be limited to the following:
   a. Observe the installation of at least two soldier beams and tie-back anchors;
   b. Observe the soldier beam survey monitoring.

MATERIAL SPECIFICATION

CAISSONS:

1. Caissons are to be machine drilled. Caissons are to be drilled straight, true and plumb.
2. Provide protection against sloughing or caving as required.
3. Drilled holes to be left open more than 12 hours shall be covered with steel plates or plywood.

TIMBER:

1. Wood lagging shall be rough sawn Douglas-Fir No. 2 (f_b= 900 psi). See TYPICAL PLAN SECTION DETAIL on SH-3.
2. Wood lagging shall be ACQ or CCA pressure treated with a minimum retention of preservative of 0.4 pcf and approved for use in ground contact by the City of Los Angeles.

STRUCTURAL STEEL:

1. Structural steel shapes shall conform to ASTM A572, Grade 50 or ASTM A992.
2. Miscellaneous steel and plates shall conform to ASTM A36, A572, Grade 50 or A992.
3. All pipes and pipe sleeves shall conform to ASTM A53, Grade B.

ANCHOR RODS:

1. Design loads on anchor rods per SCHEDULE on SH-2.
2. Diameter of anchor rods and size of concrete anchor shafts shall be logged and certified by the Soils Engineer.
3. Anchor rods shall not be welded or used for grounding welding equipment.
4. Anchor rods shall conform to ASTM A722, high-strength with a guaranteed ultimate minimum strength of 150,000 psi.
5. Anchor rods shall conform to the City of Los Angeles Research Report No. 23835.

ANCHOR TENDONS:

1. Design loads on stranded cables per SCHEDULE on sheet SH-2.
2. Tie-back strands shall be fabricated from seven-wire strands conforming to ASTM A416.
3. Strands shall be 0.6-inch diameter.
4. Strands shall be high-strength with a guaranteed ultimate minimum strength of 270 ksi.
5. Strands shall conform to the City of Los Angeles Research Report No. 25053.
6. Strands shall not be welded or used for grounding welding equipment.
7. Diameter of strands, number of strands per anchor and size of concrete anchor shafts shall be logged and checked by the Geotechnical Engineer.

WELDING:

1. All welds shall be electric arc using E70XX electrodes.
2. All structural steel welding shall conform to the ANSI/AWS D1.1.
3. All welders shall be certified by the City of Los Angeles.
4. Provide continuous inspection by a City of Los Angeles approved Deputy Inspector for all field welds.

SLURRY FOR SOLDIER PILES:

1. Slurry shall contain 1½ sacks (141 lbs) of Portland cement per cubic yard of sand.
2. Cement shall be ASTM C150 Type II/V.
3. Aggregates shall be natural sand conforming to ASTM C33.

CONCRETE FOR SOLDIER PILES:

1. Minimum compressive strength of concrete shall be 2500 psi at 28 days.
2. Cement shall be ASTM C150 Type II/V.
3. Aggregates shall be natural sand and rock conforming to ASTM C33.
4. No calcium chloride or other additive shall be used unless specifically approved by the Shoring Engineer.

CONCRETE FOR ANCHORS:

1. Concrete for earth anchors shall be high early-strength and shall reach its design strength of 3000 psi in 72 hours.
2. Provide continuous inspection by a Los Angeles City approved Deputy Inspector.
3. Cement shall be ASTM C150 Type II/V.
4. No calcium chloride or other additive shall be used unless specifically approved by the Shoring Engineer.
5. The concrete mix design shall be reviewed and approved by the Shoring Engineer prior to use.
6. The concrete mix design shall be prepared, stamped and signed by a Civil or Structural Engineer registered in the State of California.

GROUT FOR TIE-BACK ANCHORS:

1. Grout shall be a neat cement mixture containing 4½ to 5 gallons of water per cubic foot (94 lbs) of Portland cement.
2. Cement shall conform to ASTM C150, Type II/V.
3. Water reducing add mixtures may be add if approved by the City and the Shoring Engineer.
4. Accelerators shall not be used.
5. Fine aggregates, if used, shall conform to ASTM C33.

INSTALLATION PROCEDURE (GENERAL)

1. Drill shafts;
   a. Shafts are not allowed to be left open over-night.
   b. Provide protection against sloughing or caving as required. See Soils Report Boring Logs.
   c. Shafts are to be accurately located. Do not exceed the minimum or maximum allowable spacing.
2. Place soldier beams in shaft. See DETAIL 1/SH-3 for location tolerances.
3. Fill shaft with 2500 psi concrete to bottom of footing excavation as shown on ELEVATIONS. Fill balance of caisson with lean sand-cement mixture.
4. Take all initial monitoring readings. See SOLDIER BEAM SURVEY MONITORING for requirements.
5. Start excavation only after concrete in bottom of shaft has cured a minimum of 7 days. Excavation of 6 feet maximum is permissible after slurry has cured a minimum of 24 hours.
6. Lagging will be required between the soldier beams.
7. Timber lagging shall be treated. See the Material Specification, TIMBER for requirements.
8. Careful installation of the lagging will be necessary to achieve full bearing against the retained earth. Fill voids behind lagging with slurry or granular material to insure bearing of soil along the full length of lagging. Lagging lifts are not to exceed 5 feet.
9. Drill earth anchor shafts. Place tie-back anchor rods or strands as soon as the shafts are completely drilled and inspected by the Soils Engineer. See TYPICAL DRILL BENCH STAGES FOR REQUIRED EXCAVATION DETAIL 2/SH-3.
10. Anchor shafts shall be free of loose material. Concrete or grout shall be placed immediately after placing anchor rods or strands in shaft.
11. Anchor rods or strands shall be tensioned straight and true. Kinking or sharp curvature in anchor rods or strands shall not be permitted.
12. All water should be removed from the tie-back anchor shafts prior to the filling of grout. If all of the water cannot be removed anchors must be post grouted at least once. Concrete shall be placed through a rigid tremie.
13. Do not continue with the excavation before anchors are tested and certified.
14. See INSTALLATION OF PRESSURE GROUTED ANCHORS for addition requirements.

SOLDIER PILE SURVEY MONITORING

1. Soldier pile survey monitoring shall be conducted on a periodic basis until the permanent structure is capable of supporting the imposed lateral loads.
2. Control points, initial soldier pile offsets and weekly monitoring shall be performed by a California State licensed surveyor.
3. Prior to any excavation, survey monitoring control points and initial soldier pile offsets shall be established to monitor the horizontal and vertical movement of the soldier piles.
4. Initial reading and periodic reading shall be submitted to the Shoring Engineer and General Contractor.
5. Monitoring reading shall be submitted within 3 working days after they are conducted.
6. Additional reading shall be obtained when requested by the Shoring Engineer or General Contractor.
7. Control points shall be established outside the area of influence of the shoring system to ensure the accuracy of the monitoring readings.
8. If any horizontal or vertical movement of the soldier piles reaches one inch the Shoring Engineer shall evaluate such movement and recommend corrective measures, if necessary, before excavation continues.
9. If the magnitude of any horizontal or vertical movement of soldier piles reaches two inches supplemental shoring shall be installed to eliminate all further movement.

TESTING OF TIE-BACK ANCHORS

1. The Soils Engineer shall keep a record at the job site of all test loads and total anchor movements and shall certify their accuracy.
2. All of the anchors shall be tested to 150% of their design loads; the total deflection during the test shall not exceed 12 inches. The rate of creep under the 150% test shall not exceed 0.1 inch over a 15 minute period in order for the anchor to be approved for the design loading.
3. Three of the initial anchors, as selected by the Soils Engineer, shall be tested to 200% of design load for a 24 hour period. The total deflection during the 24-hour 200% test load shall not exceed 12 inches; the anchor deflection shall not exceed 0.75 inch measured after the 200% test load is applied. If the anchor movement after the 200% load has been applied for 12 hours is less than 0.5 inch, and the movement over the previous 4 hours has been less than 0.1 inch, the 24 hour test may be terminated.
4. At least 10% of the anchors shall be "quick" tested at 200% of design load and this test load maintained for 30 minutes. The total deflection shall not exceed 12 inches; the anchor movement shall not exceed 0.25 inch during the 30 minute period, measured after the 200% test load is applied.
5. In the event that the stated limits in deflection are exceeded, the Soils Engineer shall submit recommended reduced loading values and supplementary anchors may be required.
6. After a satisfactory test, each anchor shall be locked-off at the design load. The locked-off load shall be verified by rechecking the load in the anchor. If the locked-off load varies by more than 10% from the design load, the load shall be locked-off to the design load.
7. Certification from an approved testing laboratory is required for the calibration of the hydraulic rams to tension anchors prior to the start of testing and monthly thereafter.
8. The location of the 200% test shall be predetermined by the Soils Engineer. An extra strand, the next higher rod diameter or two rods shall be added, as required, to test the soils anchors.
9. If excessive twisting of the soldier beams occurs during testing, a 3"x 3/8" flat bar strap shall be installed between adjacent soldier beams, above and below the anchor pocket.

PRESSURE GROUTING PROCEDURE:

1. Grout shall conform to the Post Tension Institute Manual, 4th Edition.
2. Grout shall have a water to cement ratio of 0.4 to 0.45 and achieve a minimum compressive strength of 3000 psi at time of stressing.
3. Grout is to be batched on site, discharged into a holding tank or directly into the grout pump. The grout will be pumped by piston pump with pressures monitored by a pressure gauge at the outlet of the pump.
4. Batching Procedure:
   a. Fill mixing unit with 4½ to 5 gallons of potable water.
   b. Add one sack, 94 lbs, of cement to mixer.
   c. Agitate thoroughly until a homogenous mix is achieved.
   d. Discharge grout into tank or directly into shaft, agitate slowly to prevent segregation in pumped into tank, pump grout into shafts as noted above.

INSTALLATION OF PRESSURE GROUTED ANCHORS:

1. Machine drill the tieback shaft with temporary casing as required to prevent sloughing or caving of material.
2. Inject air and/or water under pressure through the drill stem to remove the drill cuttings from the drill shaft.
3. Install the tieback anchor rod with attached centralizing devices into the shaft or install rod through the drill casing without centralizers.
4. Fill the shaft with neat cement grout. A 3/8"ø grout tube may be used to fill shaft or grout may be tremied into the shaft through a rigid pipe from the tip out. Ensure the tremie is always in fresh grout.
5. The grout tube may remain in the shaft or be removed after initial grouting. If left in place, the grout tube must be full of grout.
6. Terminate grouting when the shaft is completely filled to the back flange of the soldier beam.
7. After the initial grout has attained its set, perform post grouting of the anchor bond zone through the attached post grout line and valves.
8. The post grout line shall be a 1/2"ø, Schedule 40, PVC pipe with rubber valves at 5 feet on center in the post grout zone, max.
9. Fracture the initially set in the bond zone with water and repeat grouting until a confinement back-pressure of approximately 300 psi is recorded. Actual injection pressures and grout volumes will vary depending on soil conditions and holding capacities of the anchor.
10. Flush post grout line with water for reuse.
11. The anchor rods shall remain undisturbed until the grout has cured a minimum of 3 days.
12. Test anchors in accordance with the procedures described in "Testing of Tie-Back Anchors".
13. Should the anchor fail the acceptance criteria, unload the rods and perform additional post grouting and retest anchor until it passes the prescribed test.
14. After a successful load test, the rods shall be locked off to within 10% of their design load.
15. Repeat the above procedure for all tiebacks.

GENERAL NOTES

1. All construction shall conform to the 2001 California Building Code and all other known applicable regulating requirements.
2. All work shall be performed in accordance with the latest edition of the California Construction Safety Orders (CAL-OSHA).
3. The design of the earth embankment shoring system is based upon soils data and recommendations contained in the Geotechnical Engineering Investigation, Proposed Office Building and Parking Structure, Fox Studio Lot, 10201 West Pico Blvd., Lot B, Los Angeles, California prepared by Geotechnologies, Inc. dated November 10, 2003 and Addendum Letter II, Update of Geotechnical Engineering Investigation dated June 10, 2004. (Geotechnologies File No. 18484-S).
4. The City of Los Angeles Department of Grading approval letter dated _____ and the above referenced Report(s) are a part of these plans.
5. The shoring contractor shall familiarize himself with all data therein and keep a copy of the soils report(s) at the job site at all times.
6. The locations of existing underground utilities are shown in an approximate way only based on the project civil drawings. The contractor shall determine the exact location of all existing utilities before commencing work. The contractor shall be fully responsible for any and all damages which might be caused by their failure to exactly locate, protect and preserve any and all underground utilities.
7. The shoring contractor shall contact Underground Service Alert at 1-800-227-2600 two working days before commencing any excavation.
8. Heavy vehicular traffic, such as cranes, concrete trucks, material trucks or material storage, (with a uniform pressure greater than 300 psf) shall be prohibited within 10 feet of the soil side of the shoring bulkhead or top of sloped embankments except for temporary construction ramps at the front side of the shoring bulkhead.
9. Dust shall be controlled at all times during construction of the retaining system and the associated shoring installation, excavation, grading and back-filling.
10. Provide sandbags, soil berm or other means to prevent surface water from entering excavation over top of shoring and cut slopes.
11. Temporary cuts shall not exceed slopes recommended in the project specifications nor those shown on these drawings.
12. Coordinate these drawings with the Architectural, Structural, Civil and Site Survey drawings.
13. Installation of shoring and excavation shall be performed under the continuous observation and approval of the Soils Engineer's Representative.
14. Installation and testing of shoring system shall comply with the Los Angeles City's "Requirements for temporary tie-back earth anchors", the Testing of Tie-Back Anchors Specification on this sheet and the above referenced Soils Reports and shall be performed under the continuous inspection and approval of the Soils Engineer and the Deputy Inspector for welding, concrete and grading.
15. A City of Los Angeles Registered Grading Deputy Inspector, approved by and responsible to the geotechnical engineer, shall be required to provide continuous inspection for the proposed shoring.
16. A City of Los Angeles Registered Deputy Grading Inspector is required on grading and foundation earthwork where the site exceeds 60,000 square feet, cut and fill slopes exceed 2:1 or foundation excavation are below a 1:1 plane from the property line.
17. Existing grades are estimates only based on the site survey and may not reflect the final site conditions after grubbing and rough grading.
18. No excavation or grading shall commence until 10 days after the notice required by Section 91.0303(1) of the City of Los Angeles Building Code has been posted on the site.
19. After the permanent subterranean portion of structure is complete, a portion of the tops of soldier beams and lagging on private property shall be removed for landscaping purposes. Consult with the Owner's Representative, General Contractor and/or Landscape Architect for requirements.
20. After the permanent basement structure is complete, all soldier beams and lagging placed in the public way wither under the sidewalk or in the roadway shall be removed to a minimum of 8-feet below gutter grade. All soldier beams and lagging placed in an alley shall be removed to a minimum of 4-feet below grade. All tieback anchor rods in the public way including alleys that are located within 20-feet of surface shall be removed. All other tiebacks in the public way shall be de-tensioned and shall be verified by the Public Works Inspector.
21. No trenches or excavations 5 feet or greater in depth into which a person is required to descend shall be constructed before obtaining the necessary permits from the State of California Division of Industrial Safety and prior to the issuance of a building or grading permit.
22. The shoring system has been designed in accordance with known applicable codes, the project soils report and an assumed drained soils condition.

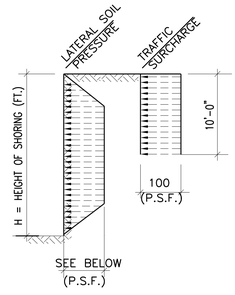
CITY OF LOS ANGELES GRADING NOTES:

1. "General Specifications for all Grading Plans" – Department of Building and Safety form B-164 is a part of these plans.
2. No fill is to be placed until the City Grading Inspector has inspected and approved the bottom of excavation.
3. Man-made fill shall be compacted to a minimum relative compaction of 90%. Cohesionless soils with less than 15% finer than 0.005 mm requires 95% relative compaction. See Section 91.7011.3.
4. Temporary erosion control is to be installed between November 1 and April 15. Obtain Grading Inspector's and the Department of Public Works approval for all proposed procedures. See Section 91.7007.1.

DESIGN CRITERIA

1. Building Code: . . . . . 2002 City of Los Angeles Building Code
2. Concrete: ACI-318-99
3. Steel: . . . . . AISC Ninth Edition (ASD)
4. Soils: . . . . . Geotechnical Engineering Investigation, Proposed Office Building and Parking Structure, Fox Studio Lot, 10201 West Pico Blvd., Lot B, Los Angeles, California prepared by Geotechnologies, Inc. dated November 10, 2003 and Addendum Letter II, Update of Geotechnical Engineering Investigation dated June 10, 2004. (Geotechnologies File No. 18484-S).

BRACED OR TIED BACK SHORING



EARTH PRESSURE DISTRIBUTION

H<15'	=	20H
H<35'	=	24H
H<45'	=	25H
MAX. LAGGING PRESSURE	=	400 PSF
TRAFFIC SURCHARGE	=	100 PSF
PASSIVE BEARING PRESSURE	=	600 PCF
MAXIMUM PASSIVE PRESSURE	=	6000 PSF
AVERAGE FRICTION VALUE		
PASSIVE ANCHORS	=	450 PSF
PRESSURE GROUTED ANCHORS	=	2000 PSF
MINIMUM ANCHOR LENGTH	=	20 FEET BEYOND FAILURE WEDGE

REGISTERED PROFESSIONAL ENGINEER — LAURA A. BURNETT — No.36209 Exp. 6-30-06 — CIVIL — STATE OF CALIFORNIA

REVISIONS	BY
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GENERAL NOTES

Date	11–08–04
Scale	AS NOTED
Drawn	JT
Checked	LAB
Job No.	04–0430
Sheet	SH-2
Of	6 Sheets

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