FINAL

Building 152
Jet Engine Drone Assembly Building

Historic American Buildings Survey
Level I

2701 North Harbor Drive,
San Diego, California 92101

Prepared for

San Diego Unified Port District (SDUPD)
San Diego County Regional Airport Authority

April 2010

CH2MHILL

HISTORIC AMERICAN BUILDINGS SURVEY

RYAN AERONAUTICAL COMPANY HISTORIC DISTRICT

BUILDING 152 - JET ENGINE DRONE ASSEMBLY BUILDING

Location: 2701 North Harbor Drive, San Diego, CA 92101, USA

Present Owner/Occupant: San Diego County Regional Airport Authority

Present Use: Vacant

Significance: Building 152 is located within the boundaries of the Ryan Aeronautical Company Historic District, a 46-acre complex containing 17 contributing resources and 30 non-contributing resources. The district is eligible on the local and national level for the National Register of Historic Places (NRHP) under Criteria A, B, and C and for the California Register of Historical Resources (CRHR) under Criteria 1, 2 and 3. The historic district is eligible under NRHP Criterion A (CRHR 1) for its association with the contribution of aircraft manufacturers at Lindbergh Field to World War II defense production. It is also eligible for its association with Cold War research, development projects, and defense manufacturing. Under Criterion NRHP B (CRHR 2) the district is eligible for its association with aviation pioneer T. Claude Ryan and his aircraft aerospace manufacturing businesses. Ryan Aeronautical Company, under Mr. Ryan's leadership, made significant contributions to national defense production during World War II, as well as important developments in aerospace research and development in the 1950s and 1960s. The historic district is eligible under NRHP Criterion C (CRHR 3) for its representation of industrial architecture associated with the 1930s and World War II. The district embodies the distinctive architectural characteristics of aircraft manufacturing buildings of the period in Southern California. The building and structures in the district illustrate the design fabrication concepts common to aircraft manufacturing plants from the 1930s to the 1960s. During this period, the aerospace industry played a dominant role in the economy of the region (URS Corporation, 2008).

Building 152 is a contributing resource to the Ryan Aeronautical Company Historic District. This building was an open-interior assembly building for jet engines and later for drones. Building 152 is representative of the period and type of construction found at aviation factories in the mid-20th century in California and the U.S.

Historian: Sara Orton

PART I. HISTORICAL INFORMATION

A. Physical History:

1. Date of erection: 1952

2. Architect: Stanley Burne, Structural Engineer; National Steel and Shipbuilding Corporation, Contractor

3. Original and subsequent owners: Ryan Aeronautical Company signed a 50-year lease in 1939. Ryan Aeronautical Company sold to Teledyne Inc. in 1969, and the combined company became Teledyne-Ryan Aeronautical Company (TDY Industries). TDY Industries merged with Allegheny Ludlum Corporation in 1996, and Northrop Grumman Corporation acquired TDY Industries from Allegheny in 1999. Presently, the property is leased by the San Diego County Regional Airport and is under the Jurisdiction of the San Diego Unified Port District.

4. Original plans and construction: Building 152 is a rectangular, open-interior building measuring 250 feet by 300 feet.

5. Alterations and additions: A shed roof addition on the west elevation, measuring 40 feet by 90 feet, was constructed post-1956. Windows have been removed from the building.

B. Historical Context:

1. San Diego's Aviation History:

During the first three decades of the 20th century, the aviation industry was established in San Diego and it became a focal point of San Diego's activities and reputation. In 1912, the Army founded an air base and the first year-round military aviation school at Rockwell Field on Naval Air Station North Island, San Diego (Macaulay, 1928; Moore, 1960). The creation of the military air bases helped establish aviation in the region during the industry's pioneering years. In 1928, the Army and Navy had invested $5,500,000 in the air bases at North Island (Macaulay, 1928). The high profile attained by aviation in the local community during these years resulted in an awareness of the potential future of the industry by the inhabitants of the region. San Diego became the first U.S. city to establish a Municipal Board of Air Control in 1926, and was also the first to issue a complete set of air ordinances (Macaulay, 1928).

In 1922, T. Claude Ryan, an aviation pioneer who began his career as an Army pilot, left the Army and moved to San Diego, where he began giving airplane rides and flying instructions. He soon established the Ryan Flying Company at the Dutch Flats Airfield in San Diego, which later became Ryan Airport. Dutch Flats Airfield was located at present-day Barnett Avenue and Midway Drive, off the current San Diego airport site and not within the current historic district boundaries. In the 1920s, Ryan Airport was the focal point for Ryan's expanding aeronautical enterprises (flying school, flying service, and an airplane manufacturing company). In the late 1920s, the use of the airport expanded as civil aviation came of age with other companies using Ryan's field to operate air services. With the help of T. Claude Ryan, civilian aviation flourished in San Diego County during these decades.

In the mid-1920s, the Chamber of Commerce promoted San Diego as the "Air Capital of the West." The development of what is now Lindbergh Field would be the central effort in this campaign. The committee realized that in order to maintain a leadership role in aviation, San Diego must have an adequate municipal airport. They wanted the location of the airport to be a place that would combine facilities for the operation of land and seaplanes, and be as near to the city of San Diego as possible. They selected an area at the north end of San Diego Bay on City-owned tideland; however, this area did not contain enough area to meet government

requirements. Negotiations were made with the United States Navy to provide portions of the Marine Corps-owned tidelands for the airport expansion (URS Corporation, 2009).

Ryan was instrumental in the development of Lindbergh Field, San Diego's nascent municipal airport, which was established in 1928. In 1929, 4,755 planes and over 20,000 passengers arrived or departed from the Dutch Flats Airfield (Leiser, 2000). Within a few years, the majority of these activities would move to Lindbergh Field. In 1939, Ryan established a manufacturing site on airport grounds, which is the location of the historic district.

2. Ryan Aeronautical Company:

T. Claude Ryan was born in Parsons, Kansas in 1898, but moved with his family to Orange, California in 1912. Ryan began a lifelong relationship with the aviation industry when, around the age of 19, he enrolled at the American School of Aviation in Los Angeles. In 1919, Ryan began studying mechanical engineering at Oregon State College. While in school, he applied to the Army for aviation cadet training and was accepted, but left the Army by January 1922 in hopes of flying as a civilian (National Aviation Hall of Fame, 2009). Ryan moved to San Diego to establish the Ryan Flying Company. The Ryan Flying Company changed its name to Ryan Airlines, Inc. when it was reorganized in 1924 to begin operating the first year-round, scheduled airline service in the United States from Dutch Flats (URS Corporation, 2009). Around the same time, in the mid-1920s, Ryan entered the aircraft manufacturing business with partner Frank Mahoney and created the Ryan M-1 Monoplane, which became one of the best-known air mail carriers in the country. A modified Ryan Monoplane became the *Spirit of St. Louis*, the plane Charles Lindbergh flew from New York to Paris in May 1927 on the first solo flight across the Atlantic Ocean. Ryan sold the company to Mahoney in 1926 and established the Ryan Aeronautical Corporation for the sale and manufacture of aircraft engines. The company changed its name to the Ryan Aeronautical Company in 1934.

Ryan Aeronautical Company signed a 50-year lease, starting in 1939, on land at the southeastern edge of Lindbergh Field along North Harbor Drive. Three buildings from the site of the previous company were relocated to this new location. The Ryan plant was one of several aircraft manufacturers located at Lindbergh Field that contributed to the nation's war effort in the 1940s. At peak wartime production, the Ryan plant had 8,500 employees and annual production exceeded $55 million. Following the war, workforce was reduced to 1,200 and annual production to $8 million (URS Corporation, 2009).

The Korean conflict provided the Ryan Aeronautical Company the opportunity to work with electronics for aerospace applications. The role in aerospace electronics led to the development of a variety of aircraft navigation and positioning equipment, including helicopter hovering devices, altimeters, and remote sensors (URS Corporation, 2009).

In 1947, the United States Navy awarded Ryan a contract to research the feasibility of reaction controls for jet aircraft. With jet engines and reaction controls handled by remote control, a Ryan vertical test rig lifted itself off the ground for the first time in 1950. In 1953, the Air Force awarded Ryan a contract to design and build two manned vertical takeoff jet research planes and 2 years later, the Ryan X-13 Vertijet was constructed. In the 1960s, Ryan continued target drone and electronic systems production and vertical takeoff and landing research (URS Corporation, 2009).

In 1969, the company was sold for $128 million to Teledyne Inc. and became known as Teledyne-Ryan Aeronautical Company (TDY Industries). T. Claude Ryan remained with the company as chairman until his death in 1982. In 1996, TDY Industries merged with Allegheny Ludlum Corporation, and then later became a subsidiary of that company. In 1999, Northrop Grumman Corporation acquired TDY Industries from Allegheny and relocated the plant to a site in Ranch Bernardo, California, leaving the former plant site vacant. The site continues to be mostly vacant, with only a small portion of Building 100 used for administrative offices and several other buildings used for storage.

PART II. ARCHITECTURAL INFORMATION

A. General Statement:

1. Architectural Character: Building 152 was a jet engine assembly and drone assembly building, but it is currently vacant. The majority of the windows have been removed. It is a large, open-interior structure with a five-barrel roof and interior posts to support them. It does not exhibit stylistic elements, but in form it is typical of mid-20th century aviation industry structures.

2. Condition of Building Material: Building 152 is in fair condition due to the open windows and exposure to the elements.

B. Description of Exterior:

1. Overall Dimensions: Building 152 is a rectangular building, two-stories in height, measuring approximately 250 feet by 300 feet. There is an addition on the west elevation measuring 40 feet by 90 feet.

2. Foundations: Building 152 sits on a concrete slab with a raised concrete perimeter foundation.

3. Walls: Building 152 has wooden 2-inch-by-4-inch stud-framed walls covered with stucco on the exterior. The wall framing on the inside of Building 152 is covered with plywood.

4. Structural System: Building 152 is composed of wood-frame construction with interior trusses supported by steel I-beam posts mounted onto the concrete slab. Additional reinforcement is provided by 5-inch-by-8-inch wooden beam posts placed approximately 12 feet apart along the interior of the wall. Each steel roof truss is approximately 50 feet wide and placed in sets of five to span the width of the building. Interior trusses are supported by two rows of 5-inch-square steel I-beam posts mounted onto the concrete slab floor. The trusses hold 4-inch-by-12-inch wooden roof joists covered with 2-inch-by-8-inch sheathing boards placed at a 45 degree angle to the roof joists axis (URS Corporation, 2009).

5. Openings:

   a. Doorways: The primary (east) elevation of Building 152 has three sliding doors: 10 feet by 8 feet, 20 feet by 18 feet, and 20 feet by 12 feet. The south elevation has a 19-foot-wide opening and an 8-foot-by-10-foot sliding door. The west elevation has a 9-foot-by-10-foot opening to the addition, and a 20-foot-by-18-foot sliding door to the exterior and a single0-entry personnel door. The addition on the west elevation has a single-entry door on the north side.

b. Windows: Most of the rows of steel-framed multi-paned rectangular windows around the perimeter of Building 152 have been removed. The openings have not been covered. The addition on the west elevation has three sets of multi-pane, wood frame windows with operable panes in the center creating an awning opening.

6. Roof: The barrel roof of Building 152 is covered with rolled asphalt roofing material.

C. Description of Interior:

Floor Plans: Building 152 is a rectangular, two-story in height, open-interior building measuring approximately 250 feet by 300 feet. There are no interior walls or separators.

D. Site:

Historic Landscape Design: None

PART III. SOURCES OF INFORMATION

A. Early Views: N/A

B. Interviews: N/A

C. Bibliography

1. Primary and Unpublished Sources:

San Diego County Regional Airport Authority (SDCRAA). 2005. Teledyne Ryan Facility Study. January 1.

San Diego Unified Port District (SDUPD). 2009. 2701 North Harbor Drive Demolition Project Environmental Impact Report. April.

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Moomjian, Scott A. and Wendy L. Tinsley. 2001. *Historic Survey Report of the Former Teledyne-Ryan Aeronautical Complex, 2701 North Harbor Drive, San Diego, California, 92101.* Prepared by Office of Maria Burke Lia, Attorney at Law, 427 C Street, Suite 416, San Diego, CA 92101. Prepared for Jones Lang La Salle, 2701 North Harbor Drive, Building 100, San Diego, California 92101. Copy on file with the San Diego Regional Airport Authority.

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San Diego Unified Port District. 1971. *San Diego Unified District Annual Report: 1970-71.* Carl Reupsch Collection, San Diego Historical Society, San Diego, CA.

San Diego Unified Port District. 1977. *San Diego Unified District Annual Report: 1976-77.* Carl Reupsch Collection, San Diego Historical Society, San Diego, CA.

Building 152 – Jet Engine Drone Assembly Building, San Diego, California, Date unknown. Teledyne-Ryan Archives.

Building 152 – Jet Engine Drone Assembly Building, exterior addition along West Elevation, San Diego, California, Date unknown. Teledyne-Ryan Archives.

Building 152 – Jet Engine Drone Assembly Building, West Elevation, facing Northeast, San Diego, California, Date unknown. Teledyne-Ryan Archives.

Building 152 – Jet Engine Drone Assembly Building, North corner of West Elevation, San Diego, California, October 2009.

Building 152 – Jet Engine Drone Assembly Building, West Elevation, San Diego, California, October 2009.

Building 152 – Jet Engine Drone Assembly Building, Northwest Oblique, San Diego, California, October 2009.

Building 152 – Jet Engine Drone Assembly Building, North Elevation, San Diego, California, October 2009.

Building 152 – Jet Engine Drone Assembly Building, North Elevation, San Diego, California, October 2009.

Building 152 – Jet Engine Drone Assembly Building, Northeast Oblique, San Diego, California, October 2009.

Building 152 – Jet Engine Drone Assembly Building, East Elevation, facing Northeast, San Diego, California, October 2009.

Building 152 – Jet Engine Drone Assembly Building, northeast corner detail, North Elevation, San Diego, California, October 2009.

Building 152 – Jet Engine Drone Assembly Building, door detail on East Elevation, San Diego, California, October 2009.

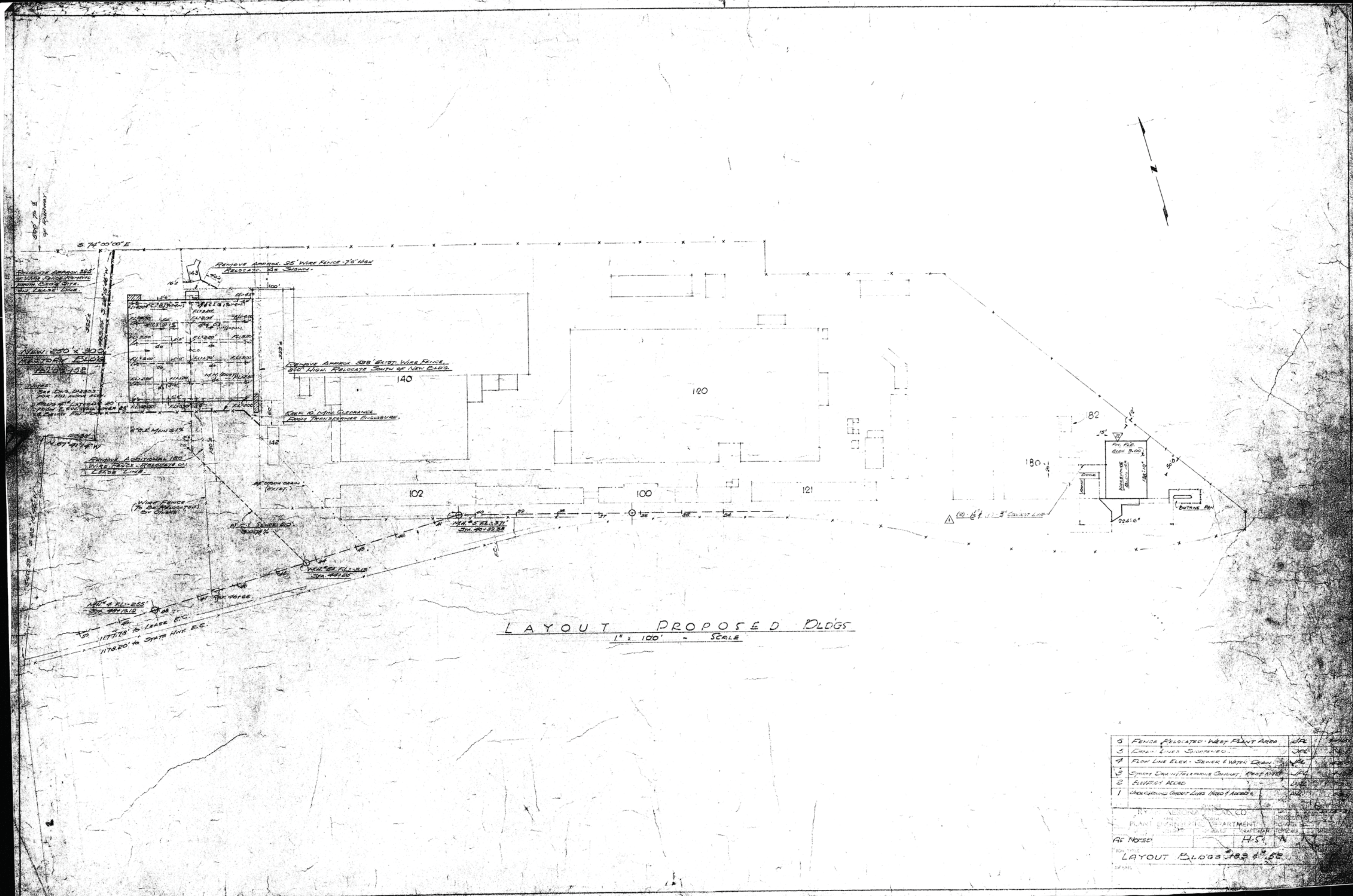
Building 152 – Jet Engine Drone Assembly Building Interior, northeast corner, San Diego, California, October 2009.

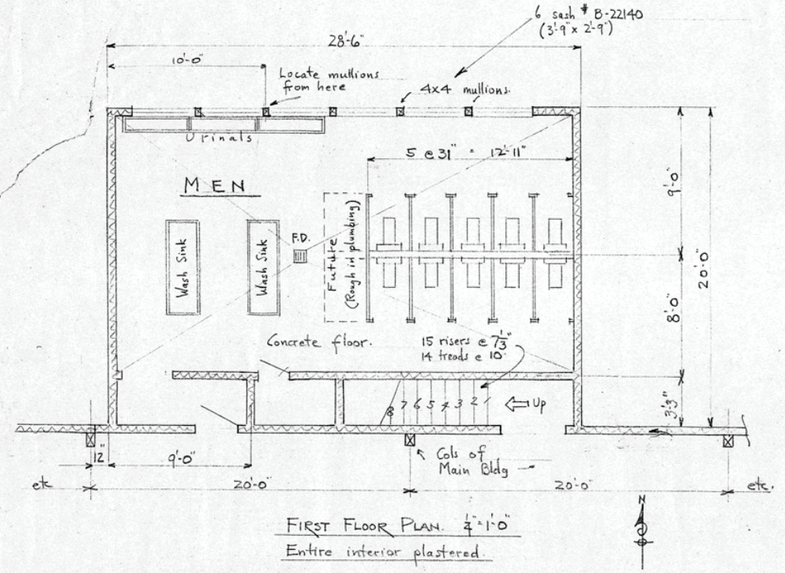
Building 152 – Jet Engine Drone Assembly Building Interior, facing southwest, San Diego, California, October 2009.

Building 152 – Jet Engine Drone Assembly Building Interior, southwest corner of the addition on the west elevation, San Diego, California, October 2009.

Building 152 – Jet Engine Drone Assembly Building Interior, ceiling detail with the opening for the roof monitor, San Diego, California, October 2009.

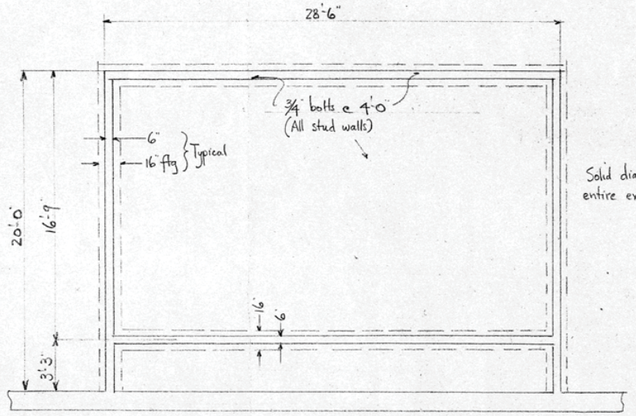
Building 152 – Jet Engine Drone Assembly Building Interior, I-beam detail, San Diego, California, October 2009.


N
S. 74°00'00" E
Remove Approx. 35' Wire Fence - 7'0" High
Relocate As Shown.
New 250' x 300'
Factory Bldg.
Remove Approx. 338' Exist. Wire Fence
8'0" High. Relocate South of New Bldg.
Keep 10' Min. Clearance
From Transformer Enclosure.
Remove Additional 180'
Wire Fence - Relocate on
Lease Line.
143
140
120
142
102
100
121
182
180
LAYOUT PROPOSED BLDGS
1" = 100' - SCALE
6 | Fence Relocated - West Plant Area | JPL
5 | Drain Lines Shortened. | JPL
4 | Flow Line Elev. - Sewer & Water Drain. | JPL
3 | Storm Drain/Telephone Conduit; Rest Rm. | JPL
2 | Elevation Added | DWL
1 | Underground Conduit Lines Moved & Added | DWL
PLANT ENGINEERING DEPARTMENT
As Noted
H.S.
LAYOUT BLDG'S #183 & #152

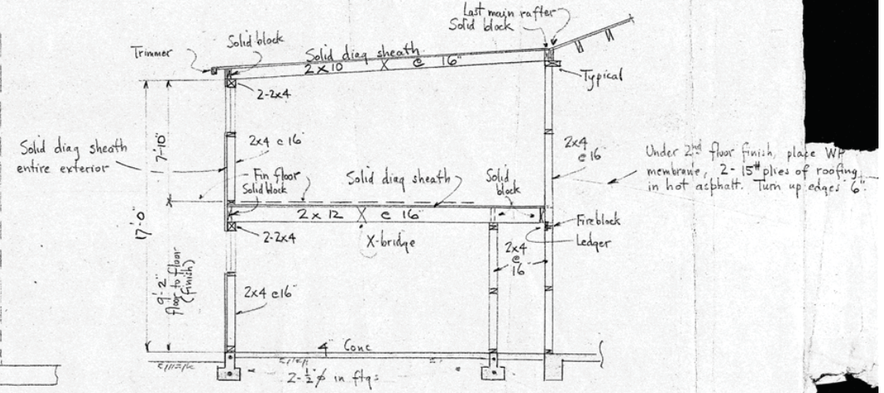


FIRST FLOOR PLAN. 1/4"=1'-0"

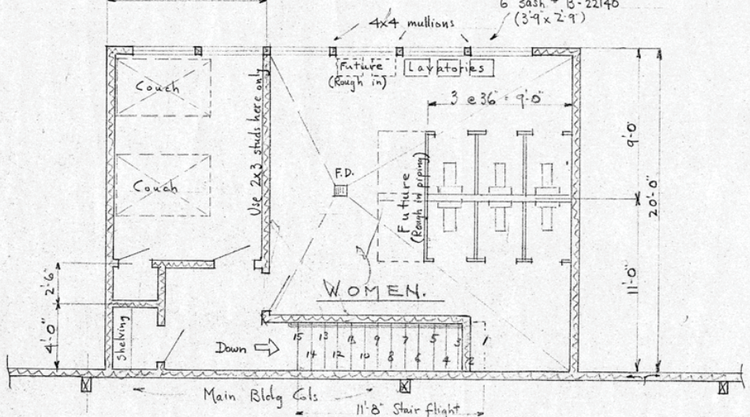
Entire interior plastered



FOUNDATION PLAN. 1/4"=1'-0"

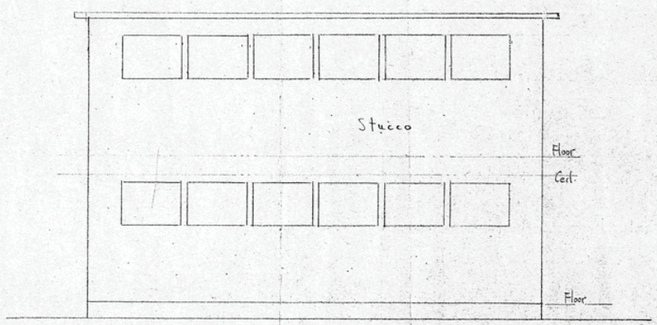


TYPICAL SECTION. looking East. 1/2"=1'-0"

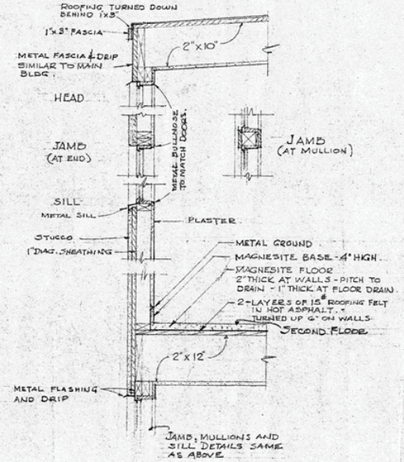


SECOND FLOOR PLAN. 1/4"=1'-0"

Magnesite floor. Entire interior plastered

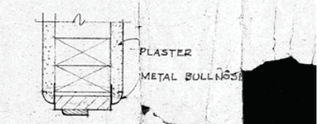


NORTH ELEVATION 1/4"=1'-0"



WALL SECTION (TYPICAL.)

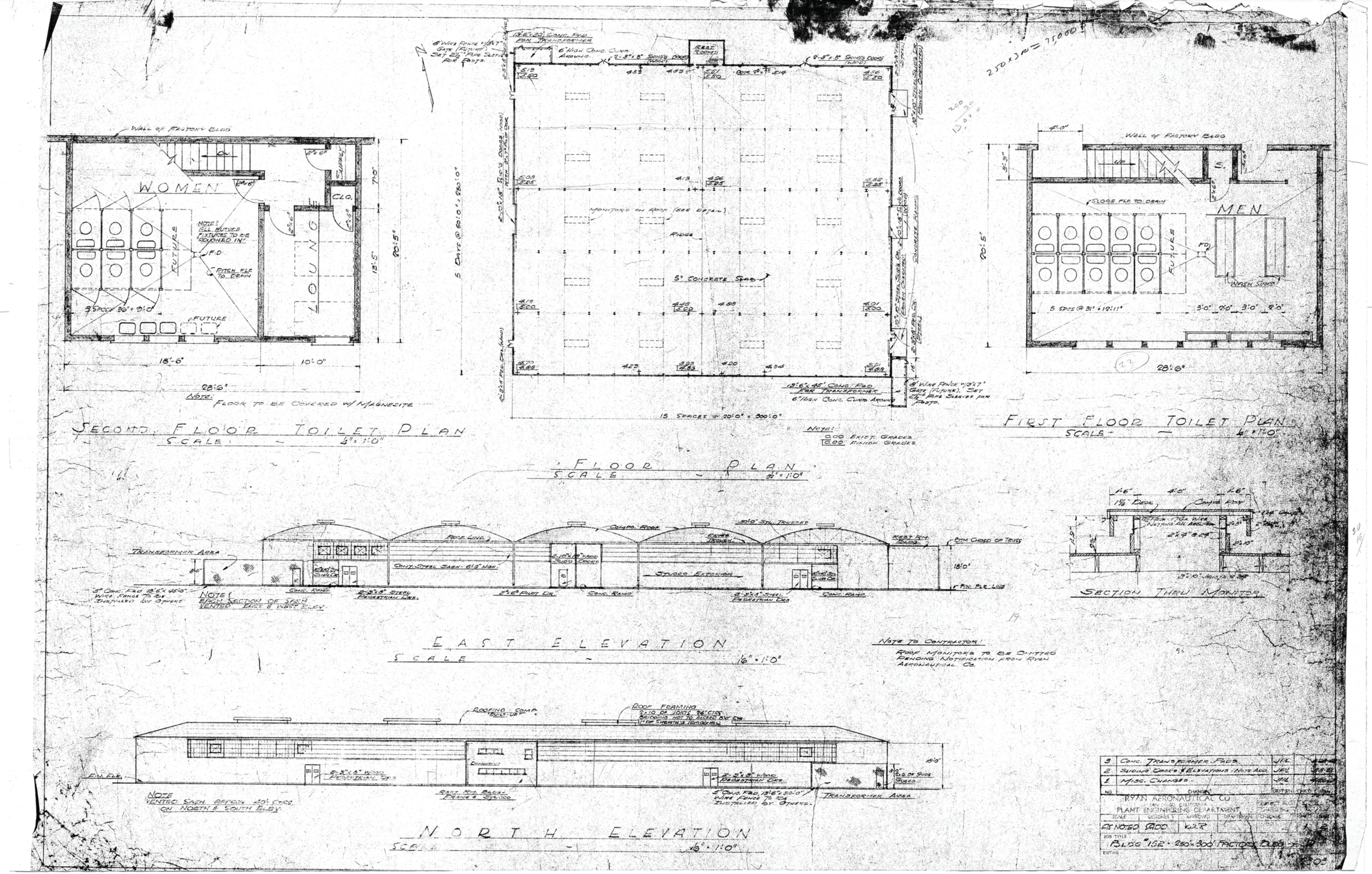
SCALE 3/4"=1'-0"

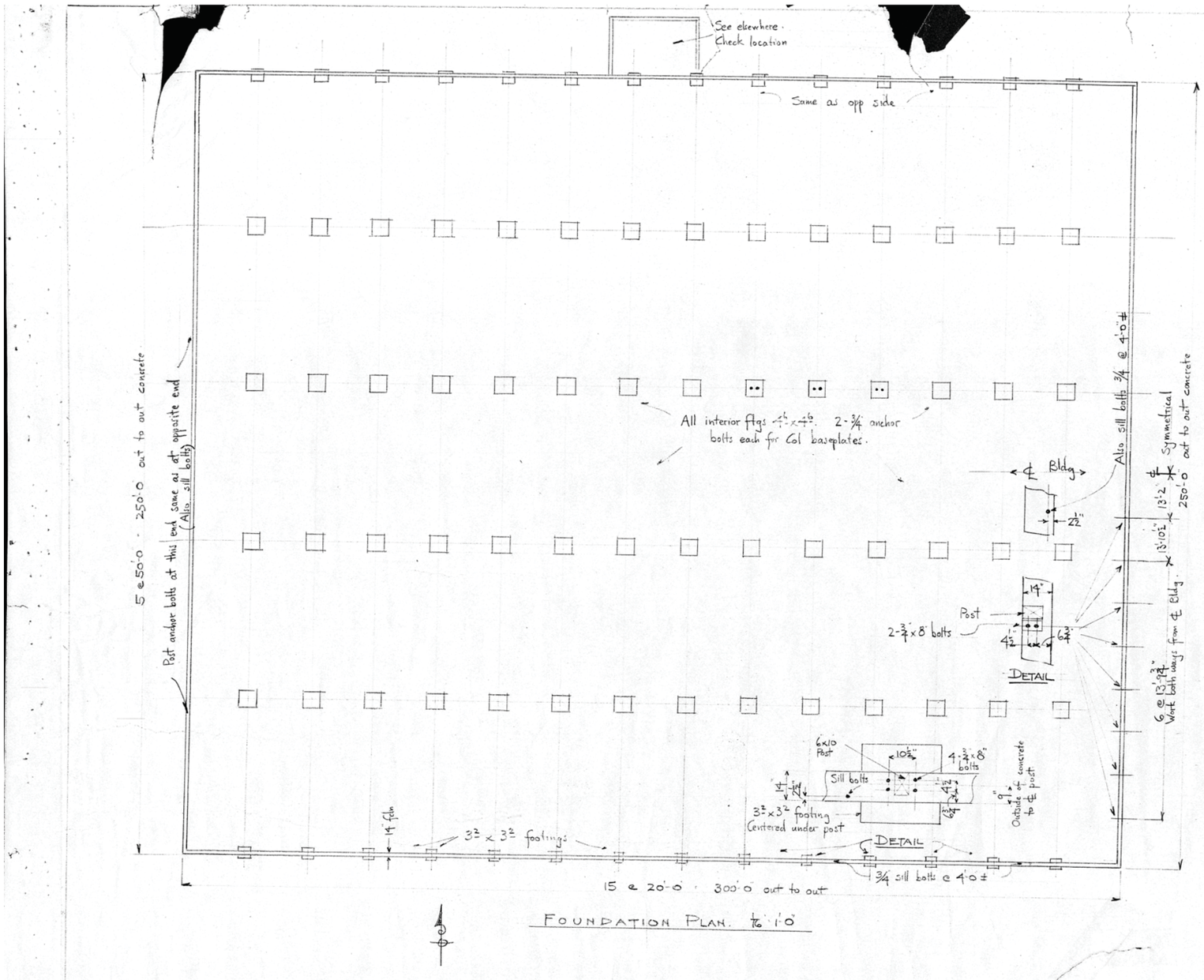


HEAD & JAMB INTERIOR DOORS

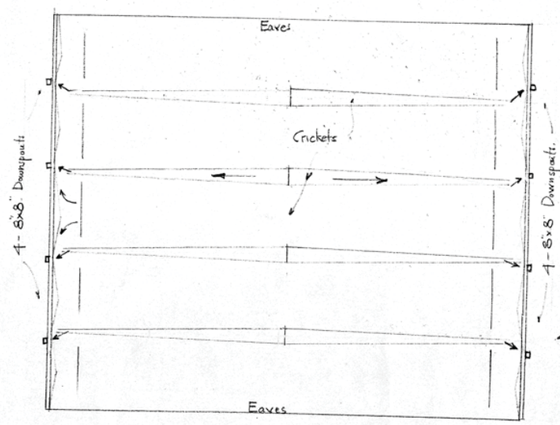
SCALE 3"=1'-0"

STANLEY BURNE
STRUCTURAL ENGINEER
JOB
Date
Sheet 4

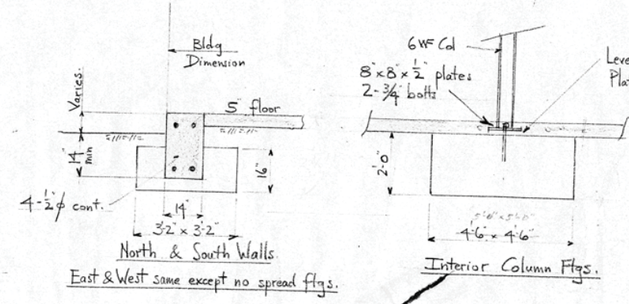

WALL OF FACTORY BLDG
WOMEN
CLO.
LOUNG
NOTE: ALL FUTURE FIXTURES TO BE "ROUGHED IN"
PITCH FLR TO DRAIN
FUTURE
18'-6"
10'-0"
28'-6"
NOTE: FLOOR TO BE COVERED W/ MAGNESITE
SECOND FLOOR TOILET PLAN
SCALE - 1/4" = 1'-0"
REST ROOMS
MONITORS ON ROOF (SEE DETAIL)
RIDGE
5" CONCRETE SLAB
5 BAYS @ 50'-0" = 250'-0"
15 SPACES @ 20'-0" = 300'-0"
13'-6"x45" CONC. PAD FOR TRANSFORMER
6" HIGH CONC. CURB AROUND
NOTE: 0.00 EXIST. GRADES 0.00 FINISH GRADES
FLOOR PLAN
SCALE - 1/32" = 1'-0"
WALL OF FACTORY BLDG
MEN
SLOPE FLR TO DRAIN
FUTURE
WASH SINKS
28'-6"
FIRST FLOOR TOILET PLAN
SCALE - 1/4" = 1'-0"
SECTION THRU MONITOR
TRANSFORMER AREA
COMPO. ROOF
ROOF LINE
STUCCO EXTERIOR
CONC. RAMP
FIN. FLR. LINE
EAST ELEVATION
SCALE - 1/16" = 1'-0"
NOTE TO CONTRACTOR: ROOF MONITORS TO BE OMITTED PENDING NOTIFICATION FROM RYAN AERONAUTICAL CO.
ROOFING - COMP. BUILT-UP
ROOF FRAMING
TRANSFORMER AREA
NOTE: VENTED SASH APPROX 40' CTRS. ON NORTH & SOUTH ELEV.
NORTH ELEVATION
SCALE - 1/16" = 1'-0"
3 CONC. TRANSFORMER PADS
2 SLIDING DOORS & ELEVATIONS - NOTE ADD.
1 MISC. CHANGES
RYAN AERONAUTICAL CO.
PLANT ENGINEERING DEPARTMENT
AS NOTED
BLDG 152 - 250'x300' FACTORY BLDG



FOUNDATION PLAN. 1/16" = 1'-0"

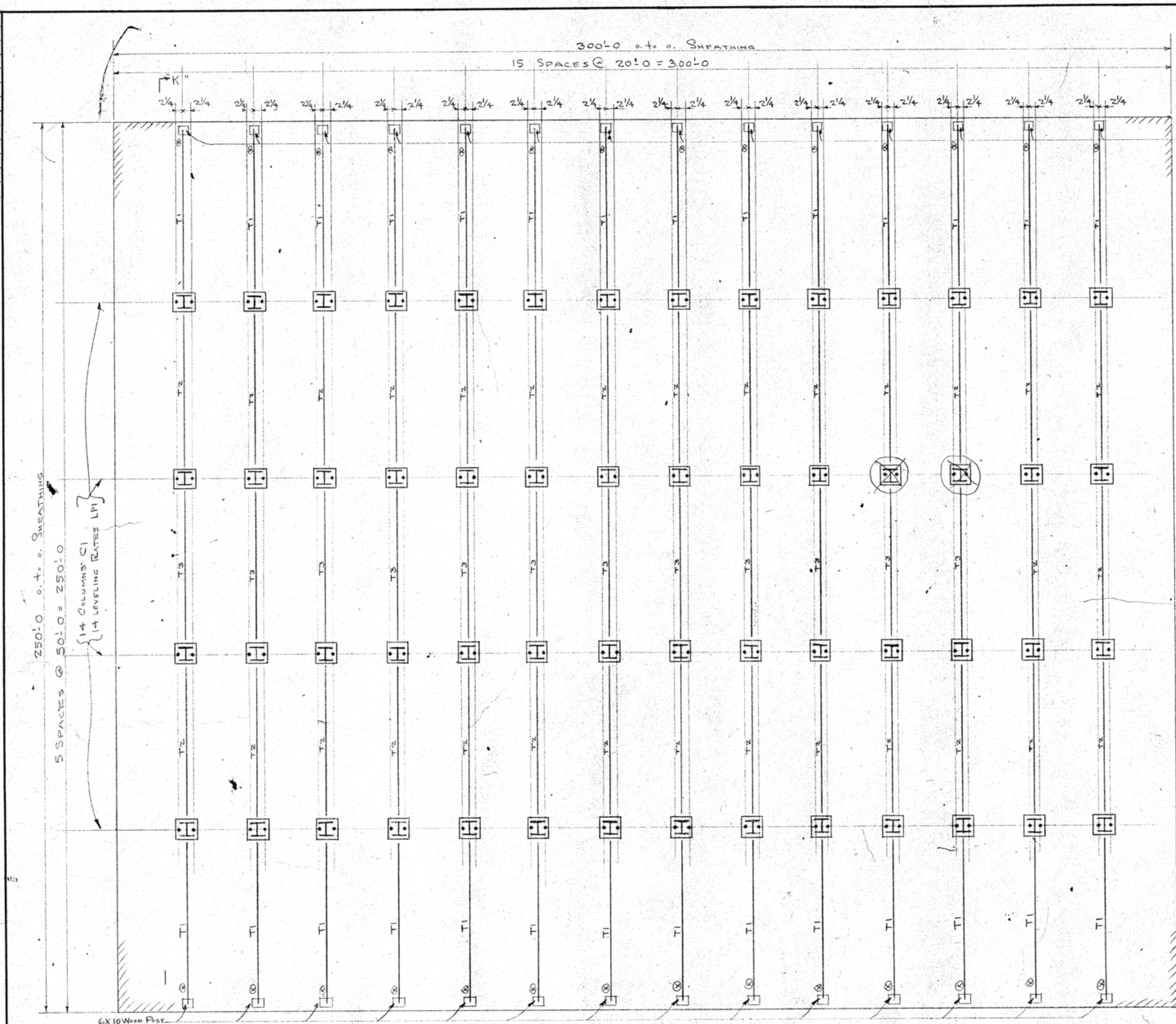


ROOF PLAN. 1" = 40'

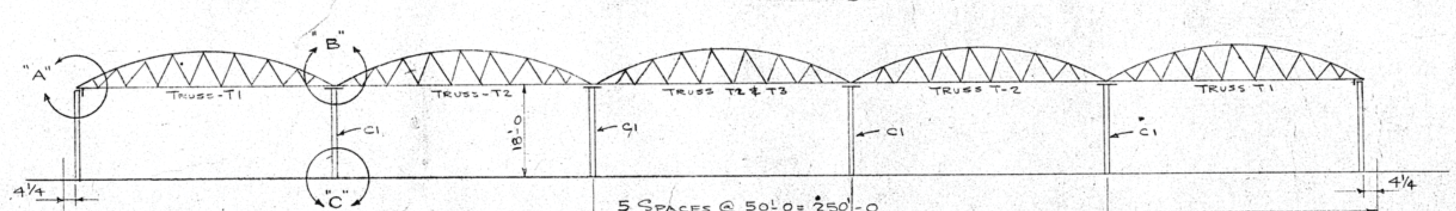


FOUNDATION DETAILS.

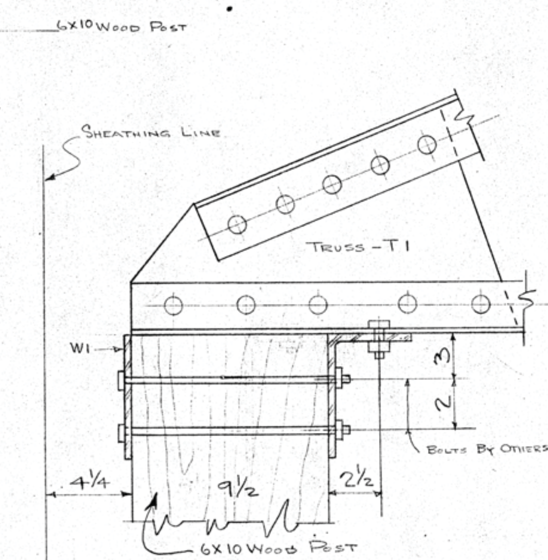
STANLEY BURNE
STRUCTURAL ENGINEER
Job
Date Apr - 51 Sheet 2



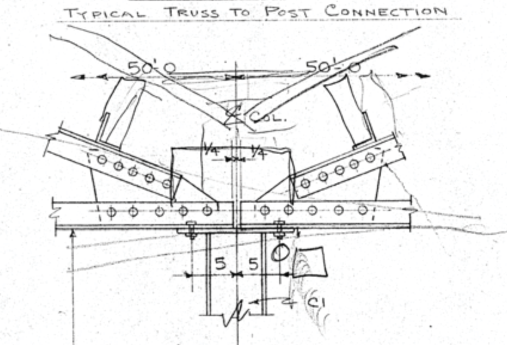
PLAN
No Scale



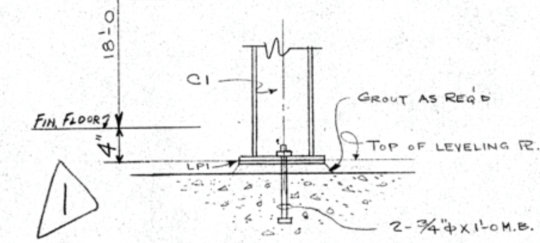
SECTION "K-K"
Typical Sect. Thru Building



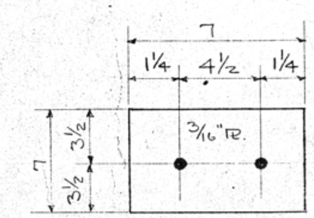
DETAIL "A"
Typical Truss to Post Connection



DETAIL "B"
Typical Truss to Column Conn.



DETAIL "C"
Typical Column Base



MAKE 56 LEVELING PLATES LP1
(No Paint)

NOTE: Anchor Bolts & Lev. Plates to be set & grouted to the correct elevation by others.

No.	Description	Date	App'd
1	Increased Length Columns 4"	5-4-51	K.L.R.

REVISIONS

MATERIAL LIST

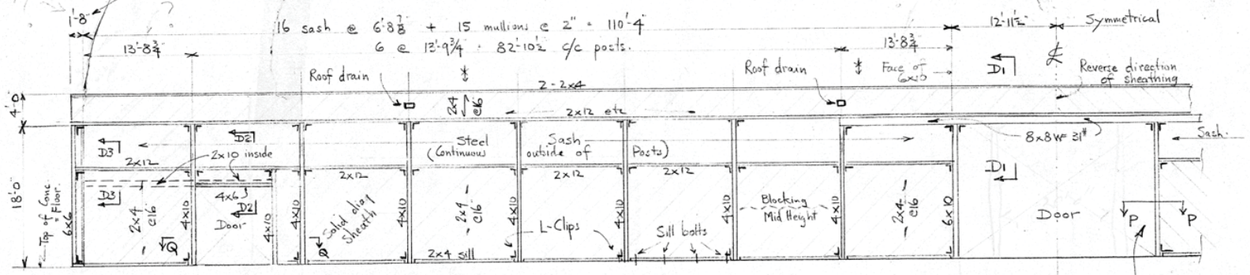
MARK	NO. PIECES	SIZE	LENGTH	CUT FROM	UNIT WT.	WEIGHT	UNIT PRICE	COST
		LEVELING PLATES						
LP1	56	PL 7x3/16	0'-7	32'-8.	4.46	146		
		ANCHOR BOLTS						
	112	3/4"φ M.B.	1'-0	—	1.83	205		
					SUB TOTAL			
SHOP PAINT		NO PAINT						
FIELD PAINT								
					TOTAL WEIGHT	351		

Bolts / Rivets 3/4"φ Holes 13/16"φ Unless Otherwise Noted
NOTE—End and Edge Distance is 1 1/4 Unless Otherwise Noted

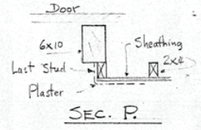
NATIONAL STEEL AND SHIPBUILDING CORPORATION
Harbor Dr. at 28th Ave. San Diego 12, California Phone F 9-8065

		Print Record	No. of Prints	Date
Customer	WALTER TREPTE	Approval	2	4-23-51
Building	RYAN AERONAUTICAL CO.	Final App.		
Location	SAN DIEGO, CALIF.	Shop	5	5-1-51
	ERECTION DIAGRAM & ANCHOR BOLT SETTING PLAN	Erection		
		Contractor	2	5-1-51
		Mat'l. Cont.	1	5-1-51

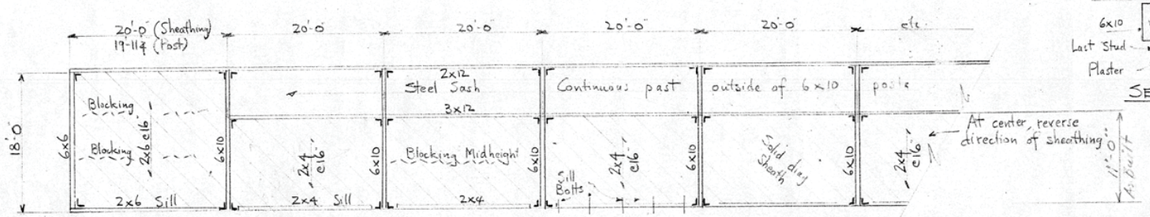
Architect		Engineer	
Drawn by	FRAN	Date	4-19-51
Checked by	T.BA	Date	4-23-51
Approved by	A.Tone	Date	4-23-51
Sheet No.	E1 of 1	Job No.	7249
File No.	PM-54		



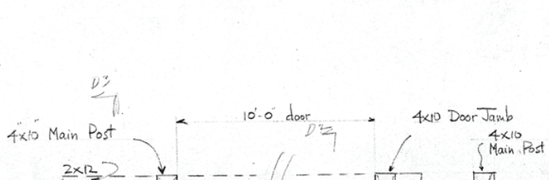
ELEVATION - FRAMING East & West Walls: 8'-1'0"



SEC. P.

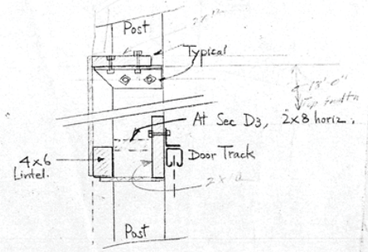


ELEVATION - FRAMING. North & South Walls: 8'-1'0"

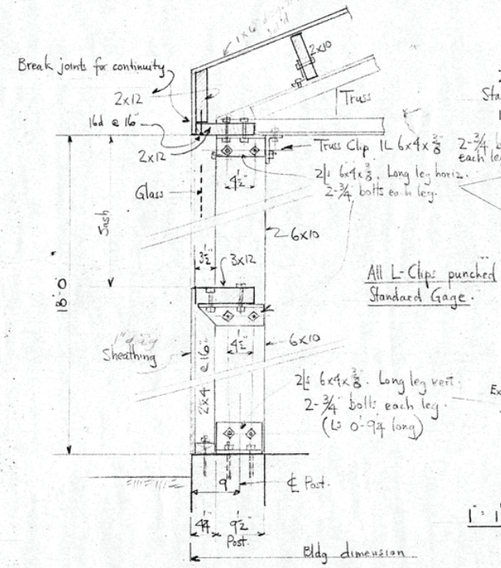


PLAN SEC. Q.

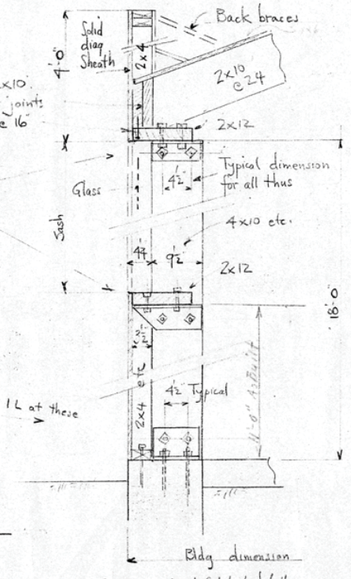
1" = 1'-0"



SEC D2. (& D3)

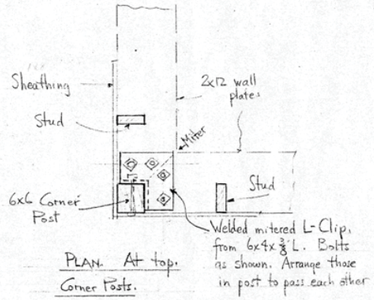


SECTION. North & South Walls
At Sash. End bays 2x6 studs @ 16" full ht.

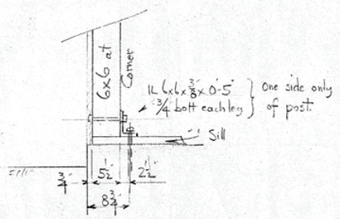


SECTION East & West Walls.
At Sash. See special details at Doors.

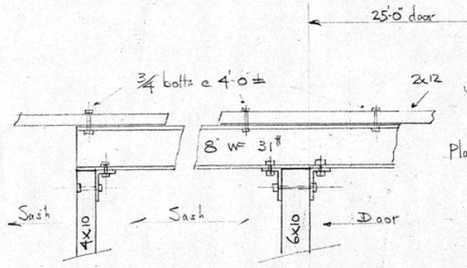
All sills Redwood or Treated Fir. Bottom 12" of each wood post (bearing on concrete) treated with Woodtox or Woodlife.



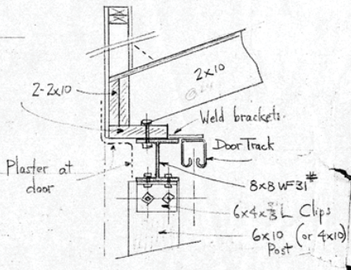
PLAN. At top. Corner Posts.



CORNER POSTS.
Bottom Fastening.

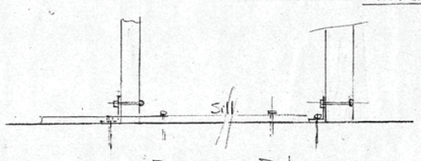


ELEVATION.



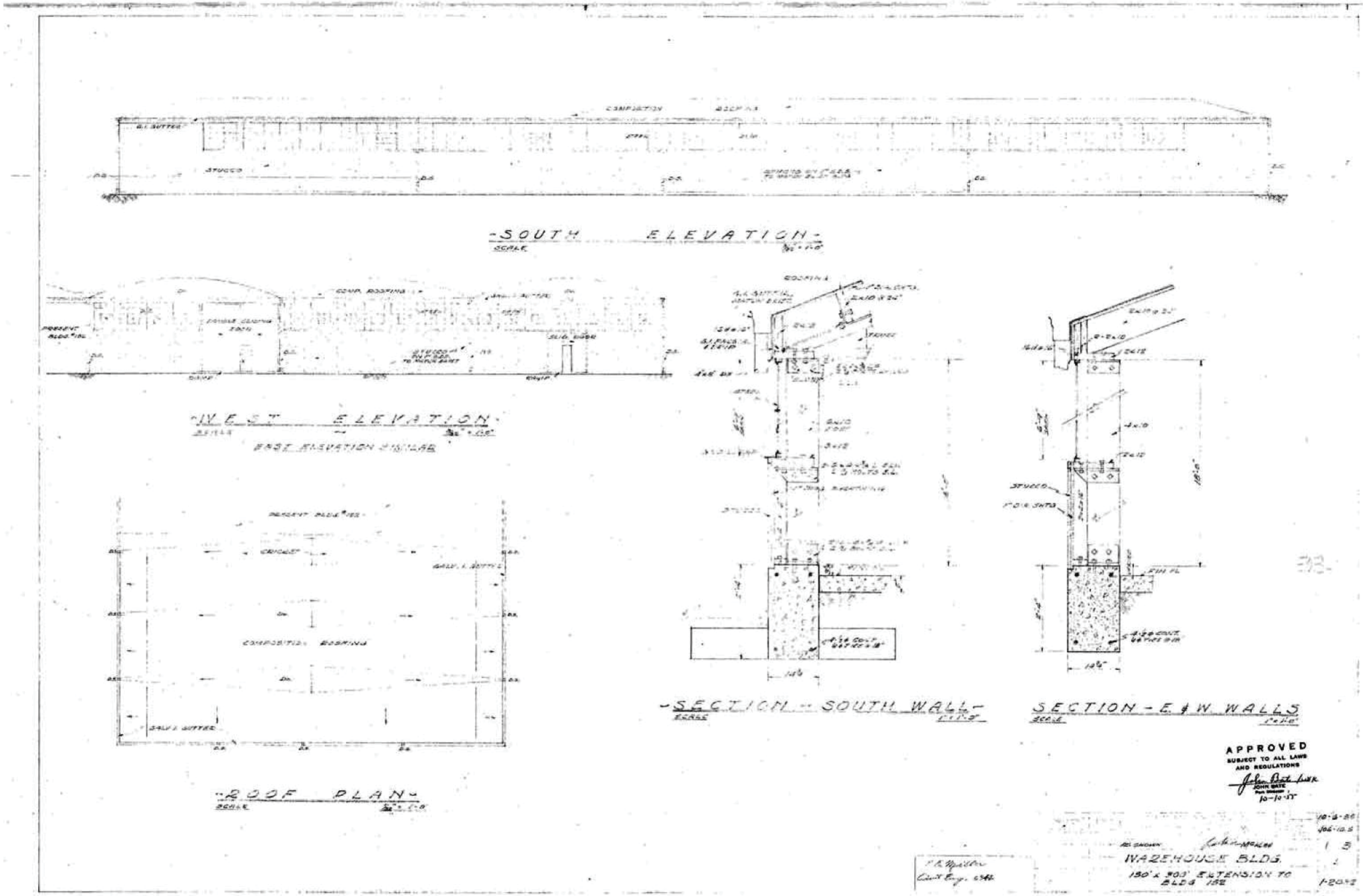
SECTION. D1

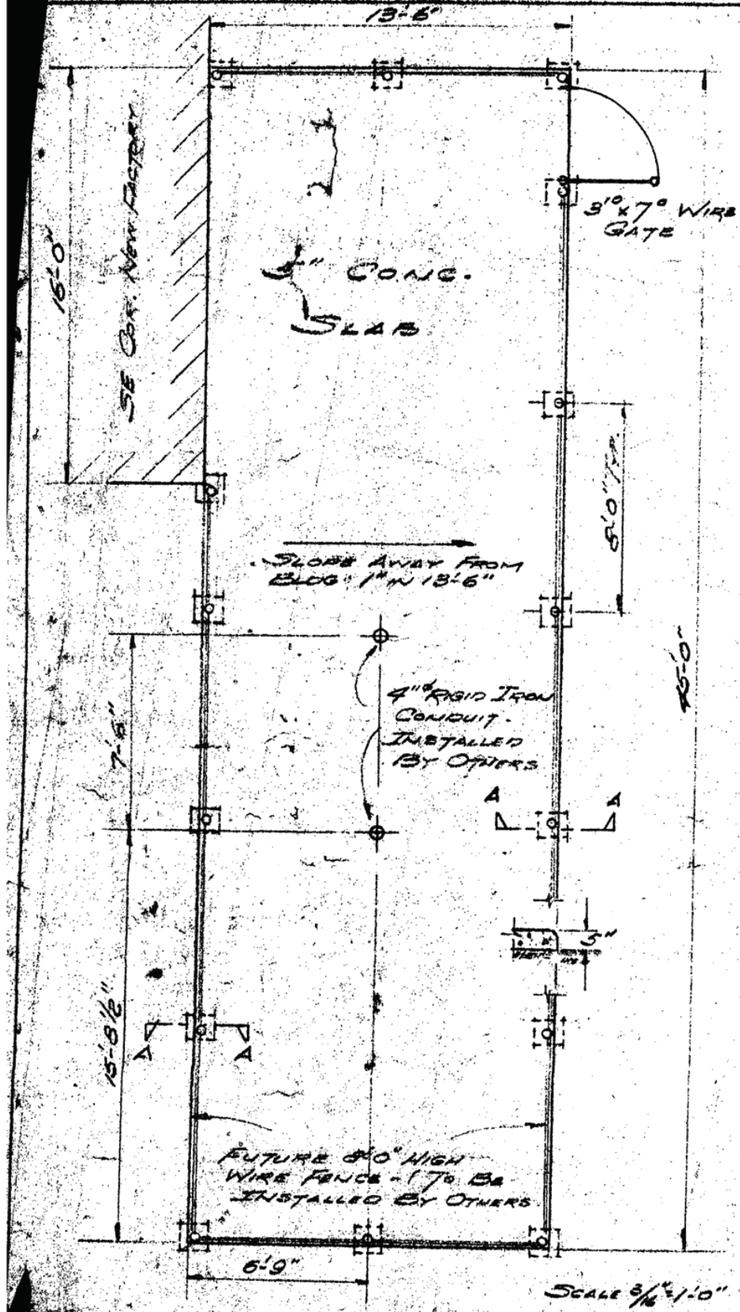
LINTEL ETC. over large doors. 1'-1'0"



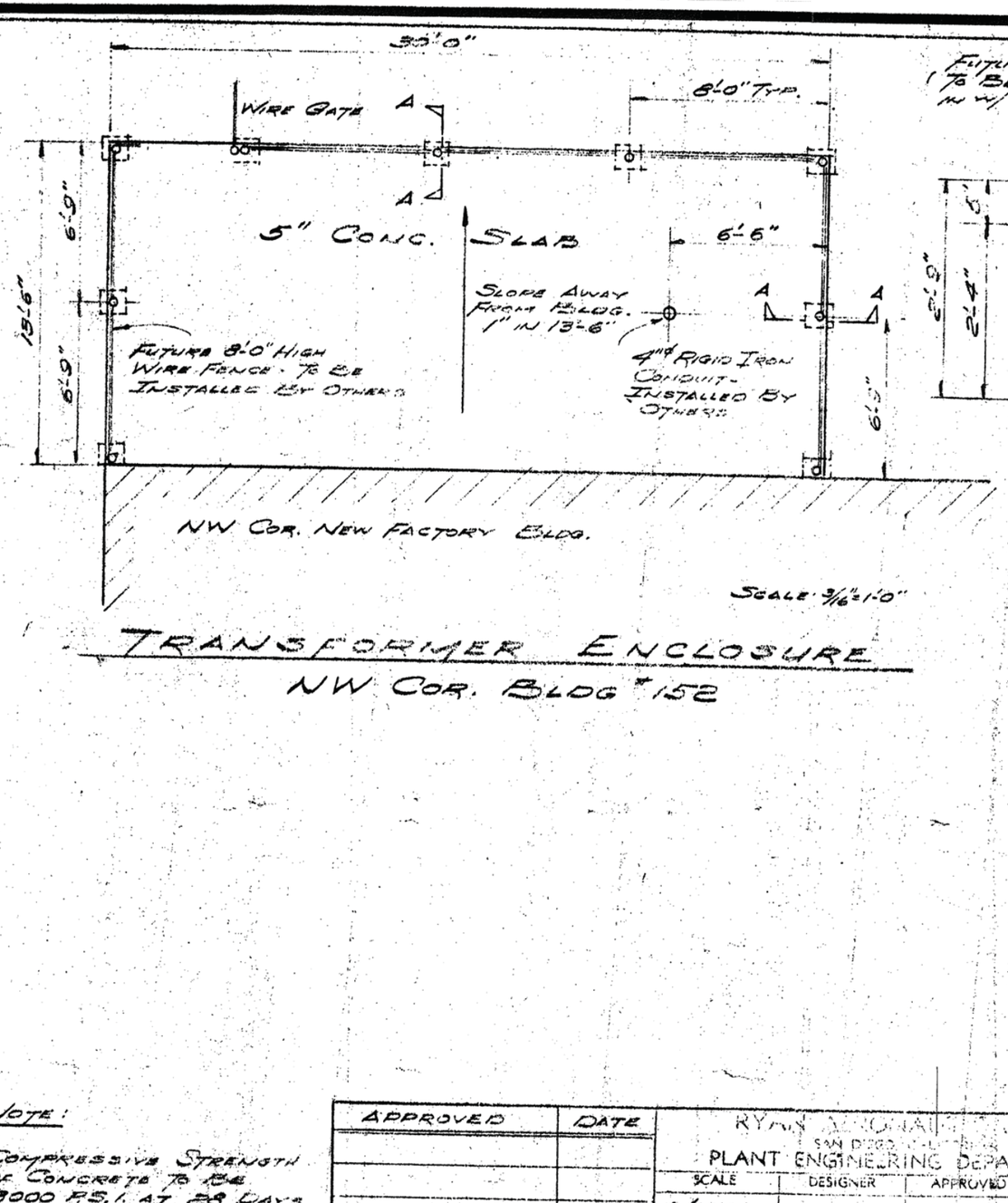
BOTTOMS OF POSTS.

STANLEY BURNE
STRUCTURAL ENGINEER
Job
Date Apr. 51 Sheet 3

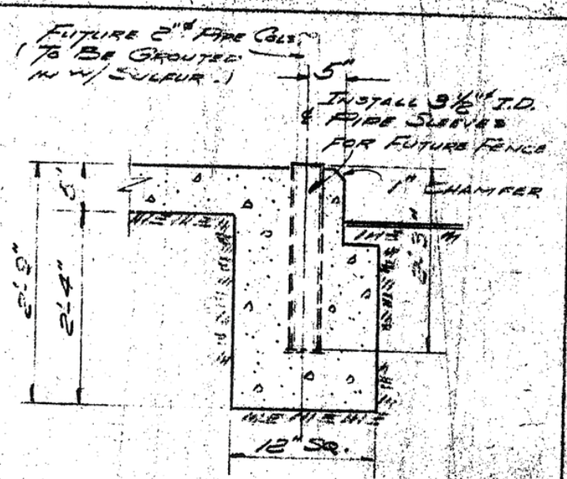

-SOUTH ELEVATION-
STUCCO
-WEST ELEVATION-
EAST ELEVATION SIMILAR
COMP. ROOFING
PRESENT BLDG. #152
-SECTION - SOUTH WALL-
SECTION - E. & W. WALLS
STUCCO
18'-0"
-ROOF PLAN-
COMPOSITION ROOFING
CRICKET
GALV. I. GUTTER
APPROVED
SUBJECT TO ALL LAWS
AND REGULATIONS
JOHN BATE
10-10-55
AS SHOWN
WAREHOUSE BLDG.
150' x 300' EXTENSION TO
BLDG 152
1-2042



Transformer Enclosure
SE Cor. Bldg. #152



Transformer Enclosure
NW Cor. Bldg #152



Section A-A
Post Ftgs

Note:

Compressive Strength of Concrete To Be 3000 P.S.I. at 28 Days

Approved	Date

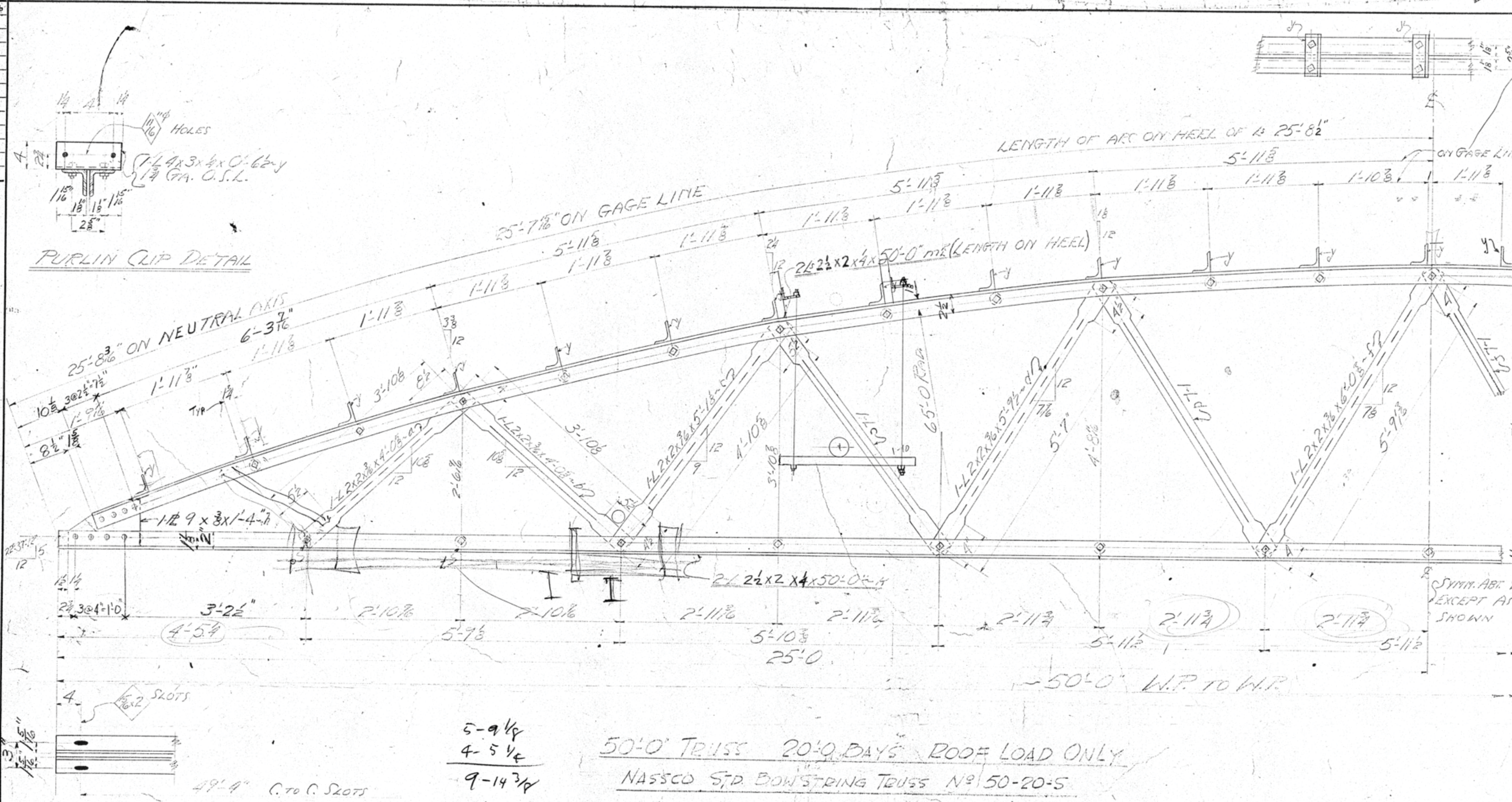
Ryan Aeronautical Co.
San Diego, California
Plant Engineering Department

Scale	Designer	Approved	Draftsman	Checker
Noted			JRL	(AH)

Job Title: Transformer Enclosures New Factory Bldg. - Bldg. #152

Detail:

Date	6-21-51
Charge No.	
Sheet of Sheets	1 / 1
Drawing Size	D
Drawing No.	2321



DATA

LIVE LOAD = 12#□'
DEAD LOAD = 10#□'
UNIT LOAD = 22#□'

TOTAL LOAD ON TRUSS @ 20' BAYS = 20x50x22#□' = 22000#
REACTION – R = 1/2 OF 22000# = 11,000#

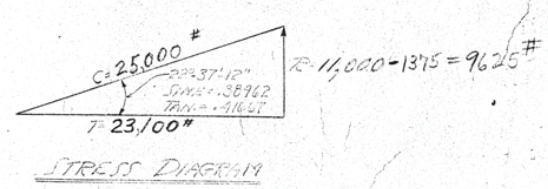
TOP CHORD:-
$P = \frac{9625}{.3846} = 25000\#$
l = 6'-0" = 72"
$l/r = \frac{72}{.78} = 92.3$
F_c = 12,870 psi
$f_c = \frac{P}{A} = \frac{25000}{2.12} = 11800$ psi < 12,870

PANEL LOAD = $\frac{50 \times 20 \times 22}{8} = 2750\#$
VERT. COMPONENT of T.C. = $R - \frac{PL}{2}$ = 11,000 − 1375 = 9625#
2∠s 2 1/2 x 2 x 1/4
r_x = .78
r_y = .94 @ 3/8 b-b
A = 2.12 □"

BOTTOM CHORD:-
$T = \frac{9625}{.4167} = 23{,}100\#$
F_t = 20,000 psi.
Req'd. A = $\frac{23100}{20000}$ = 1.15 □", A of 2 - 7/8 ϕ holes = 0.44
80% NET A of ∠s = 2.12 − 0.44 = 1.68 X .80 = 1.34 □" > 1.15 □"

2∠s 2 1/2" x 2" x 1/4
A = 2.12

Truss re-designed, from old standards to new Code requirements
[signature]



MATERIAL LIST

MARK	NO. PIECES	SIZE	LENGTH	CUT FROM	UNIT WT.	WEIGHT	UNIT PRICE	COST
	MATERIAL FOR ONE TRUSS							
m℄	2	∠s 2 1/2 x 2 x 1/4	50'-0	100'-0	3.62	362		
k	2	∠ 2 1/2 x 2 x 1/4	50'-0	100'-0	3.62	362		
a	2	∠s 2 x 2 x 3/16	4'-0 5/8	8-1 1/4	2.44	20		
b	2	do.	4'-0 5/8	8-1 1/4		20		
c	4	do.	5'-1 1/8	20-4 1/2		50		
d	4	do.	5'-9 1/2	23-2		57		
f	2	do	6'-0 3/8	12-0 3/4		29		
h	2	PLs 9 x 3/8	1'-4"	2'-8"	11.5	31		
y	25	∠s 4 x 3 x 1/4	0-6 1/2	13-6 1/2	5.8	79		
	PL WASHER							
t	23	2" x 3/8	0-2"	3'-10"	2.55	10		
P	2	2" x 3/16	0-2"	0'-4"	1.28	1		
	SHOP BOLTS							
	38	3/4" ϕ MACH. B.	0-1 3/4	—	.54	21		
	50	do	0-1 1/2	—	.52	26		
	SHOP RIVETS							
	16	3/4" ϕ RIVETS	0-2 1/4	—	.5	8		

SUB TOTAL 1076
SHOP PAINT 1 COAT % 5
FIELD PAINT %
TOTAL WEIGHT 1081

RIVETS & BOLTS 3/4" ϕ HOLES 13/16" ϕ UNLESS OTHERWISE NOTED
NOTE—END AND EDGE DISTANCE IS 1 1/4" UNLESS OTHERWISE NOTED

22 = ROOF LOAD

NO.	DESCRIPTION	DATE	APP'D
	REVISED SIZES T&B CHORDS	12/22/62	
	TRACED FROM ORIGINAL	3/59	

REVISIONS

NATIONAL STEEL AND SHIPBUILDING CORPORATION
HARBOR DR. AT 28TH AVE. SAN DIEGO 12, CALIFORNIA PHONE F 9-8065

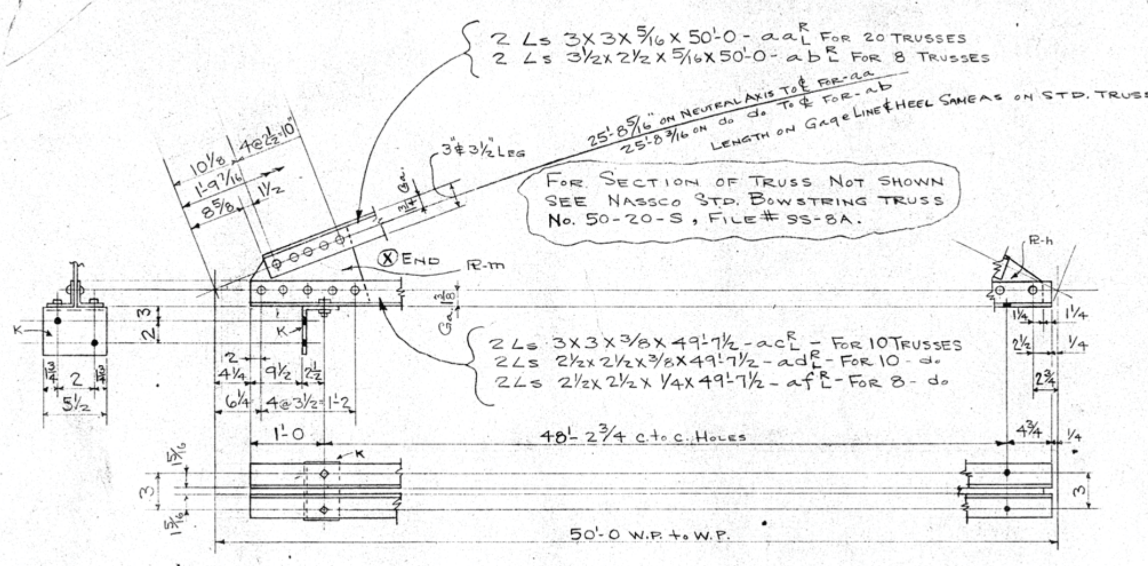
CUSTOMER NASSCO
BUILDING 50'-0 STD BOWSTRING TRUSS
LOCATION

50'-0 TRUSS – 20'-0" BAYS
ROOF LOAD ONLY
TRUSS Nº 50-20-S

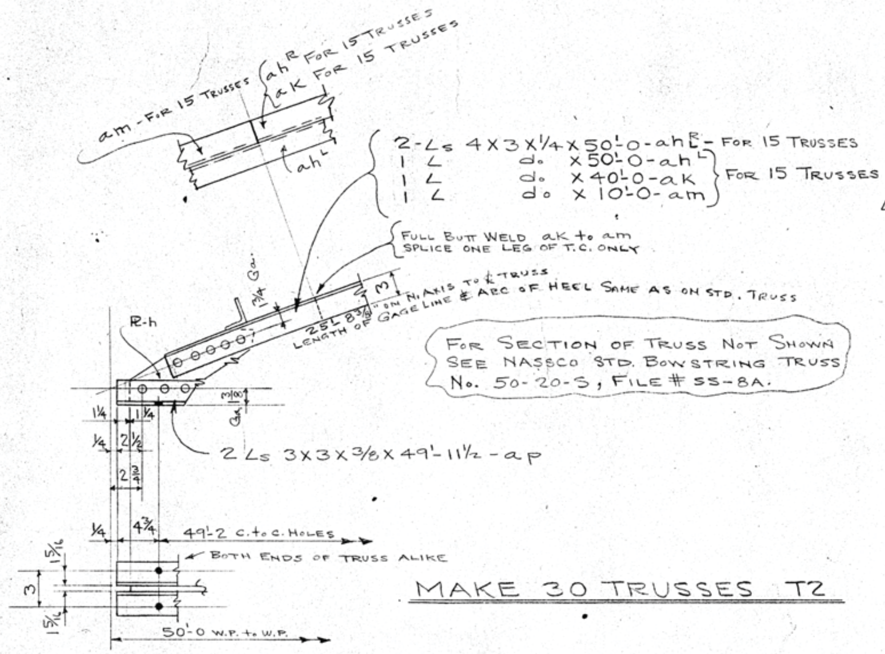
ARCHITECT		ENGINEER	
DRAWN BY	R.B.L.	DATE	3-23-57
CHECKED BY	[illegible]	DATE	[illegible]
APPROVED BY	STEVENS	DATE	[illegible]

PRINT RECORD	NO. OF PRINTS	DATE
APPROVAL		
FINAL APP.		
SHOP		
ERECTION		
CONTRACTOR		
MAT'L. CONT.		

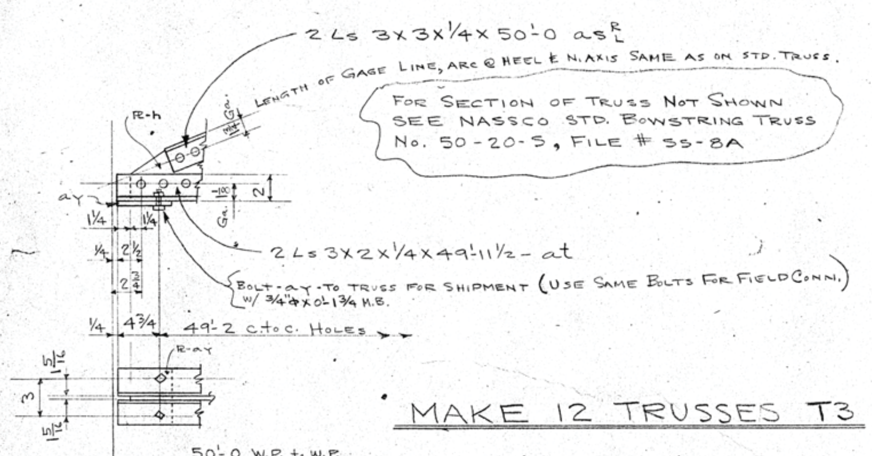
SHEET NO. OF
JOB NO.
FILE NO. 55-[illegible]



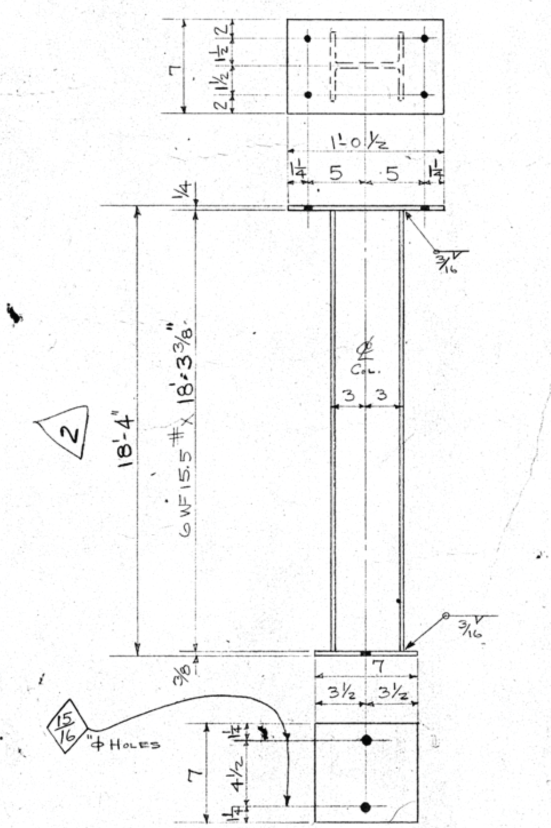
MAKE 28 TRUSSES T1



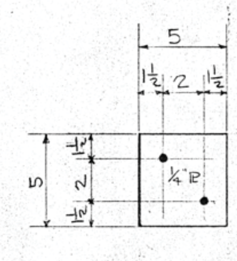
MAKE 30 TRUSSES T2



MAKE 12 TRUSSES T3



MAKE 56 COLUMNS C1



MAKE 28 RATE WASHERS W1

152

MATERIAL LIST						
MARK	NO. PIECES	SIZE	LENGTH	CUT FROM	UNIT WT.	WEIGHT
		28 TRUSSES - T1				
		12 TRUSSES - T2				
		30 TRUSSES - T3				
aaR L	40	L3X3X5/16	50'-0	2000-0	6.1	12200
abR L	16	L3½X2½X5/16	50'-0	800-0	6.1	4880
acR L	20	L3X3X3/8	49'-7½	992-6	7.2	7146
adR L	20	L2½X2½X3/8	49'-7½	992-6	5.9	5856
afR L	16	L2½X2½X¼	49'-7½	794-0	4.1	3255
ahR	15	L4X3X¼	50'-0	750-0	5.8	4350
ahL	30	do.	50'-0	1500-0		8700
aK	15	do.	40'-0	600-0		3480
am	15	do.	10'-0	150-0		870
ap	60	L3X3X3/8	49'-11½	2997-6	7.2	21582
asR L	24	L3X3X¼	50'-0	1200-0	4.9	5880
at	24	L3X2X¼	49'-11½	1199-0	4.1	4916
ay	24	R6X¼	0'-6½	13-0	5.1	66
a	140	L2X2X3/16	4'-0⅝	567-3½	2.44	1384
b	140	do.	4'-0⅝	567-3½		1384
c	280	do.	5'-1⅛	1426-3¼		3480
d	280	do	5'-9½	1621-8		3957
f	140	do	6'-0⅜	844-4½		2060
h	112	R10½X3/8	1'-6½	172-8	13.4	2314
K	28	L6X4X3/8	0'-5½	12-10	12.3	158
m	28	R10½X3/8	1'-6¾	43-9	13.4	586
Y	1750	L4X3X¼	0'-6½	947-11	5.8	5498
		— R WASHERS —				
t	1610	2¼X3/8	0'-2¼	301-10½	2.87	866
P	140	2¼X3/16	0'-2¼	26-3	1.43	38
		— SHOP RIVETS				
	1400	¾"φ Rivets	0'-2¼	—	.5	700
		— SHOP BOLTS —				
	2764	¾"φ M.B.	0'-1¾	—	.55	1520
	3500	do.	0'-1½		.51	1785
		— COLUMNS —				
C1	56	6WF15.5#	18'-3⅜	1023'-9	15.5	15868
ba	56	R7X¼	1'-0½	58-4	5.95	347
bb	56	R7X3/8	0'-7	32-8	8.93	292
		— RATE WASHERS —				
W1	28	R5X¼	0'-5	11'-8	4.25	50
		— FIELD BOLTS —				
	235	¾"φ M.B.	0'-1½	—	.49	115
				SUB TOTAL		125,583
SHOP PAINT		ONE COAT P.S.O.			½%	628
FIELD PAINT		—			%	
				TOTAL WEIGHT		126211

Bolts & Rivets ¾"φ Holes 13/16"φ Unless Otherwise Noted

NOTE—End And Edge Distance is 1¼" Unless Otherwise Noted

2	Added R to Cols	5/4/51	L.C.B.
		5/1/51	L.C.B.
		DATE	APP'D

NATIONAL STEEL AND SHIPBUILDING CORPORATION

Harbor Dr. At 28th Ave. San Diego 12, California Phone F 9-8065

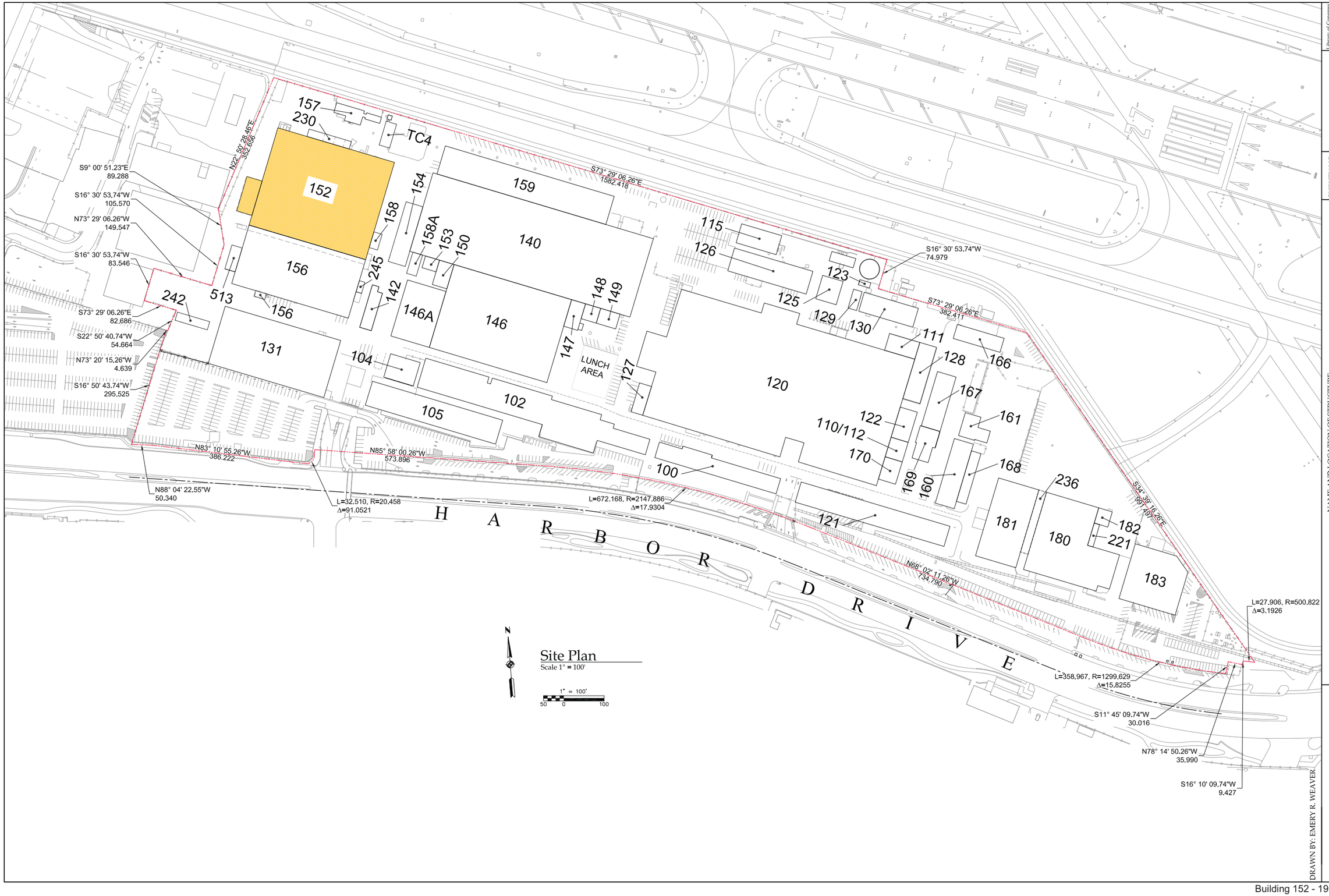
		PRINT RECORD	No. of Prints	DATE
Customer	WALTER TREPTE	Approval	2	4-23-51
Building	RYAN AERONAUTICAL CO.	Final App.		
Location	SAN DIEGO, CALIF.	Shop	5	5-1-51
		Erection		
		Contractor	2	5-1-51
		Mat'l. Cont.	1	5-1-51

COLUMNS & TRUSSES

Architect / Engineer

Drawn by FRAN Date 4-20-51

Checked by T



Site Plan
Scale 1" = 100'

Library of Congress Index Number

HISTORIC AMERICAN BUILDINGS SURVEY

SURVEY NO.

SHEET 1 OF 4 SHEETS

NAME AND LOCATION OF STRUCTURE

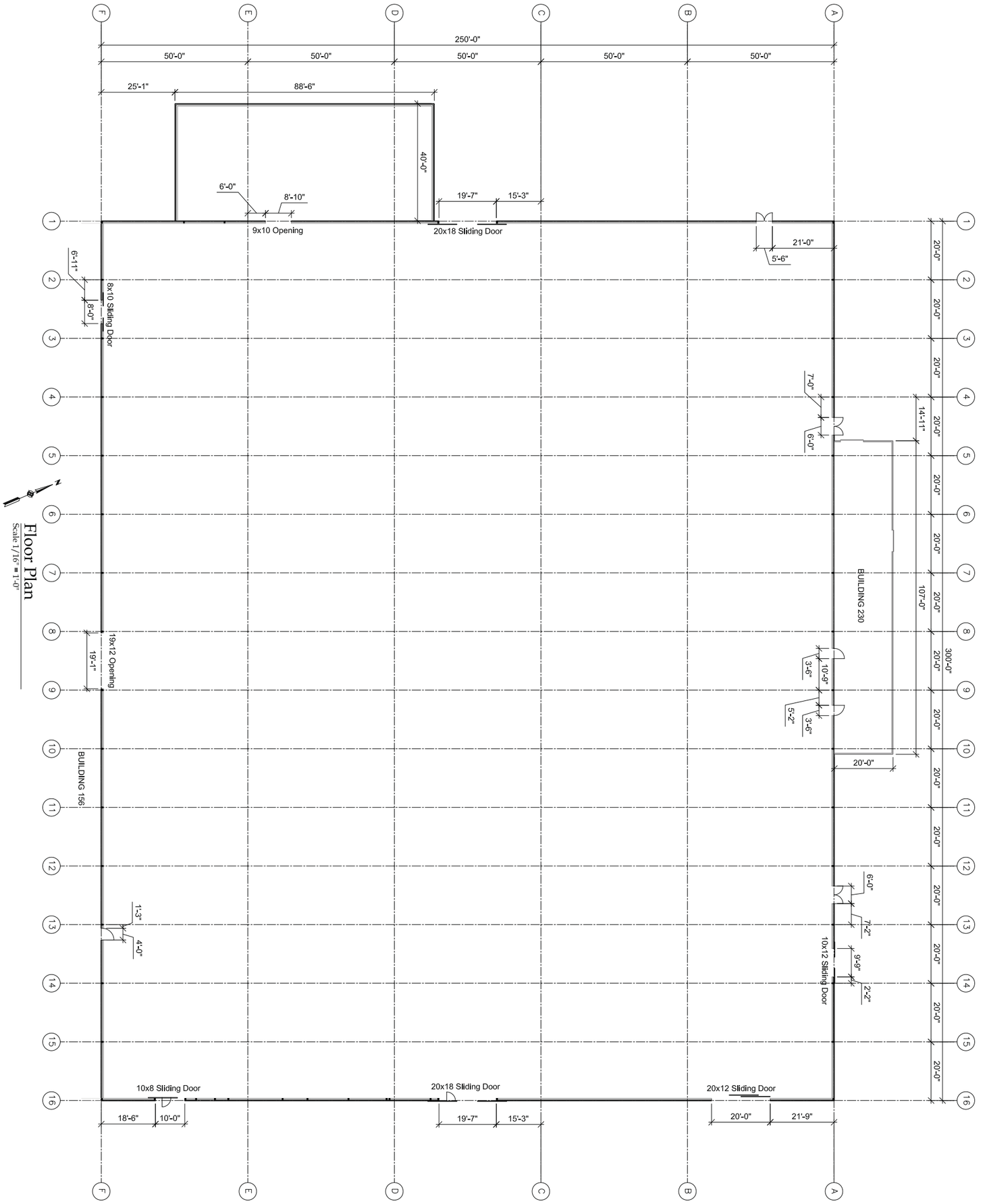
BUILDING 152 - JET ENGINE DRONE ASSEMBLY BUILDING

2701 N. HARBOR DRIVE

SAN DIEGO, CALIFORNIA

DRAWN BY: EMERY R. WEAVER

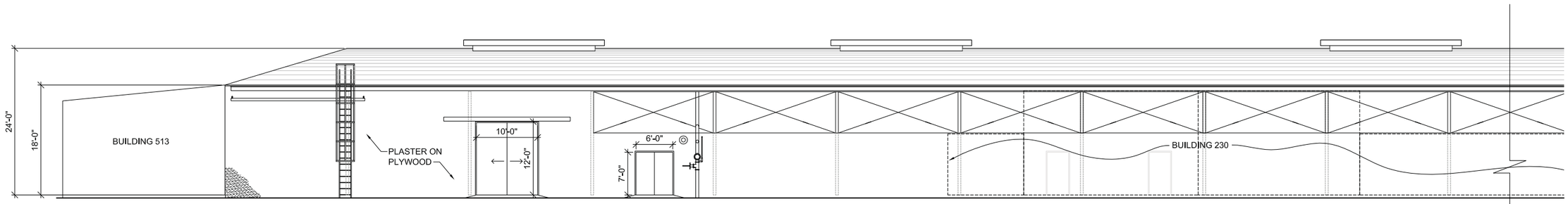
RYAN AERONAUTICAL COMPANY
HISTORIC DISTRICT
JANUARY 2010



Floor Plan
Scale 1/16" = 1'-0"

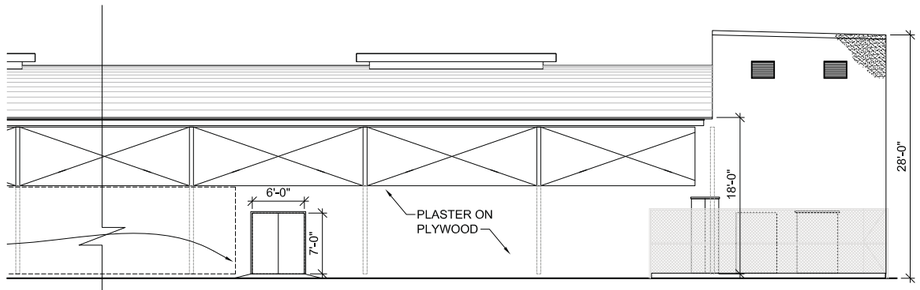
DRAWN BY: EMERY R. WEAVER

RYAN AERONAUTICAL COMPANY HISTORIC DISTRICT JANUARY 2010	NAME AND LOCATION OF STRUCTURE BUILDING 152 - JET ENGINE DRONE ASSEMBLY BUILDING 2701 N. HARBOR DRIVE — SAN DIEGO, CALIFORNIA — SAN DIEGO COUNTY	SURVEY NO. SHEET 2 OF 4 SHEETS	HISTORIC AMERICAN BUILDINGS SURVEY	Library of Congress Index Number



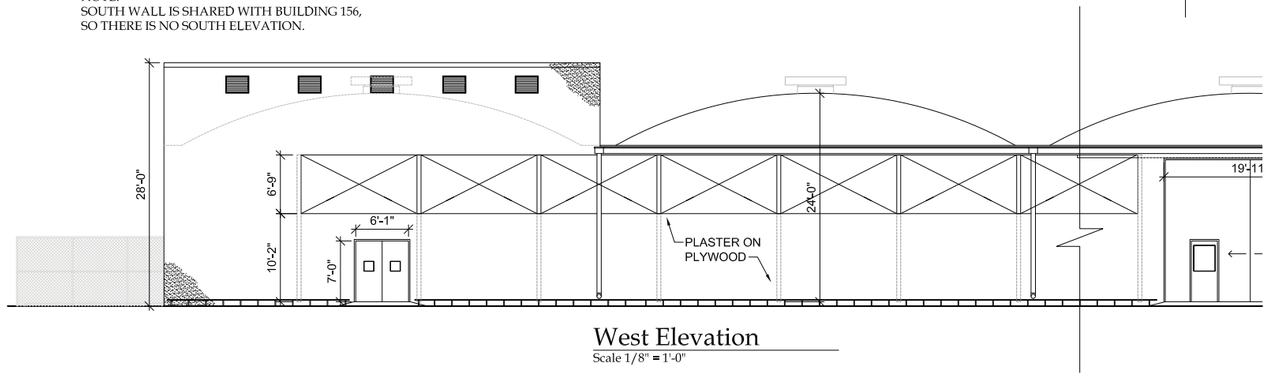
North Elevation
Scale 1/8" = 1'-0"

NOTE:
SOUTH WALL IS SHARED WITH BUILDING 156,
SO THERE IS NO SOUTH ELEVATION.

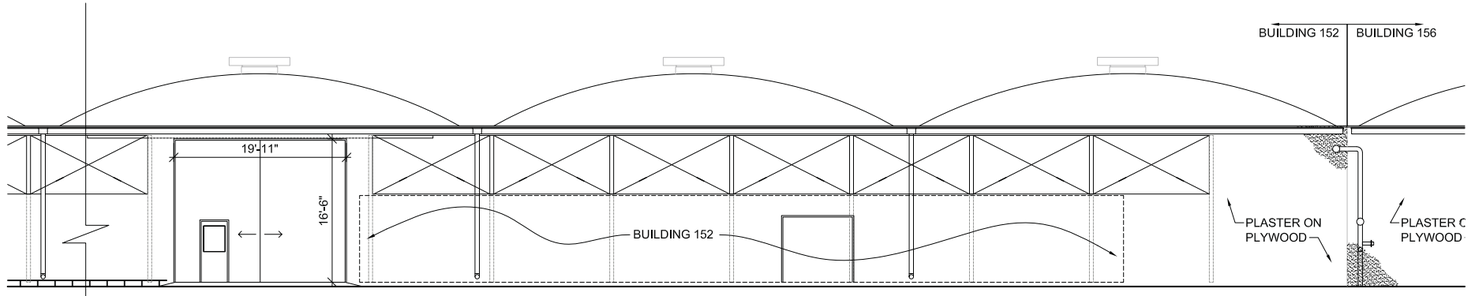


North Elevation Continued
Scale 1/8" = 1'-0"

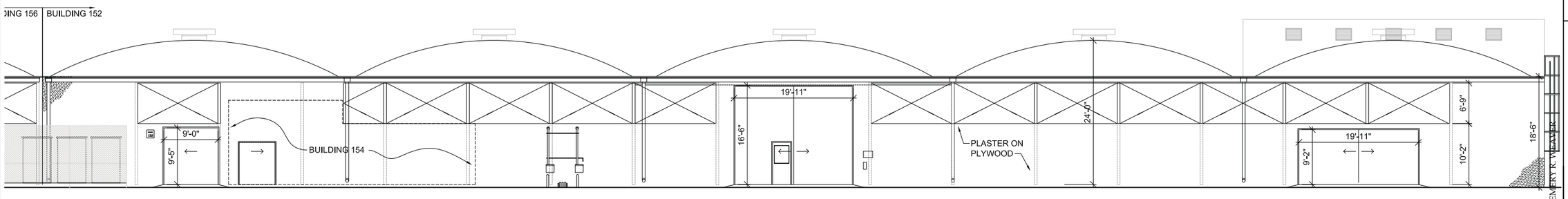
NOTE:
SOUTH WALL IS SHARED WITH BUILDING 156,
SO THERE IS NO SOUTH ELEVATION.



West Elevation
Scale 1/8" = 1'-0"



West Elevation Continued
Scale 1/8" = 1'-0"



East Elevation
Scale 1/8" = 1'-0"

DRAWN BY: EMERY R. WEAVER

Library of Congress Index Number

HISTORIC AMERICAN BUILDINGS SURVEY

SURVEY NO.

SHEET 3 OF 4 SHEETS

NAME AND LOCATION OF STRUCTURE

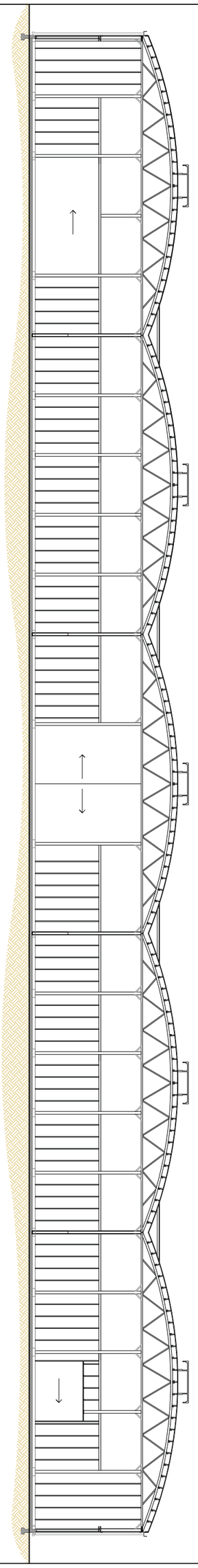
BUILDING 152 - JET ENGINE DRONE ASSEMBLY BUILDING

2701 N. HARBOR DRIVE

SAN DIEGO COUNTY

SAN DIEGO, CALIFORNIA

RYAN AERONAUTICAL COMPANY
HISTORIC DISTRICT
JANUARY 2010



Section
Scale: 1/8" = 1'-0"

DRAWN BY: EMERY R. WEAVER

RYAN AERONAUTICAL COMPANY HISTORIC DISTRICT JANUARY 2010	NAME AND LOCATION OF STRUCTURE BUILDING 152 - JET ENGINE DRONE ASSEMBLY BUILDING 2701 N. HARBOR DRIVE SAN DIEGO, CALIFORNIA SAN DIEGO COUNTY	SURVEY NO. SHEET 4 OF 4 SHEETS	HISTORIC AMERICAN BUILDINGS SURVEY	Library of Congress Index Number