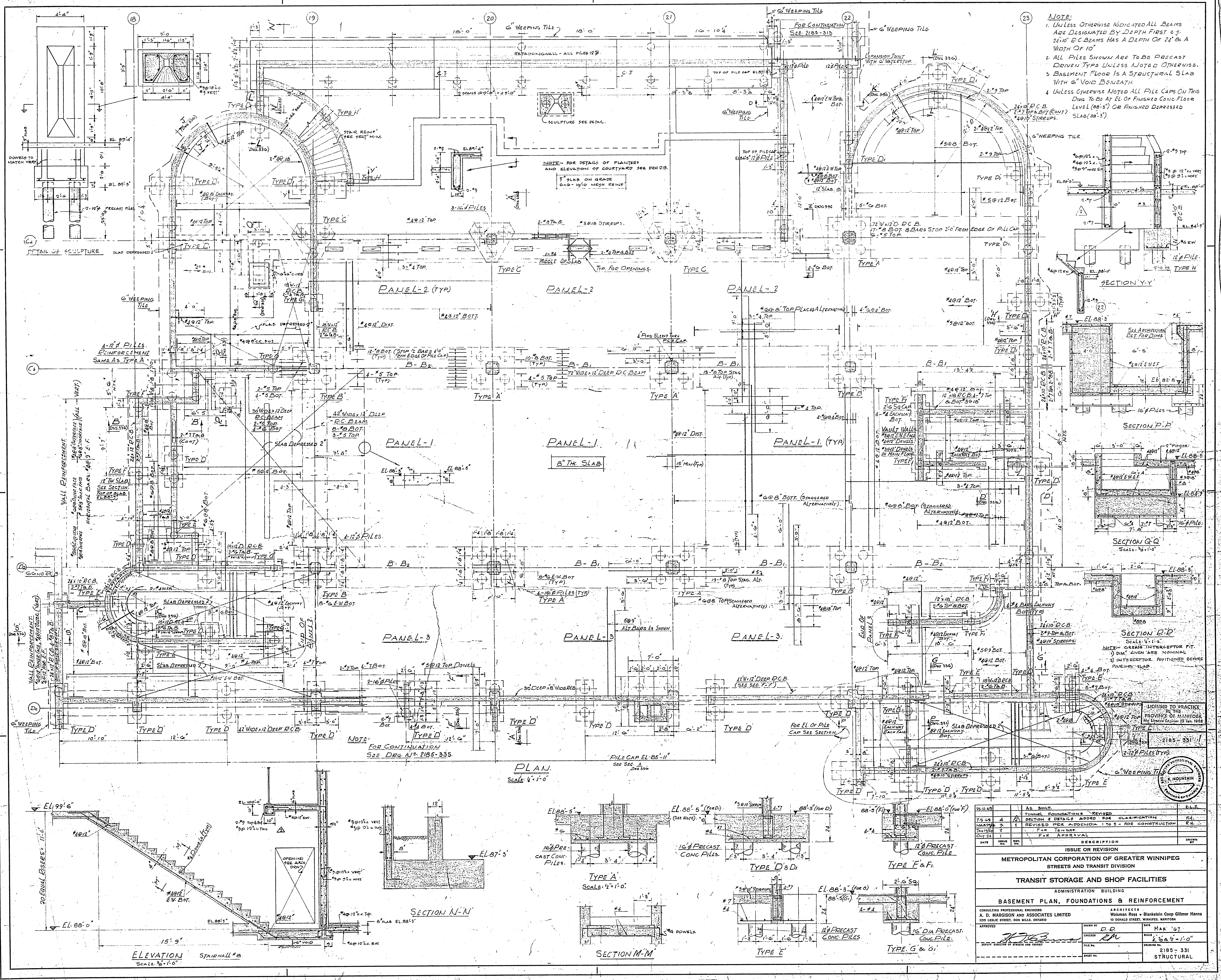
Appendix P3 R1



NOTE:

1. UNLESS OTHERWISE INDICATED ALL BEAMS ARE DESIGNATED BY DEPTH FIRST e.g. 24"x10" R.C. BEAMS HAS A DEPTH OF 24" & A WIDTH OF 10"
2. ALL PILES SHOWN ARE TO BE PRECAST DRIVEN TYPE UNLESS NOTED OTHERWISE.
3. BASEMENT FLOOR IS A STRUCTURAL SLAB WITH 6" VOID BENEATH.
4. UNLESS OTHERWISE NOTED ALL PILE CAPS ON THIS DWG TO BE AT EL. OF FINISHED CONC. FLOOR LEVEL (88'-5") OR FINISHED DEPRESSED SLAB (88'-3").

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
25-11-69			AS BUILT.	R.L.J.
			TUNNEL FOUNDATIONS REVISED	
7.5.68	4	2	SECTION & DETAILS ADDED FOR CLARIFICATION	RH.
MAR29/68	3	1	REVISED PER ADDENDIA 1 TO 5 - FOR CONSTRUCTION	RH.
JAN 19/68	2		FOR TENDER.	
OCT 26	1		FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

ADMINISTRATION BUILDING

BASEMENT PLAN, FOUNDATIONS & REINFORCEMENT

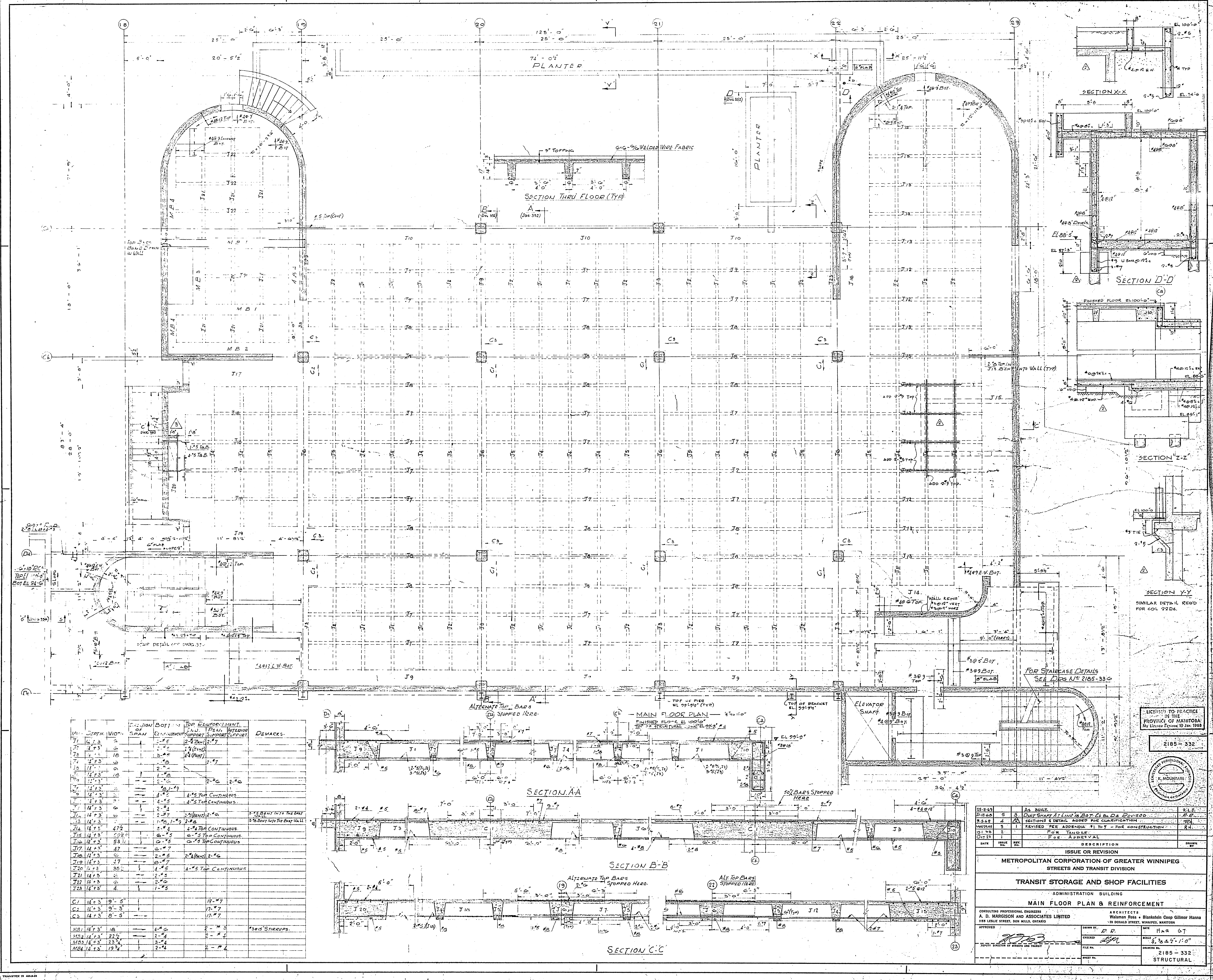
CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY D.D.
CHECKED KM
FILE No.
SHEET No.
DATE MAR '67
SCALE ¼, ⅜ & ½ = 1'-0"
DRAWING No. 2185-331 STRUCTURAL

K. MOUNTAIN



MARK	DEPTH	WIDTH	DIRECTION OF SPAN	BOTTOM REINFORCEMENT	TOP REINFORCEMENT END SUPPORT	TOP REINFORCEMENT PEN. SUPPORT	TOP REINFORCEMENT INTERIOR SUPPORT	REMARKS
J1	14"+3	6	↕	2-#5	2-#4 (BENT)	2-#7		
J2	14"+3"	6	↕	2-#5	2-#4 (BENT)			
J3	14"+3"	18	↕	3-#5	4-#4 (BENT)			
J4	14"+3"	6	↕	2-#8		2-#7		
J5	14"+3"	6	↕	2-[illegible]				
J6	14"+3"	18	↕	1-#8				
J7	14"+3"	[illegible]	↔	2-#6		2-#6	2-#6	
J8	14"+3"	[illegible]	↔	[illegible]#8, 1-#9				
J9	14"+3"	[illegible]	↔	4-#5	4-#5 TOP CONTINUOUS.			
J10	14"+3"	[illegible]	↔	4-#5	4-#5 TOP CONTINUOUS.			
J11	14"+3	6	↕	2-#4				
J12	14"+3"	6	↔	2-#7	2-#5 (BENT)	2-#6		2-#5 BENT INTO THE EAST WALL
J13	14"+3"	[illegible]	↔	1-#8, 1-#9	2-#8			2-#8 BENT INTO THE EAST WALL
J14	14"+3"	47½		5-#4	4-#4 TOP CONTINUOUS.			
J15	14"+3"	50½"	↕	6-#5	6-#5 TOP CONTINUOUS.			
J16	14"+3"	53½"	↕	6-#5	6-#5 TOP CONTINUOUS			
J17	14"+3"	47	↔	6-#7				
J18	14"+3"	6	↔	2-#5	2-#4 (BENT)	2-#6		
J19	14"+3	47	↔	6-#7				
J20	14"+3"	35½	↕	4-#5	4-#5 TOP CONTINUOUS			
J21	14"+3"	6	↔	2-#5				
J22	14"+3	6	↔	2-#6				
J23	14"+3"	4.	↕	1-#5				
C1	14"+3"	9'-5"	↕			17-#7		
C2	14"+3"	9'-3"	↕			17-#7		
C3	14"+3"	8'-5"	↔			17-#7.		
MB1	14"+3"	18"	↔	4-#6		2-#5		#3@15" STIRRUPS.
MB2	14"+3"	22½"	↔	2-#4		2-#4		
MB3	14"+3"	23¾"	↕	3-#4				
MB4	14"+3"	19¾"	↕	2-#4		2-#4		

LICENSED TO PRACTICE
IN THE
PROVINCE OF MANITOBA
My Licence Expires 10 Jan. 1968

2185-332

K. MOUNTAIN

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
25.11.69			AS BUILT.	R.L.J.
21.12.68	5	3	DUCT SHAFT AT LINE 18 BET. Cb & Da REVISED	R.R.
9.5.68	4	2	SECTIONS & DETAIL ADDED FOR CLARIFICATION	R.H.
MAR 29.68	3	1	REVISED PER ADDENDA #1 TO 5 - FOR CONSTRUCTION	R.H.
19.1.68	2		FOR TENDER.	
OCT 20	1		FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

ADMINISTRATION BUILDING

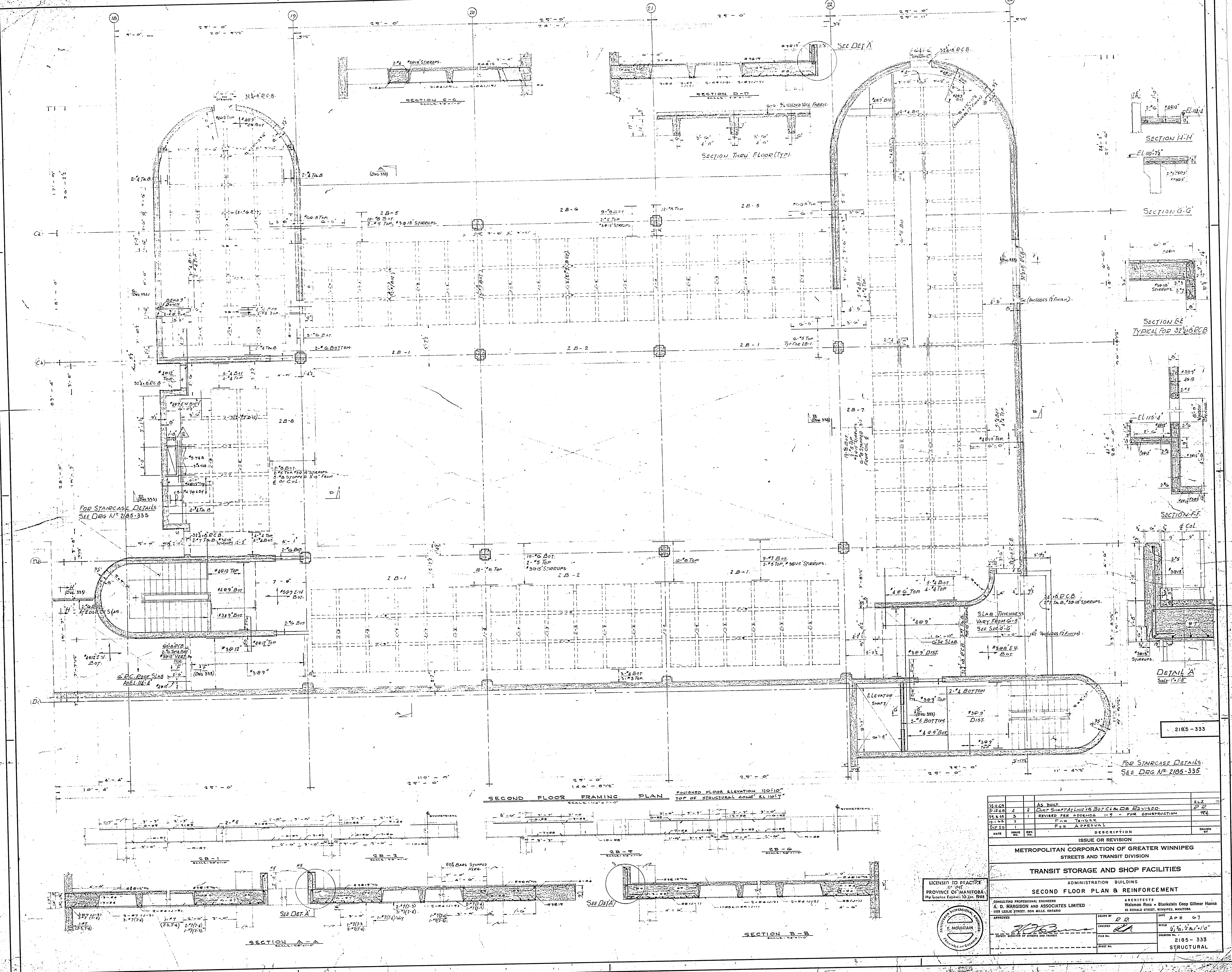
MAIN FLOOR PLAN & REINFORCEMENT

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY R.R.
CHECKED
FILE No.
SHEET No.
DATE MAR 67
SCALE 1/4, 3/8 & 1/2" = 1'-0"
DRAWING No. 2185 – 332
STRUCTURAL



FOR STAIRCASE DETAILS SEE DRG. Nº 2185-335

25·11·69			AS BUILT.	R.L.J.
21·12·68	4	2	DUCT SHAFT AT LINE 18 BET C6 & Da REVISED.	R.R.
29.3.68	3	1	REVISED PER ADDENDA 1-5 - FOR CONSTRUCTION	RH.
19·1·68	2		FOR TENDER	
OCT 20	1		FOR APPROVAL	
DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

ADMINISTRATION BUILDING
SECOND FLOOR PLAN & REINFORCEMENT

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

LICENSED TO PRACTICE
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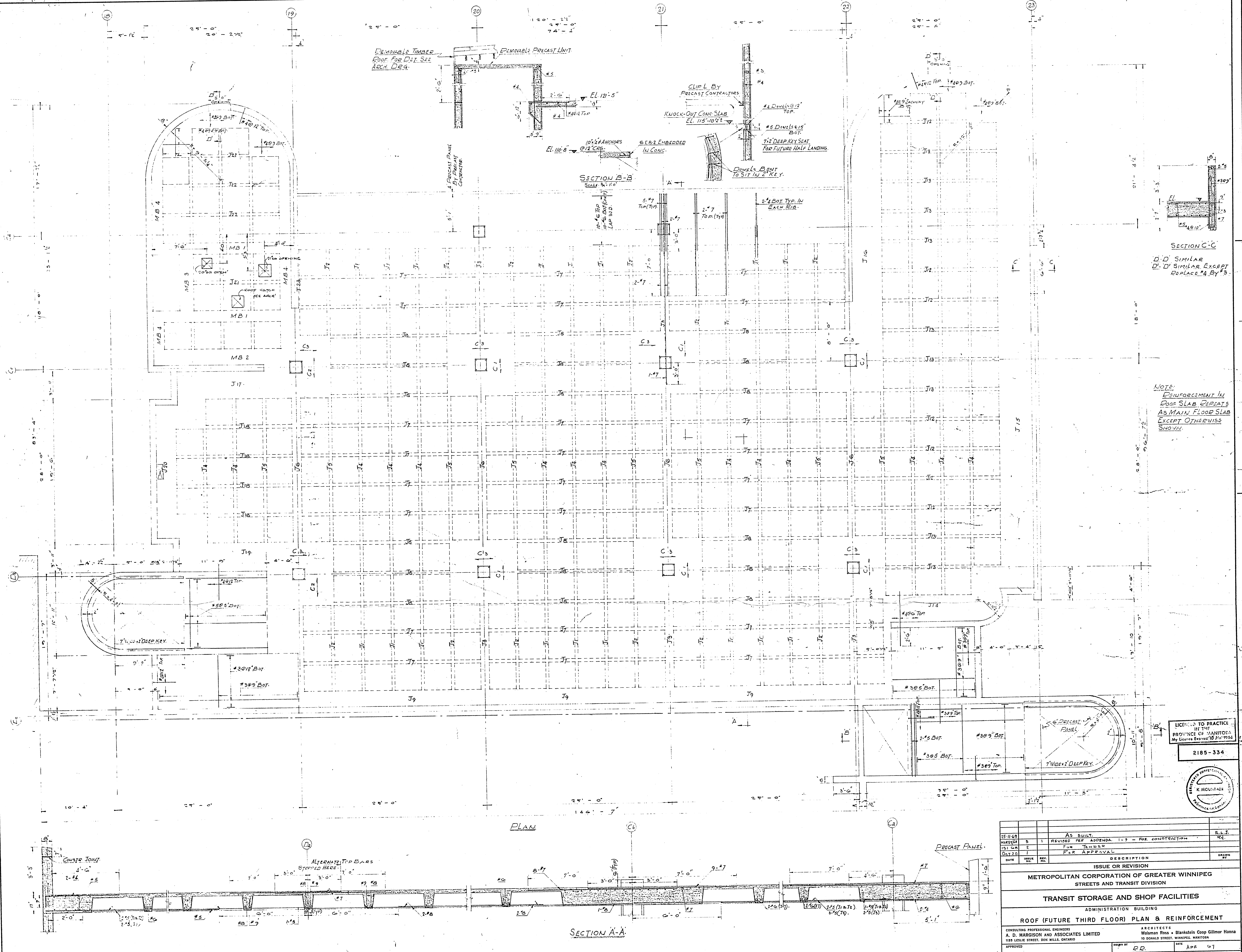
PROVINCE OF MANITOBA
My Licence Expires: 10 Jan. 1968

K. MOUNTAIN

APPROVED

DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY R.R.
CHECKED
FILE No.
SHEET No.
DATE APR 67
SCALE 1/4", 3/8", 1/2" & 1"=1'-0"
DRAWING No. 2185- 333
STRUCTURAL



SECTION 'C'-'C'

'D'-'D' SIMILAR
'D''-'D'' SIMILAR EXCEPT
REPLACE #4 BY #3.

NOTE:
REINFORCEMENT IN ROOF SLAB REPEATS AS MAIN FLOOR SLAB EXCEPT OTHERWISE SHOWN.

LICENSED TO PRACTICE
IN THE
PROVINCE OF MANITOBA
My Licence Expires 10 Jan 1968

2185-334

REGISTERED PROFESSIONAL ENGINEER
K. MOUNTAIN
PROVINCE OF ONTARIO

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
25.11.69			AS BUILT.	R.L.J.
MAR 29/68	3	1	REVISED PER ADDENDA 1-7 – FOR CONSTRUCTION	RH.
19.1.68	2		FOR TENDER	
OCT 20	1		FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

ADMINISTRATION BUILDING

ROOF (FUTURE THIRD FLOOR) PLAN & REINFORCEMENT

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

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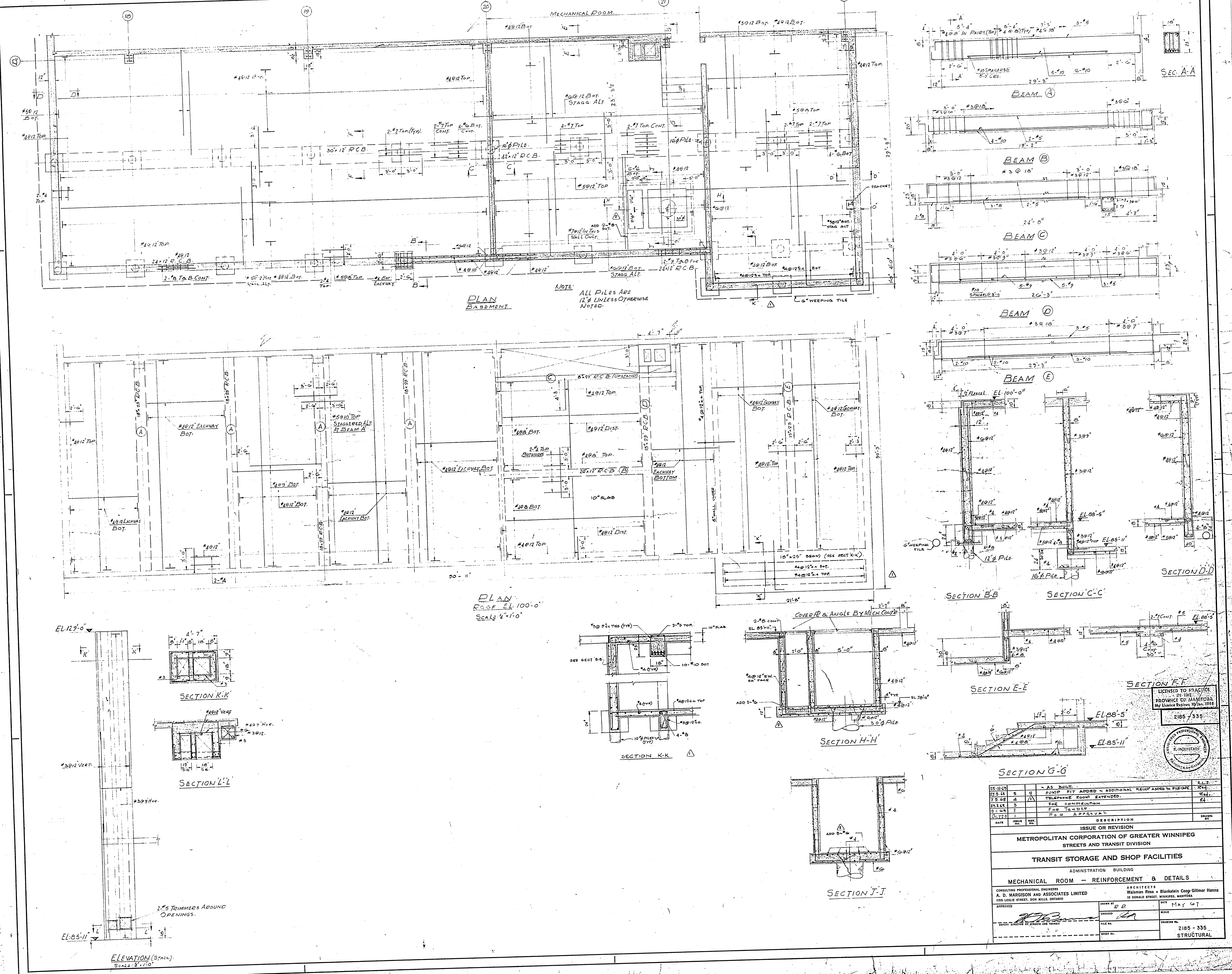
DRAWN BY R.R.
CHECKED
FILE No.
SHEET No.
DATE APR 67
SCALE ¼" & 3/8" = 1'-0"
DRAWING No. 2185-334
STRUCTURAL



LICENSED TO PRACTICE
IN THE
PROVINCE OF MANITOBA
My Licence Expires 10 Jan. 1968

2185 - 335

K-MOUNTAIN

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
25·11·69			~ AS BUILT.	R.L.J.
27.5.68	5	2	SUMP PIT ADDED ~ ADDITIONAL REINF ADDED TO PILE-CAPS.	R4
7.5.68	4	⚠1	TELEPHONE ROOM EXTENDED.	R4
29.3.68	3		FOR CONSTRUCTION	R4
19.1.68	2		FOR TENDER	
OCT20	1		FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

ADMINSTRATION BUILDING

MECHANICAL ROOM — REINFORCEMENT & DETAILS

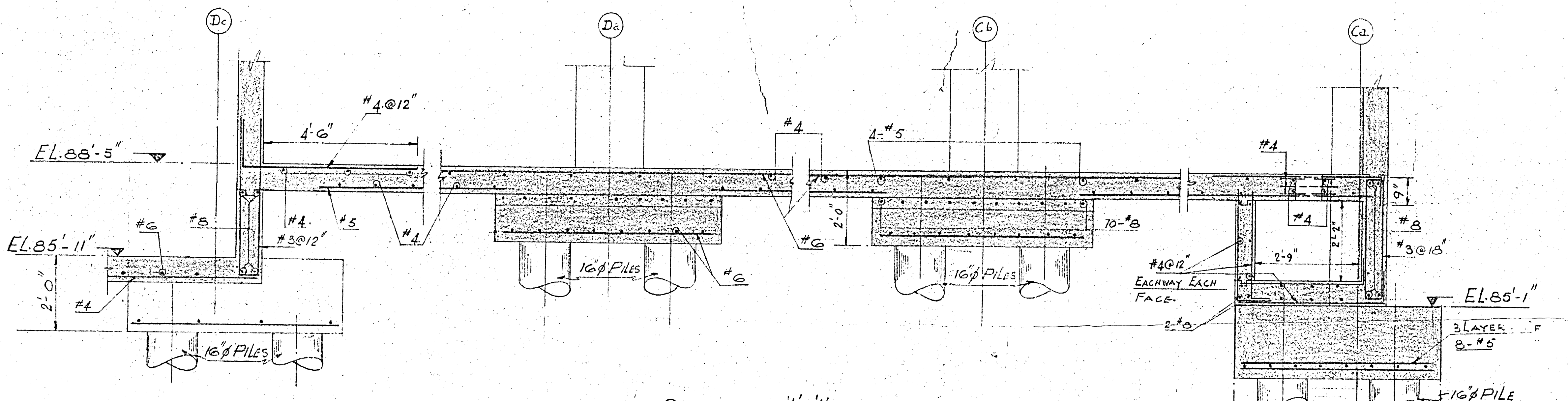
CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

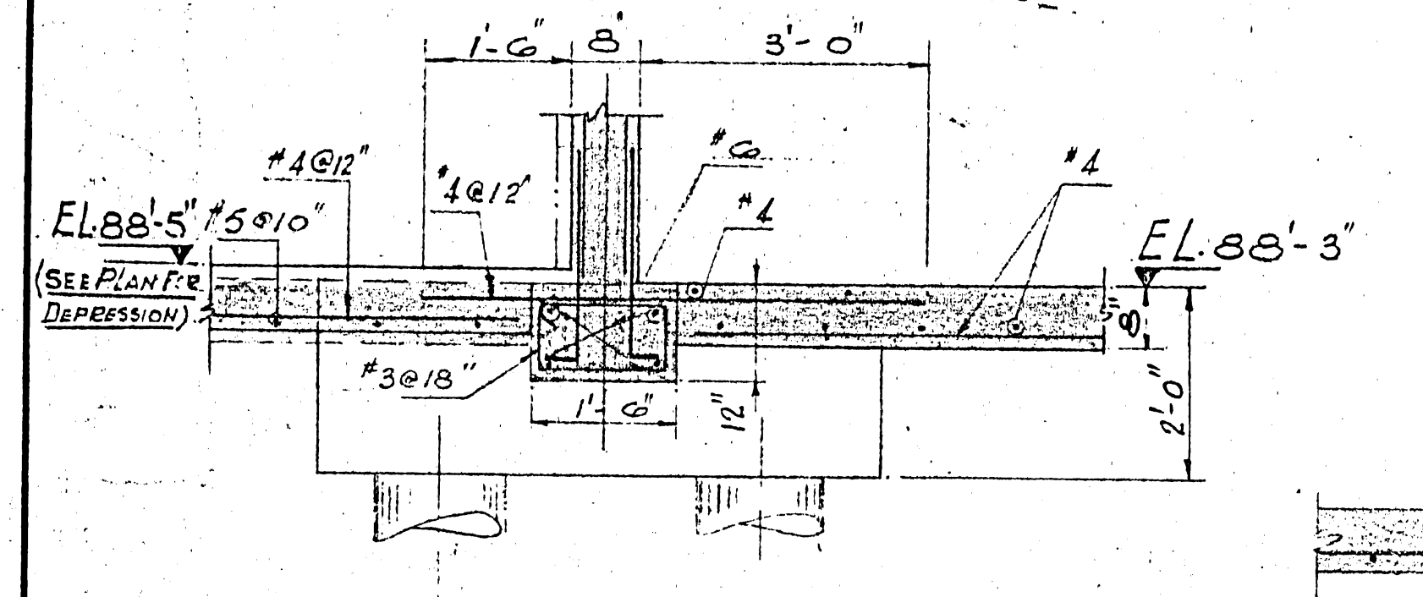
APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY R.R.
CHECKED
FILE No.
SHEET No.
DATE MAY 67
SCALE
DRAWING No. 2185 - 335 STRUCTURAL

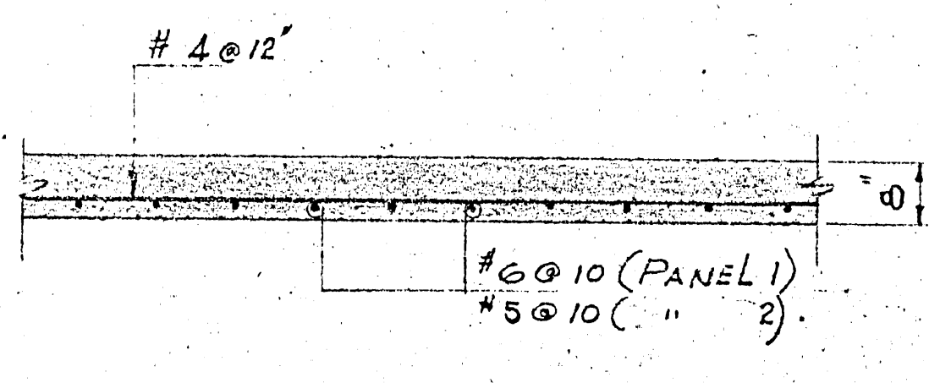
N.W.C.L. TRANSTEX 15 4006-61



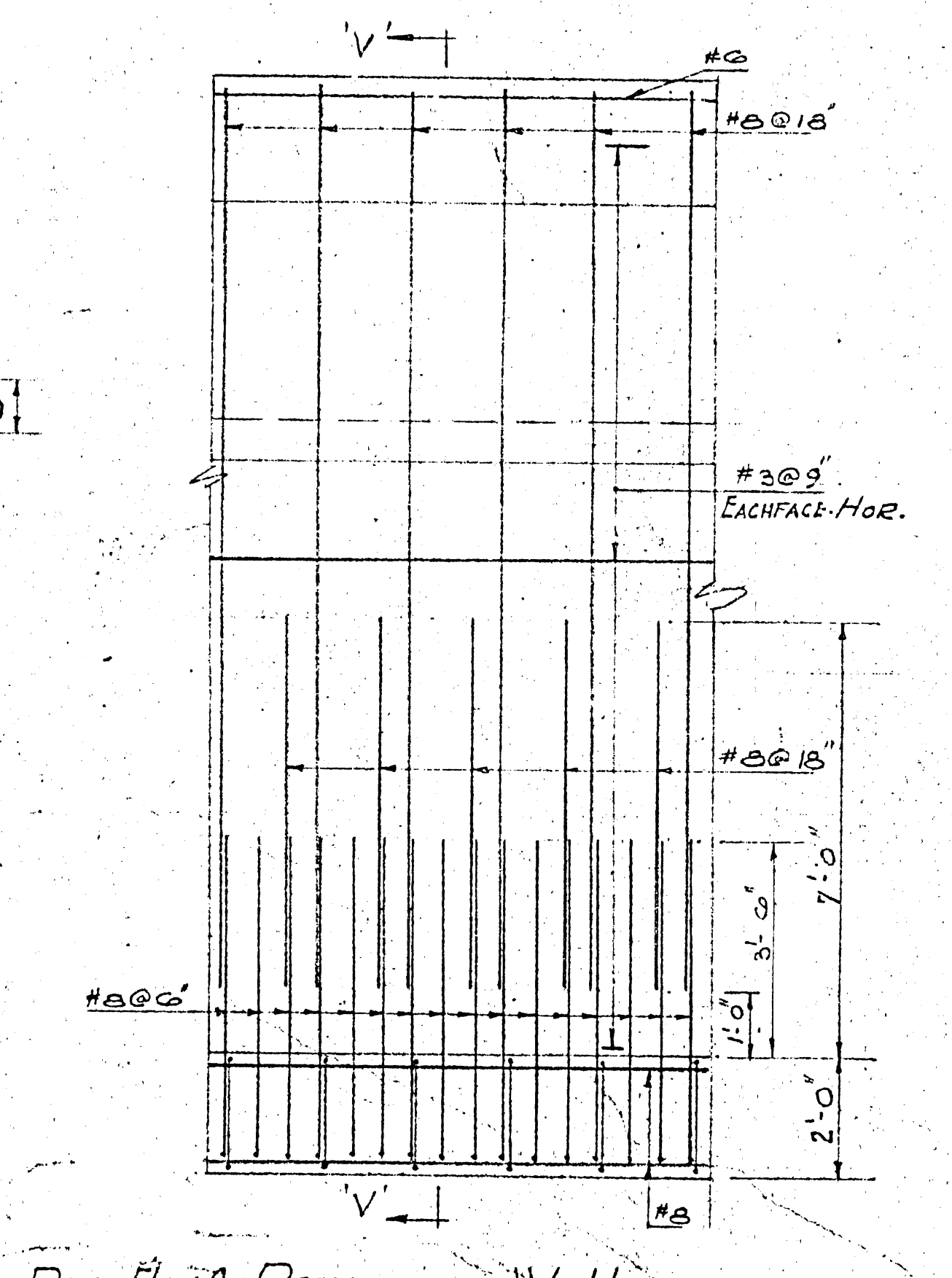
SECTION 'A-A'



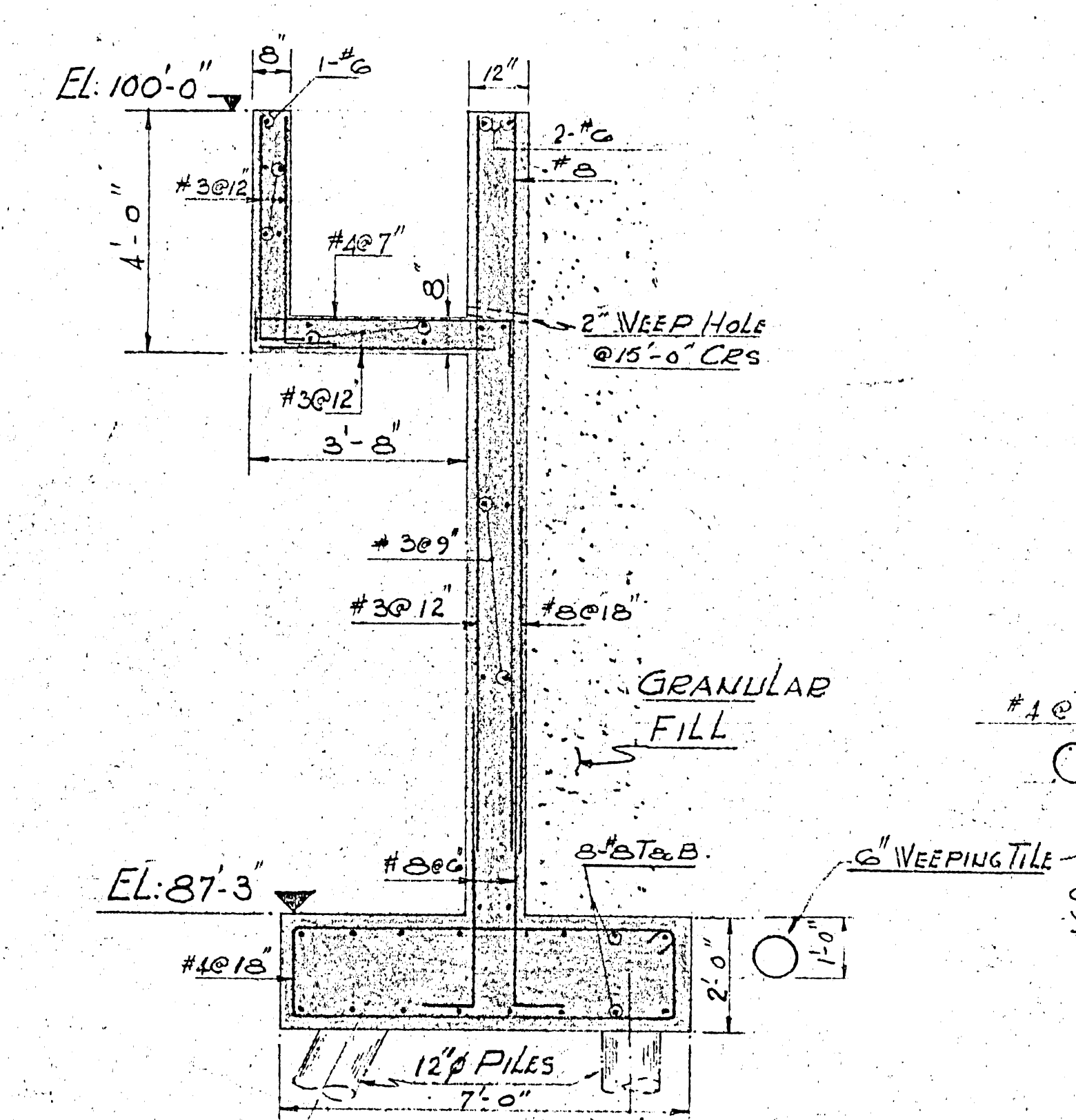
SECTION 'C-C'



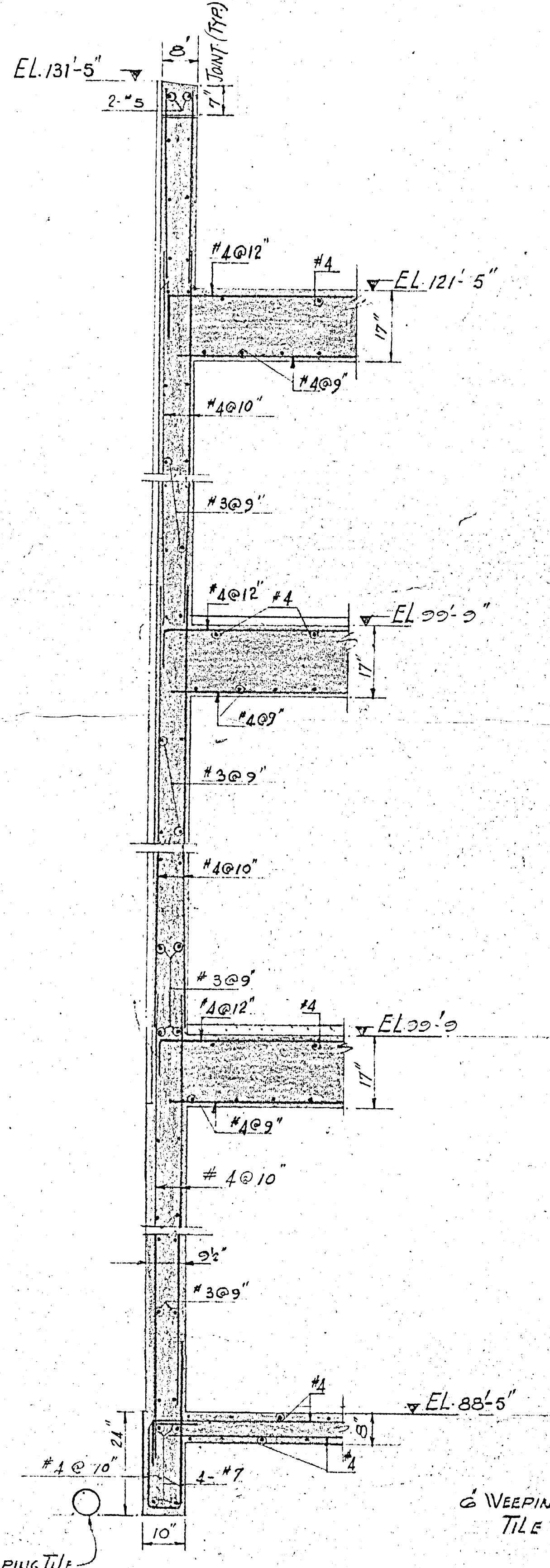
TYPICAL SECTION THRU' FLOOR SLAB (BASEMENT).



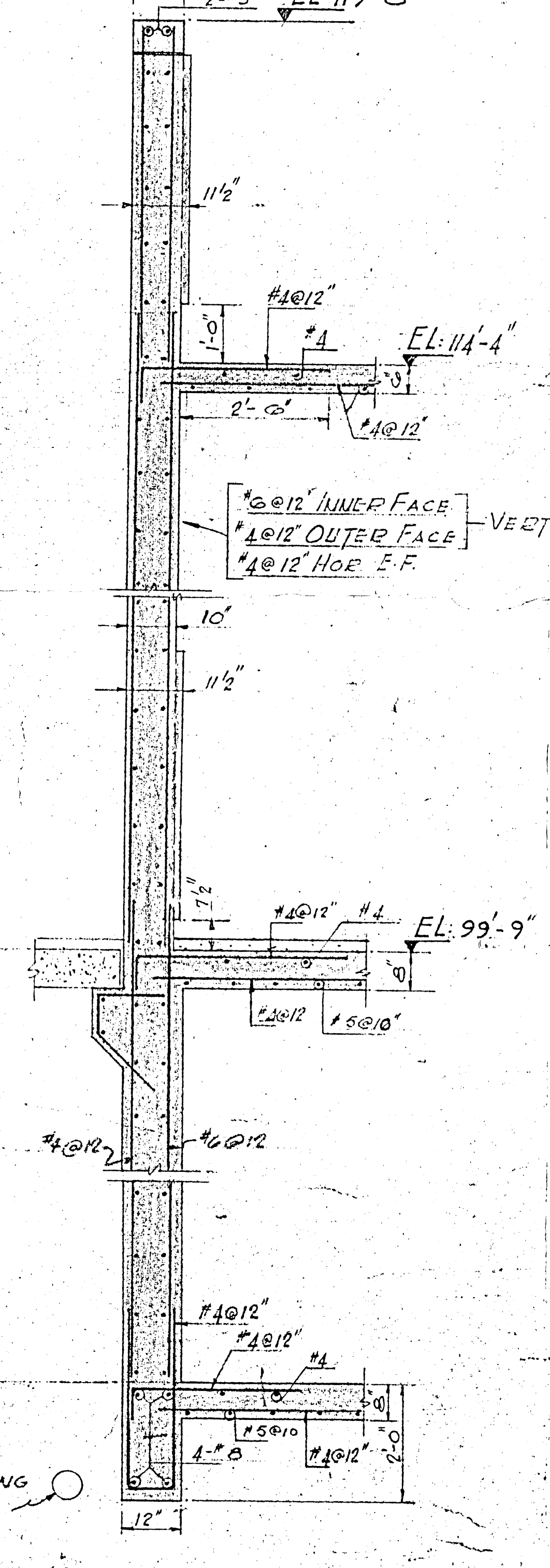
PART ELEV. OF RETAINING WALL.
SCALE: 3/8"=1'-0"



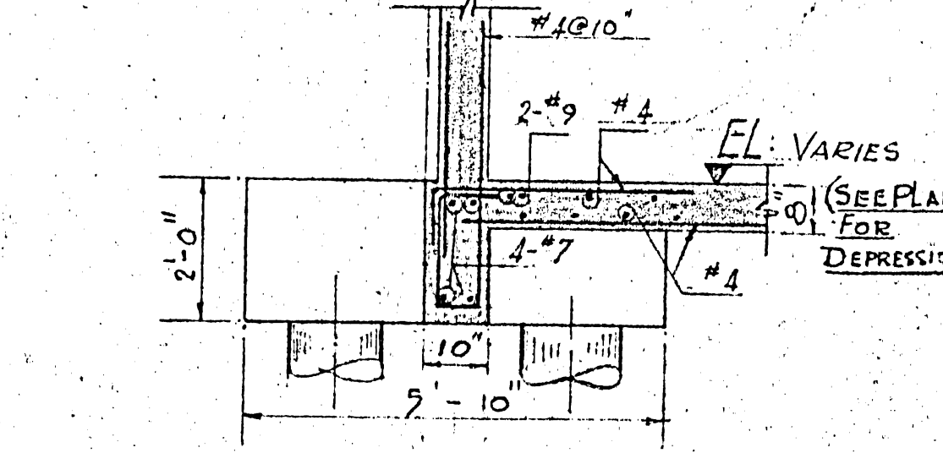
SECTION 'V-V'



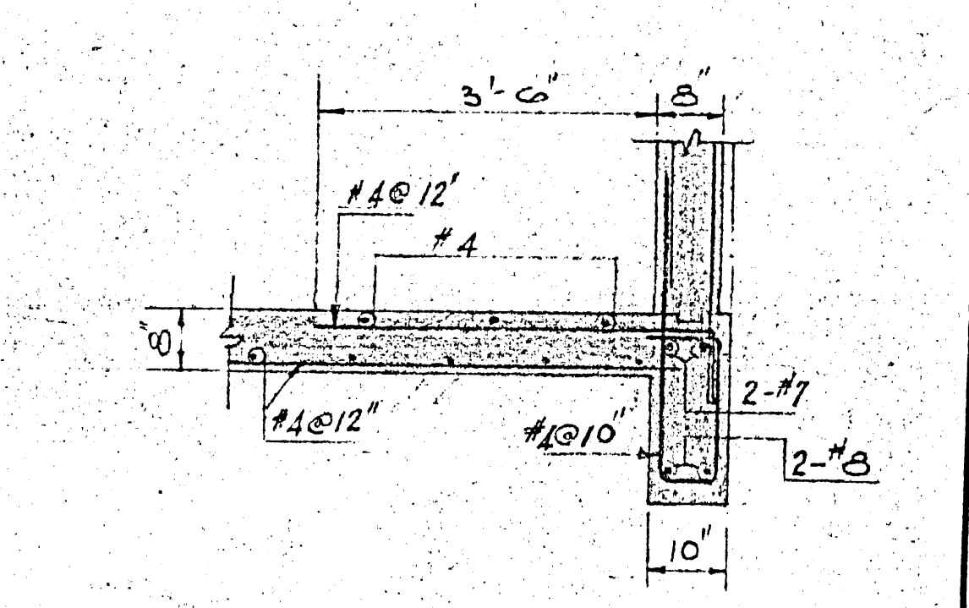
SECTION 'K'-'K'



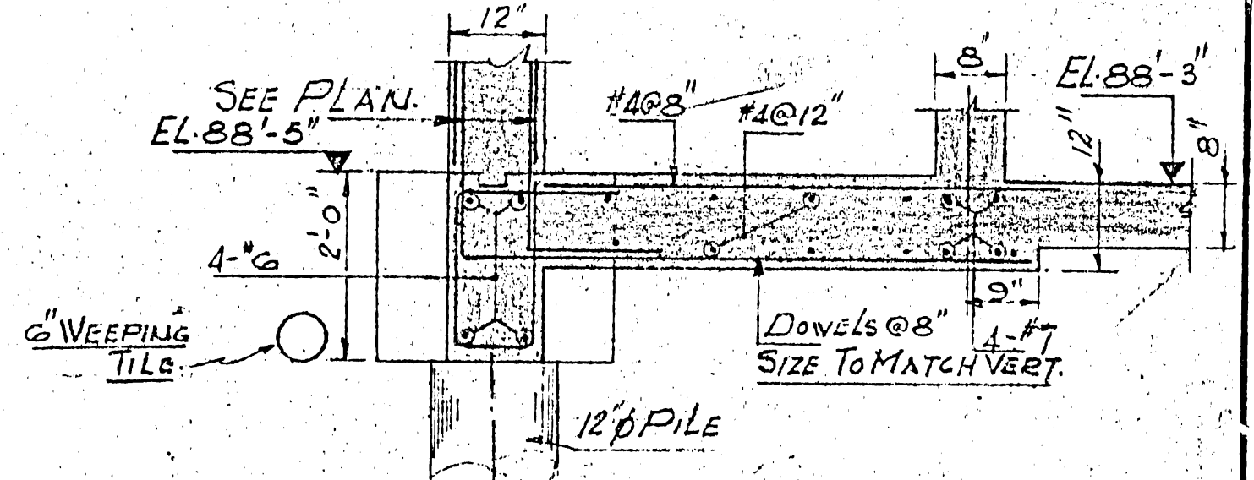
SECTION 'S'-'S'



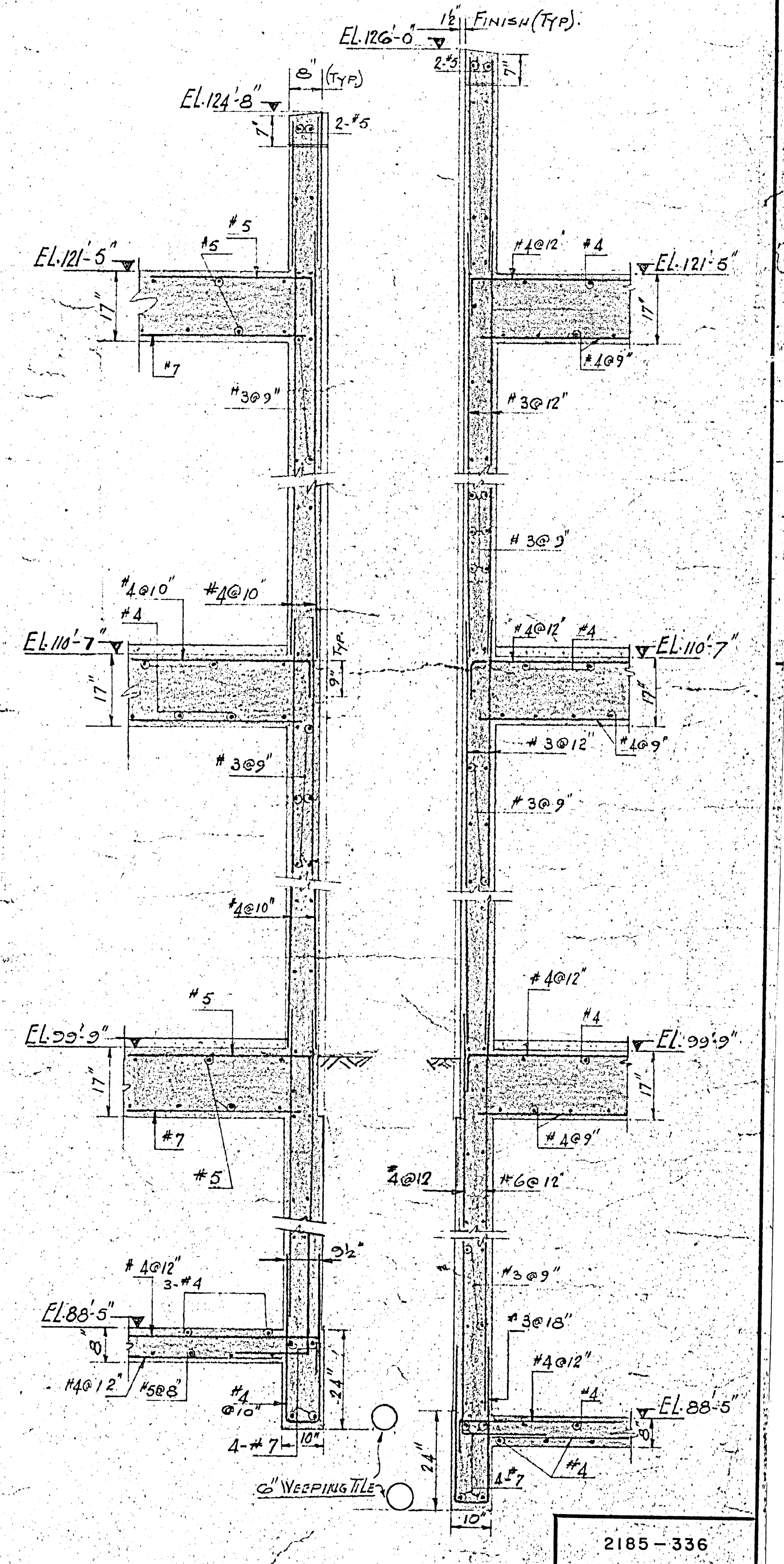
SECTION 'L'-'L'
SCALE: 3/8"=1'-0"



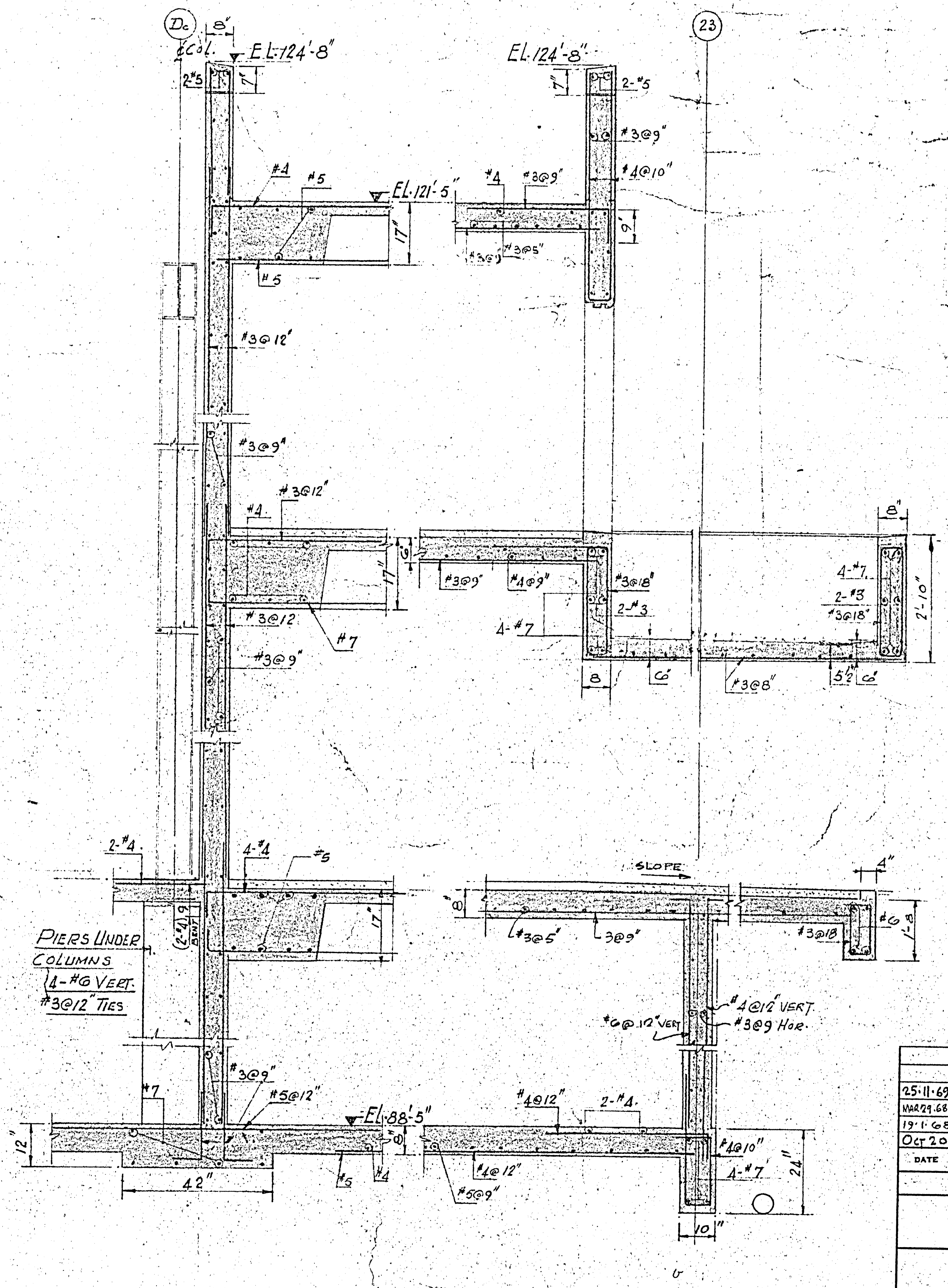
SECTION 'D'-'D'



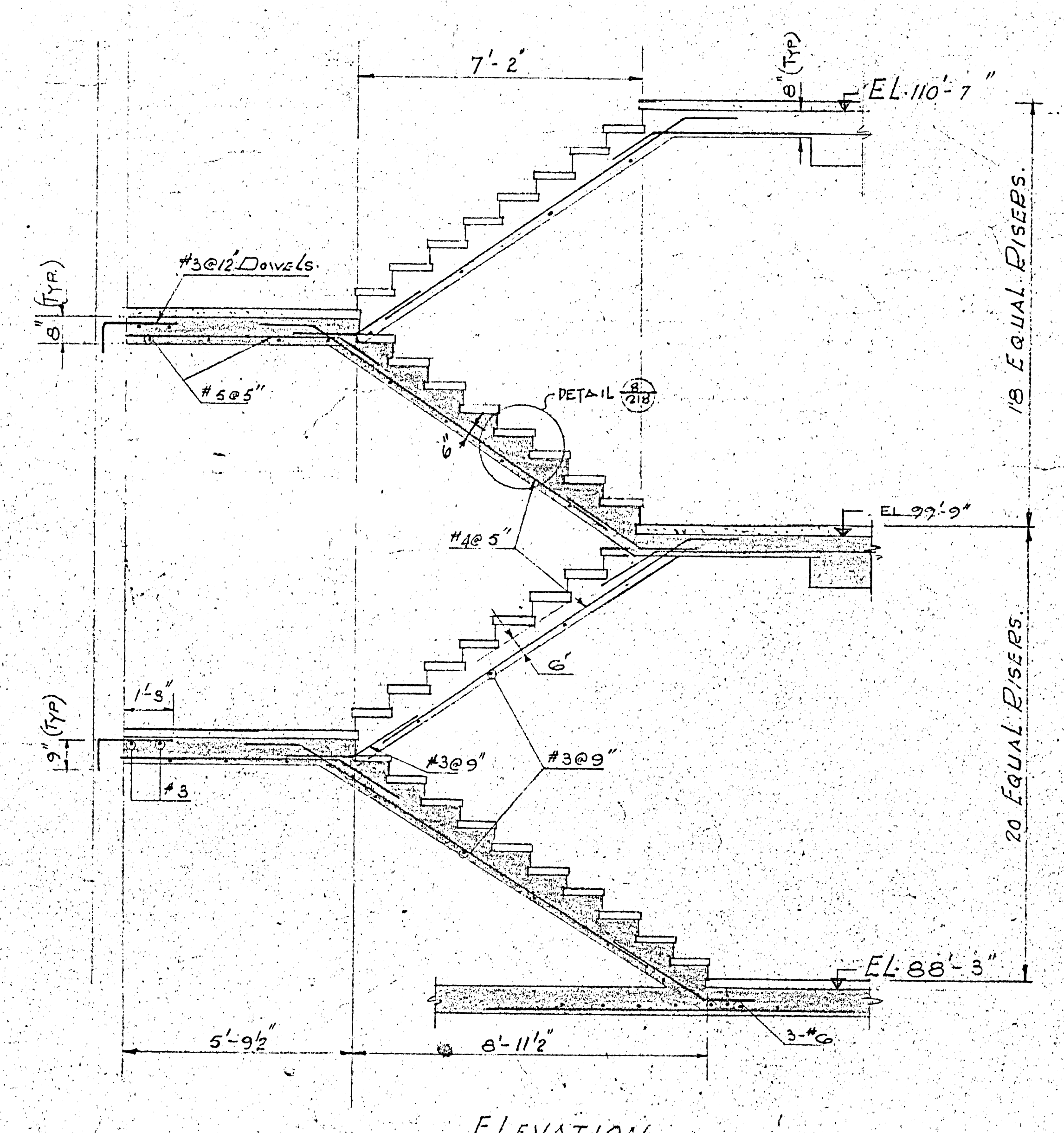
SECTION 'B'-'B'



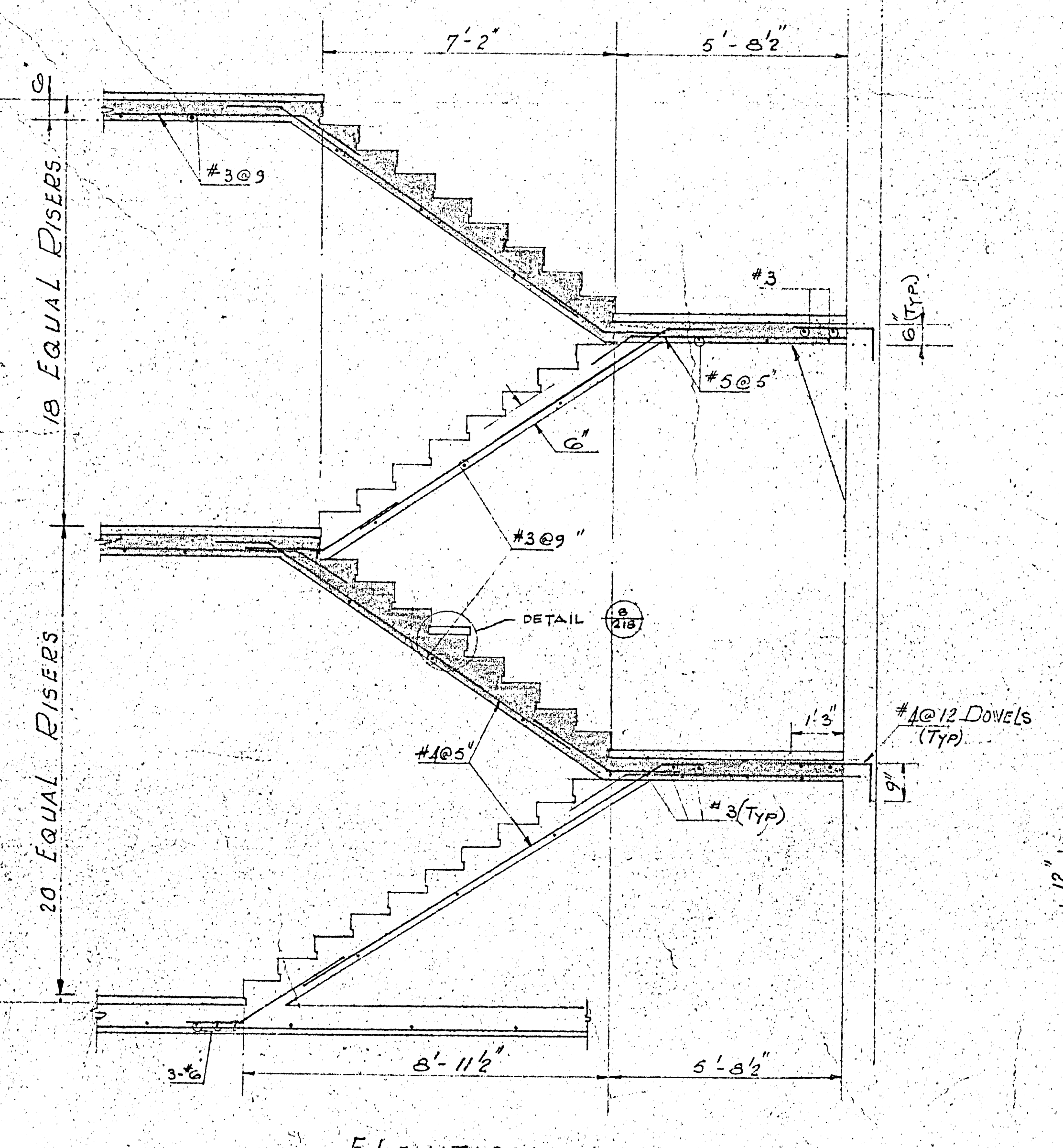
SECTION 'H'-'H'   SECTION 'J'-'J'



SECTION 'F'-'F'   SECTION 'G'-'G'



ELEVATION.
STAIR HALL #5
SCALE: 3/8"=1'-0"



ELEVATION.
STAIR HALL #6
SCALE: 3/8"=1'-0"

COLUMN SCHEDULE			
COLUMN	BASEMENT TO MAIN FLOOR.	MAIN FLOOR TO 2ND FLOOR.	2ND FLOOR TO ROOF.
Ca 20 Ca 21	8-#9 18" 18"	8-#8 18"x18"	8-#6 18"x18"
Cb 19 Cb 22	8- 7 22" 22"	8-#6 18"x18"	8-#6 18"x18"
Cb 20 Cb 21 Dc 20 Dc 21.	8-#9 22"x22"	8-#8 18"x18"	8-#6 18"x18"
Ca 22	8-#9:22"x22" BEND BARS IN TOP OF SLAB.	—	—
Db 18 Db 19 Db 20 Db 21 Db 22.	8-#6 + 2-#4 9 17" 22"	8-#6	8-#6

STIRRUPS: #3 @ 12"
BARS TO BE LAPPED 20D.

2185 – 336

LICENSED TO PRACTICE
IN THE
PROVINCE OF MANITOBA
My Licence Expires: 10 Jan. 1968

K. MOUNTAIN

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
25·11·69			AS BUILT.	R.L.J.
MAR 29.68	3	1	REVISED AS PER ADDENDA 1-5 - FOR CONSTRUCTION.	R.H.
19·1·68	2		FOR TENDER	
OCT 20	1		FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

ADMINISTRATION BUILDING
SECTIONS

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY R.R.
CHECKED
DATE MAY 67
SCALE 3/8" & 1/2" = 1'-0"
FILE No.
SHEET No.
DRAWING No. 2185 – 336
STRUCTURAL

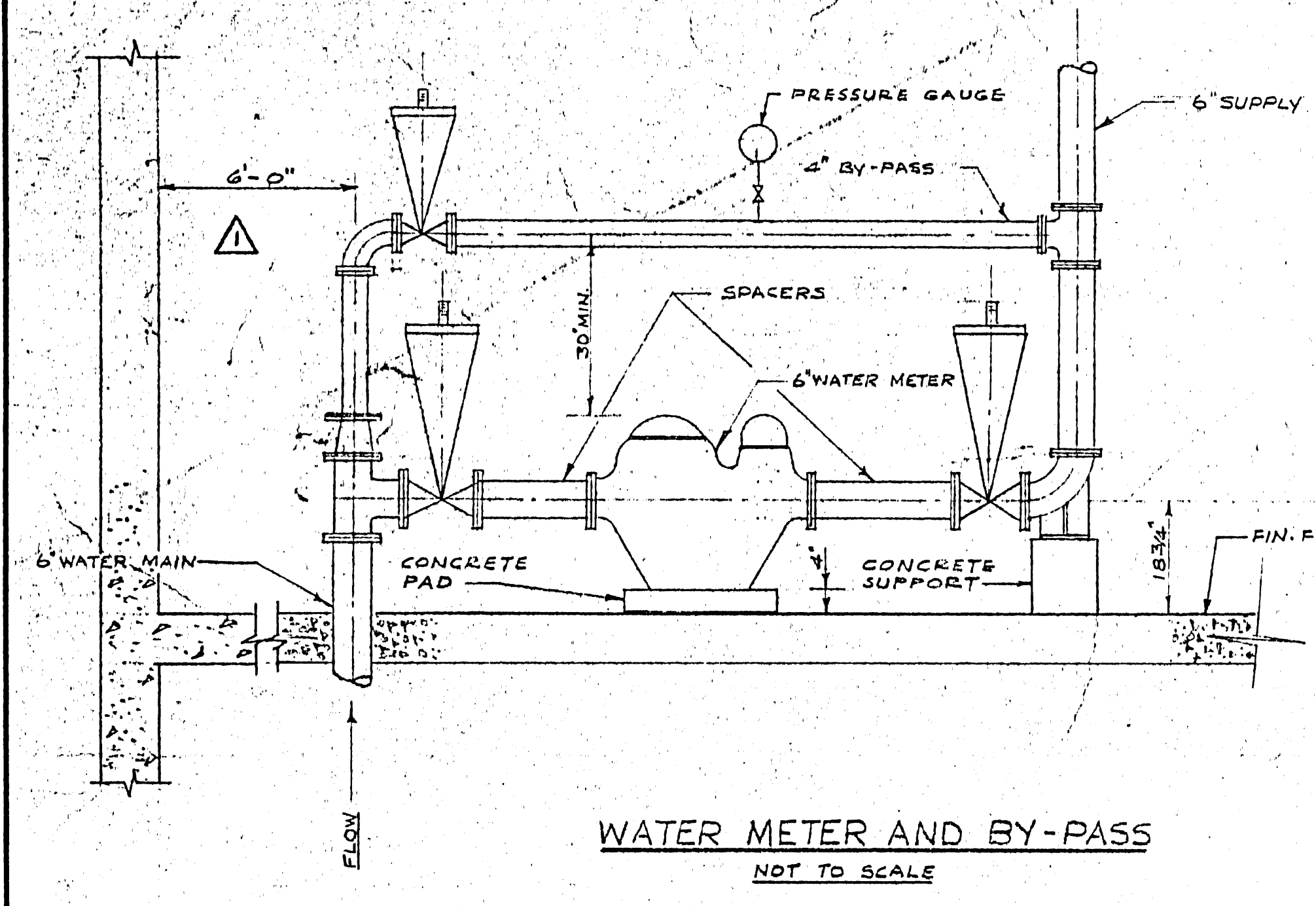
421 OSBORNE ST.
address

TRANSIT STORAGE & SHOP FACILITIES

project no.

2185-401
sheet no.

GARAGE & SERVICE BAY - PLUMBING & DRAINAGE - PLANS & DETAILS
description



WATER METER AND BY-PASS

NOT TO SCALE

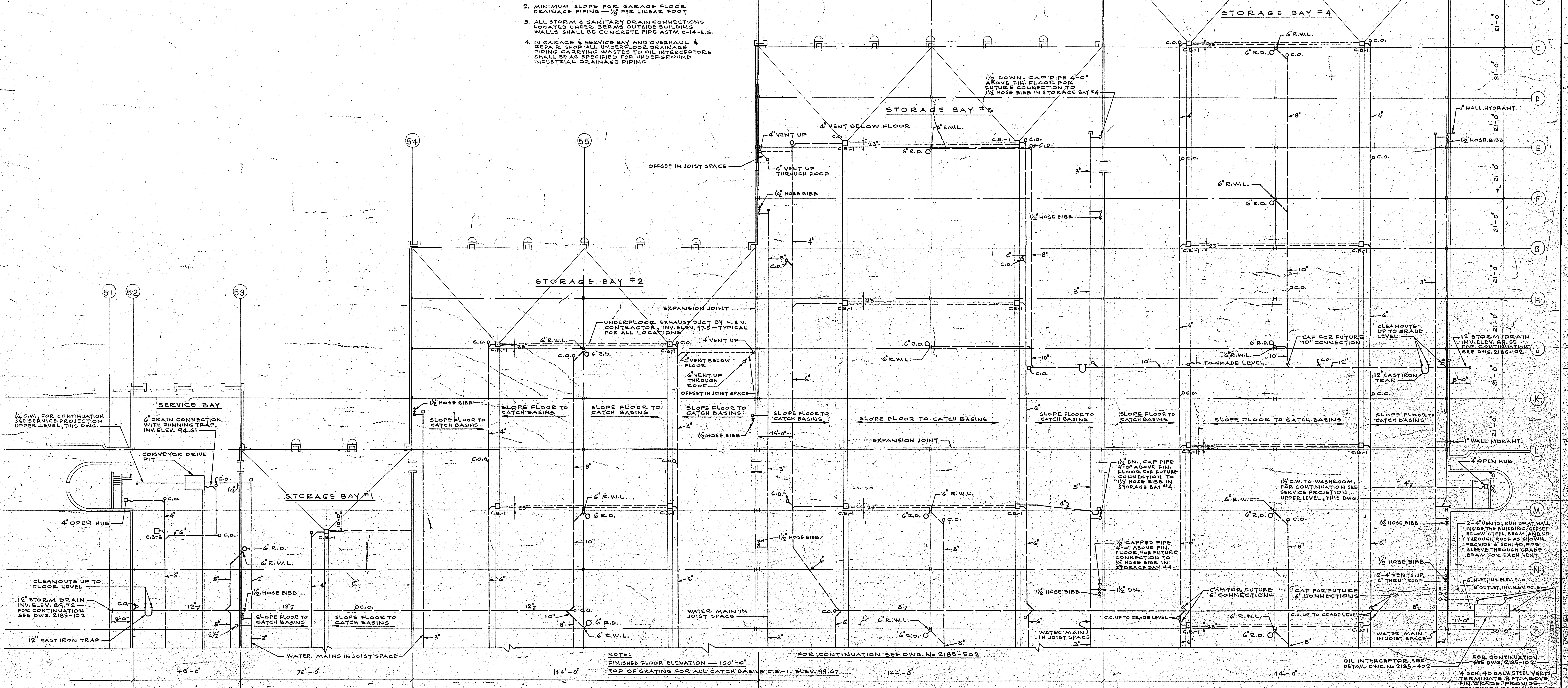
LEGEND

————————	SOIL, WASTE OR LEADER ABOVE GRADE
——— ———	SOIL, WASTE OR LEADER BELOW GRADE
——— - ———	COLD WATER
——— -- ———	HOT WATER
——— --- ———	HOT WATER RECIRCULATING
- - - - - - - -	VENT
——— G ———	GAS
—⋈—	GATE VALVE
—N—	CHECK VALVE

NOTES:

1. MINIMUM SLOPE FOR UNDERFLOOR STORM DRAINAGE PIPING — 1/4" PER LINEAR FOOT
2. MINIMUM SLOPE FOR GARAGE FLOOR DRAINAGE PIPING — 1/8" PER LINEAR FOOT
3. ALL STORM & SANITARY DRAIN CONNECTIONS LOCATED UNDER BERMS OUTSIDE BUILDING WALLS SHALL BE CONCRETE PIPE ASTM C-14-E.S.
4. IN GARAGE & SERVICE BAY AND OVERHAUL & REPAIR SHOP ALL UNDERFLOOR DRAINAGE PIPING CARRYING WASTES TO OIL INTERCEPTORS SHALL BE AS SPECIFIED FOR UNDERGROUND INDUSTRIAL DRAINAGE PIPING

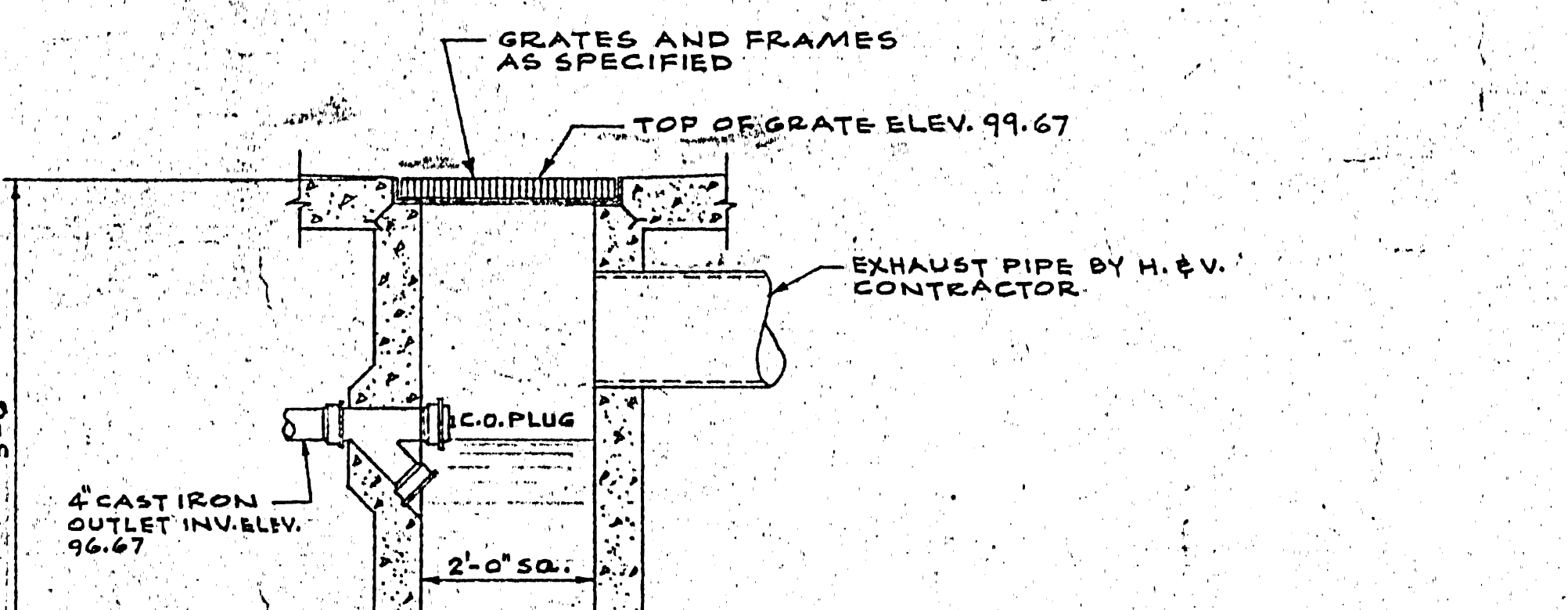
STORAGE BAYS BETWEEN COL'S. 59 & 61 NOT IN CONTRACT
SEE SPECIFICATION



NOTE:
FINISHED FLOOR ELEVATION — 100'-0"
TOP OF GRATING FOR ALL CATCH BASINS C.B.-1, ELEV. 99.67

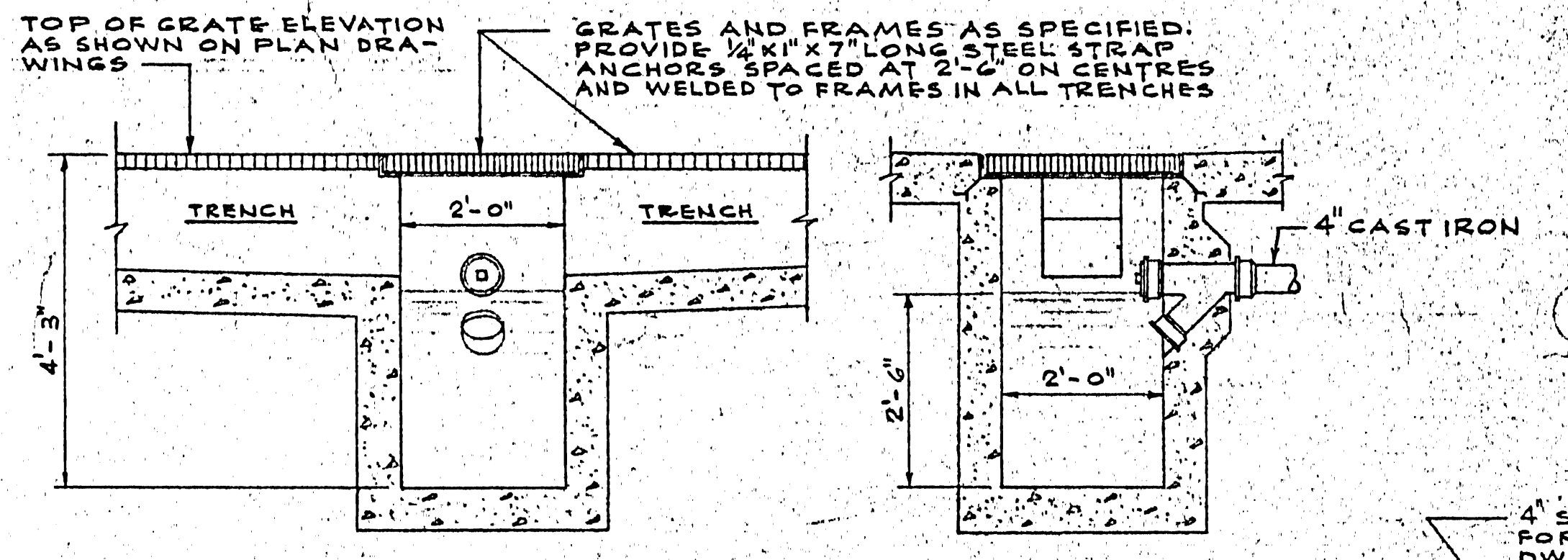
GARAGE PLAN

SCALE 1/16"=1'-0"



TYPICAL SECTION FOR CATCH BASIN C.B.-1

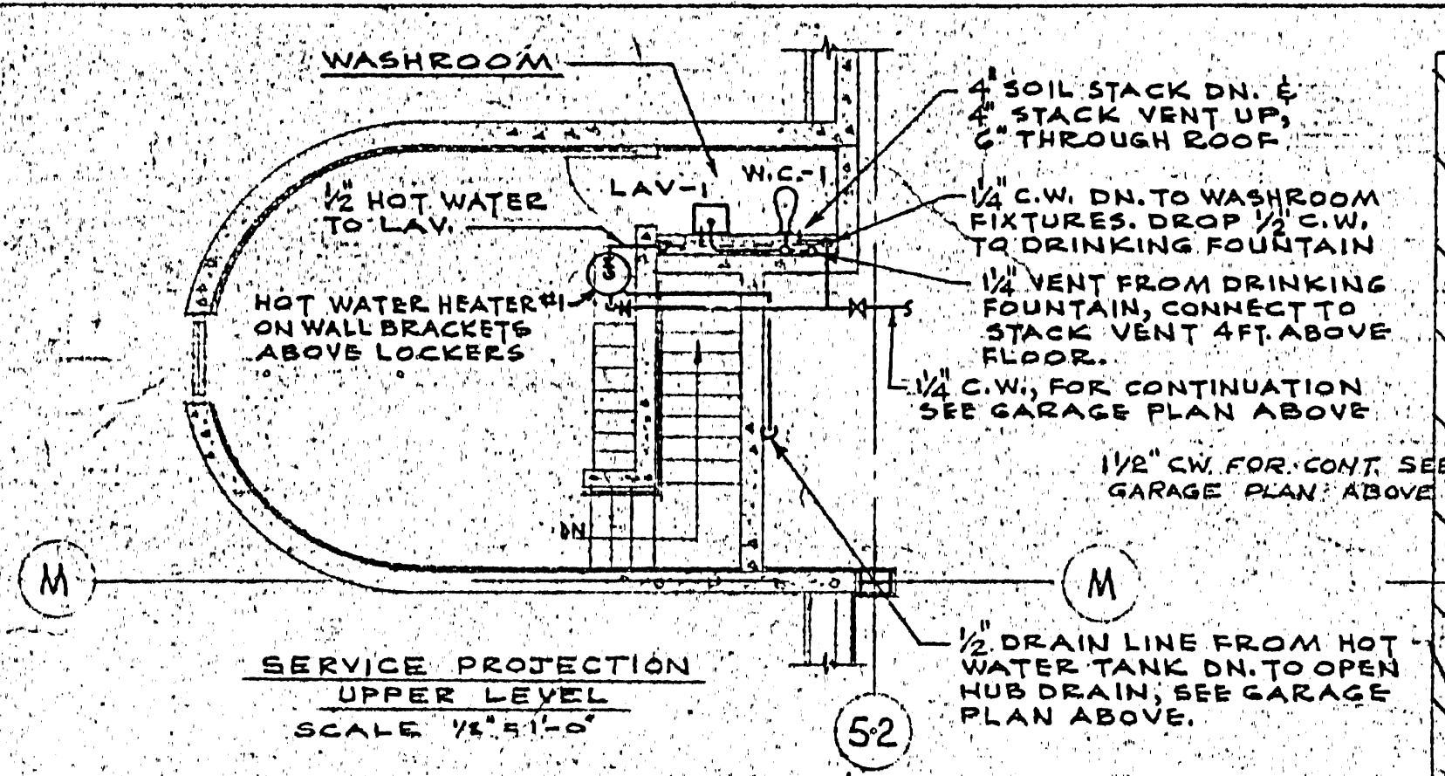
SCALE 1/2"=1'-0"



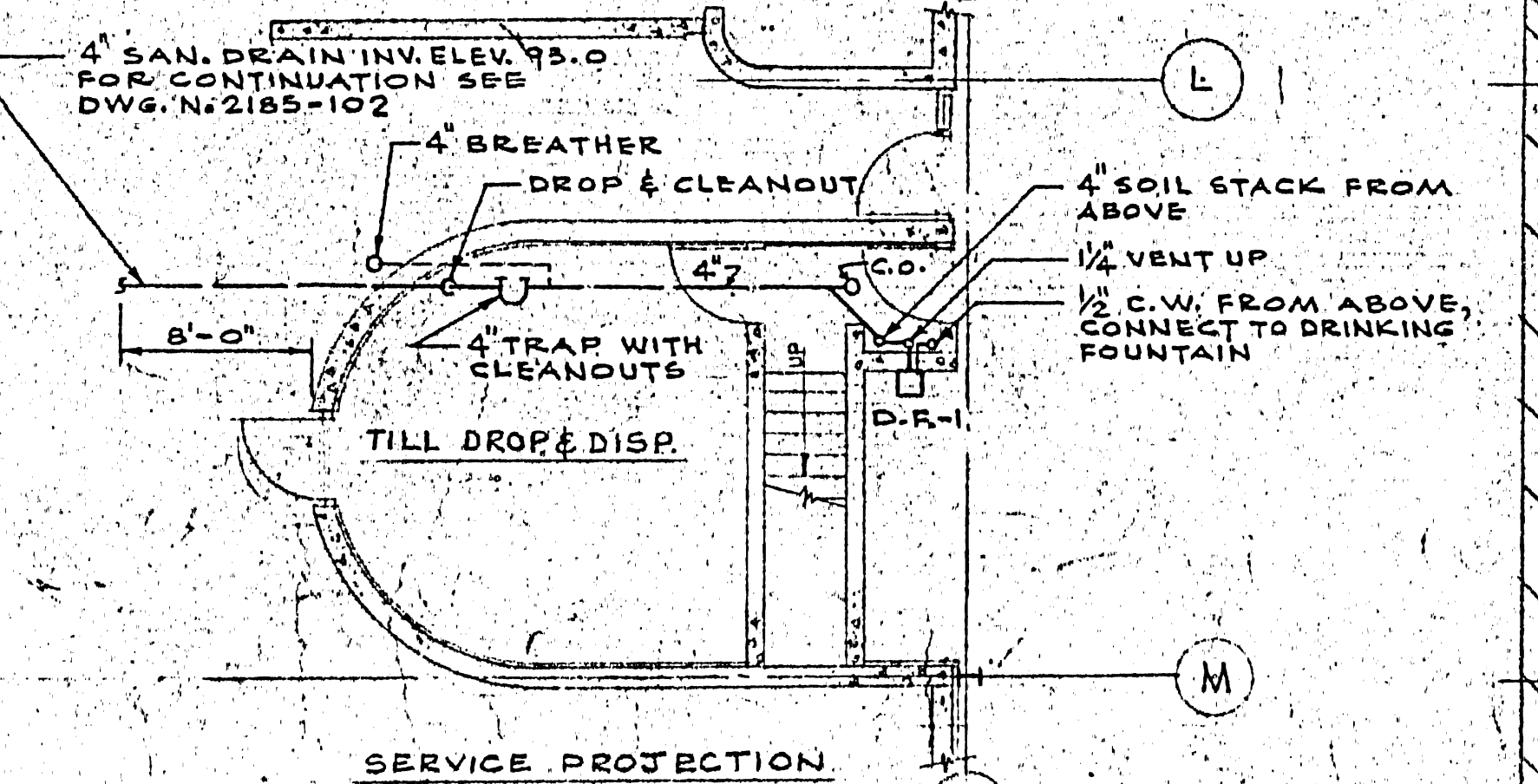
TYPICAL SECTIONS FOR CATCH BASIN C.B-2

SCALE 1/2"=1'-0"

NOTE:
CATCH BASIN C.B.-3 IS SIMILAR BUT WITHOUT TRENCH CONNECTION

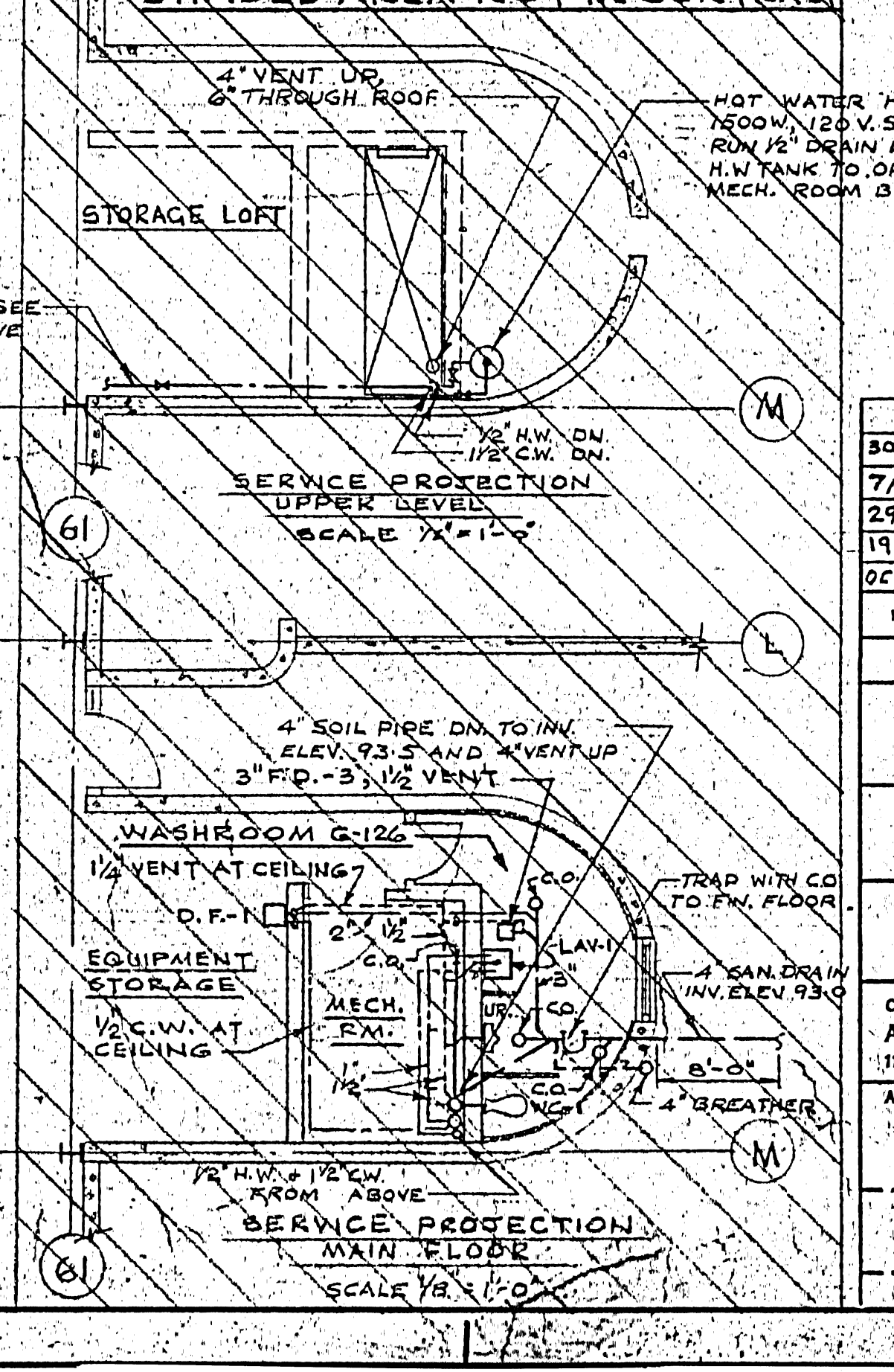


SERVICE PROJECTION
UPPER LEVEL
SCALE 1/8"=1'-0"



SERVICE PROJECTION
MAIN FLOOR

SHADED AREA NOT IN CONTRACT



2185 – 401

J. T. F. THORPE

LICENSED TO PRACTICE
IN THE
PROVINCE OF MANITOBA
My Licence Expires: 10 Jan, 1968

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
30.9.69		2	AS BUILT	J.L.
7/6/68	4	1	REVISED PER PROPOSED NOTICE OF CHANGE # 17	J.L.
29/3/68	3		FOR CONSTRUCTION	
19/1/68	2		FOR TENDER	
OCT.20/67	1		FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

GARAGE & SERVICE BAY
PLUMBING & DRAINAGE – PLAN & DETAILS

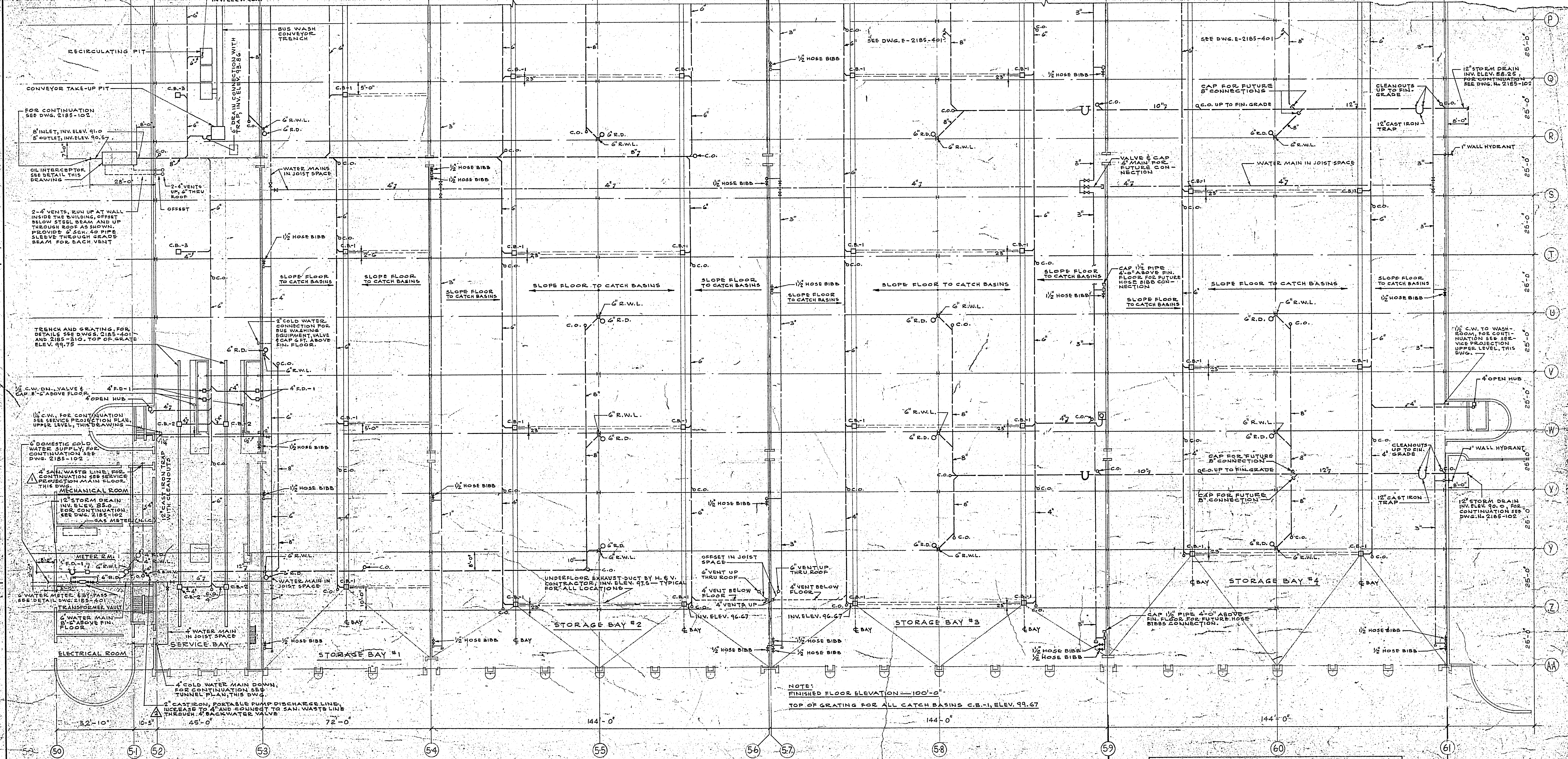
CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY J. L.
CHECKED J.T.T.
FILE No.
SHEET No.
DATE AUGUST '67
SCALE AS SHOWN
DRAWING No. 2185-401
MECHANICAL

421 OSBORNE ST.
address
TRANSIT STORAGE & SHOP FACILITIES
project no. 2185-402 sheet no.
GARAGE & SERVICE BAY - PLUMBING & DRAINAGE - PLANS & DETAILS
description

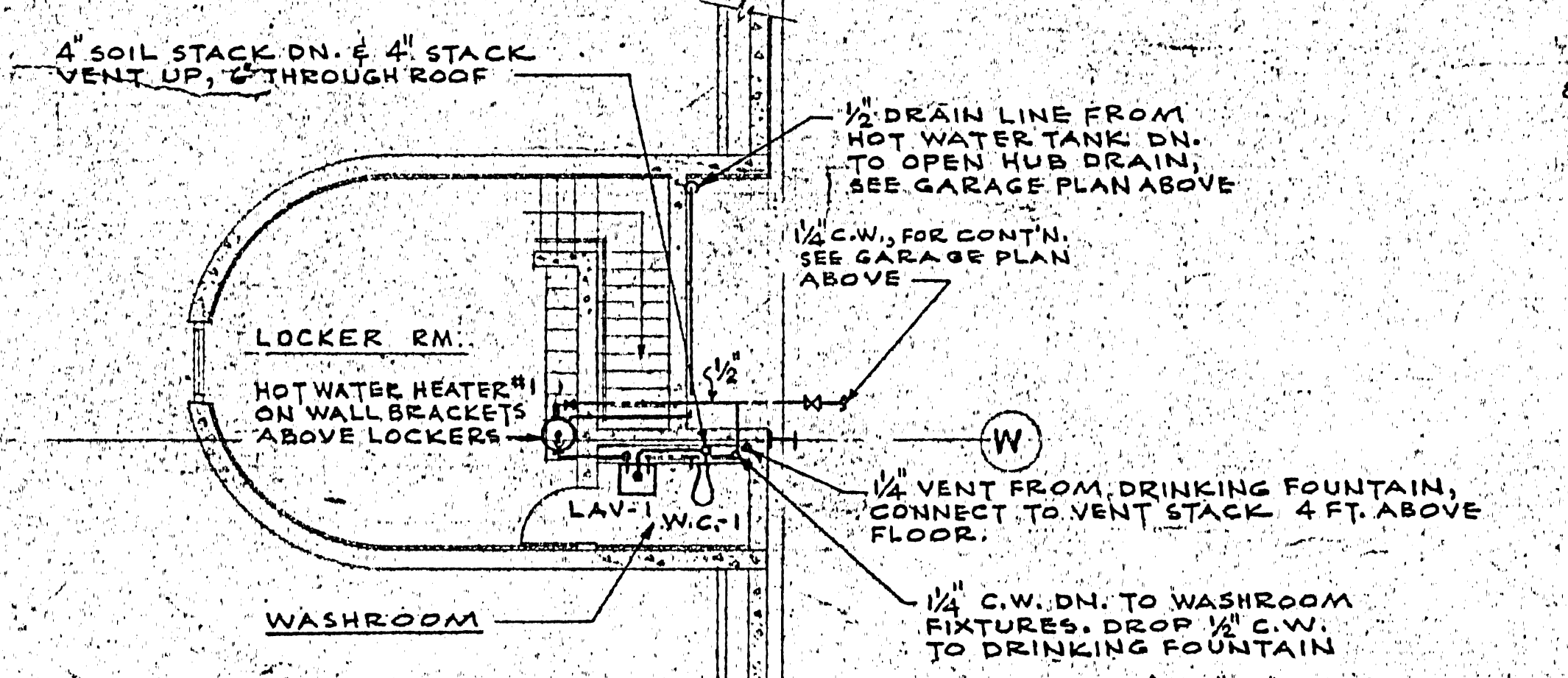


NOTE:
FINISHED FLOOR ELEVATION — 100'-0"
TOP OF GRATING FOR ALL CATCH BASINS C.B.-1, ELEV. 99.67

STORAGE BAYS BETWEEN COLS. 59 & 61 NOT IN CONTRACT
SEE SPECIFICATION

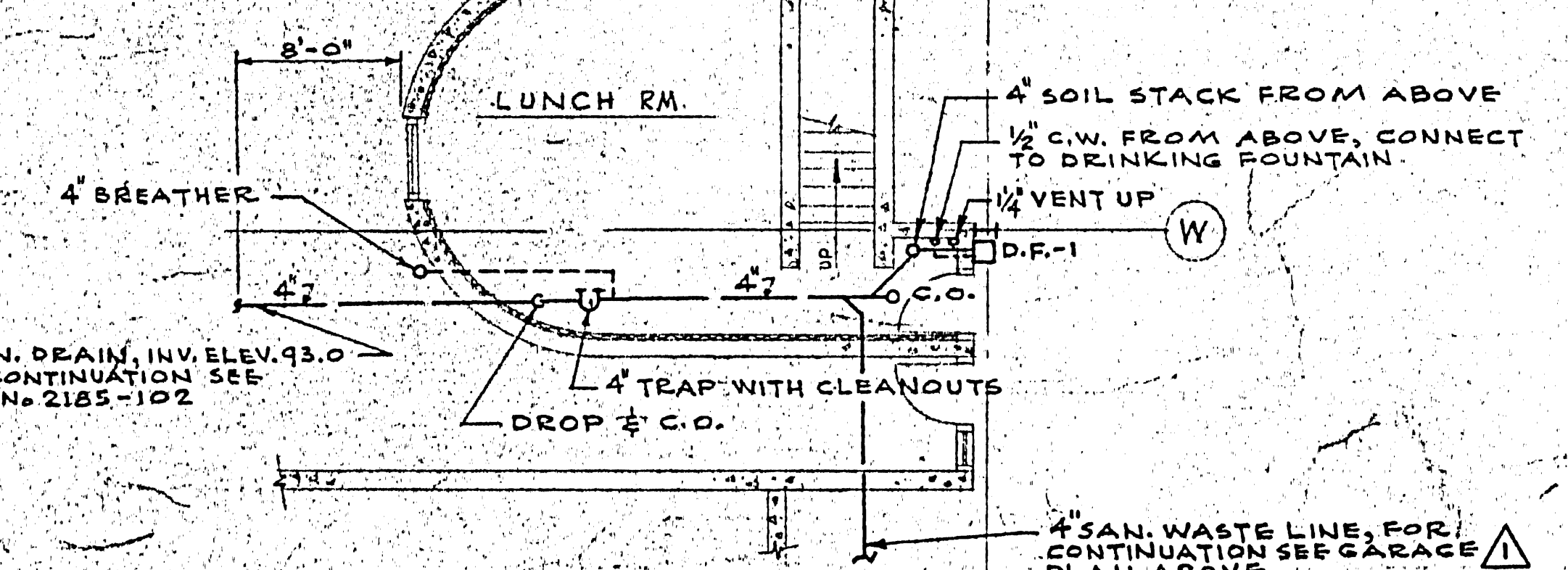
GARAGE PLAN

SCALE 1/16" = 1'-0"



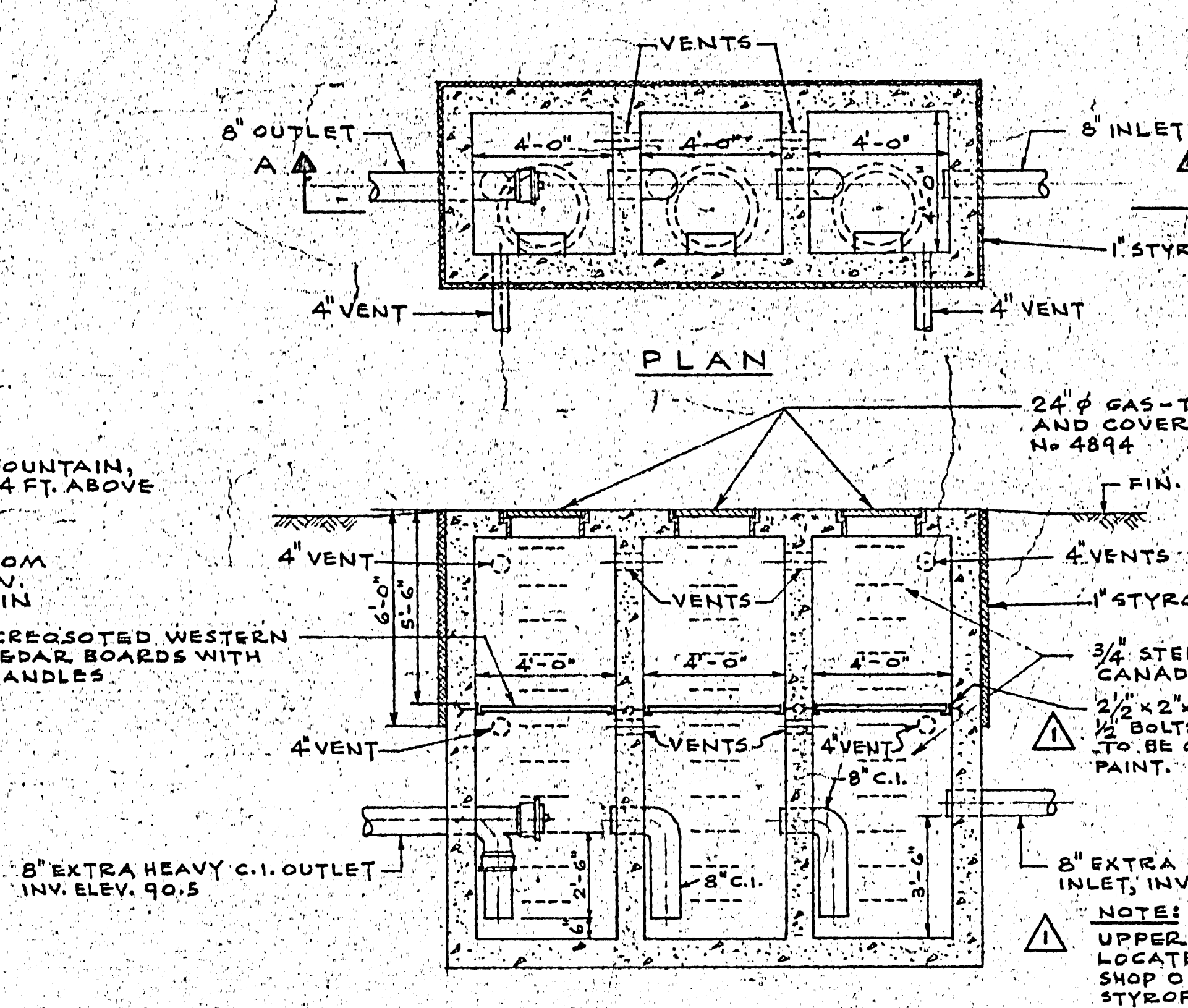
SERVICE PROJECTION
UPPER LEVEL
SCALE 1/8" = 1'-0"

52



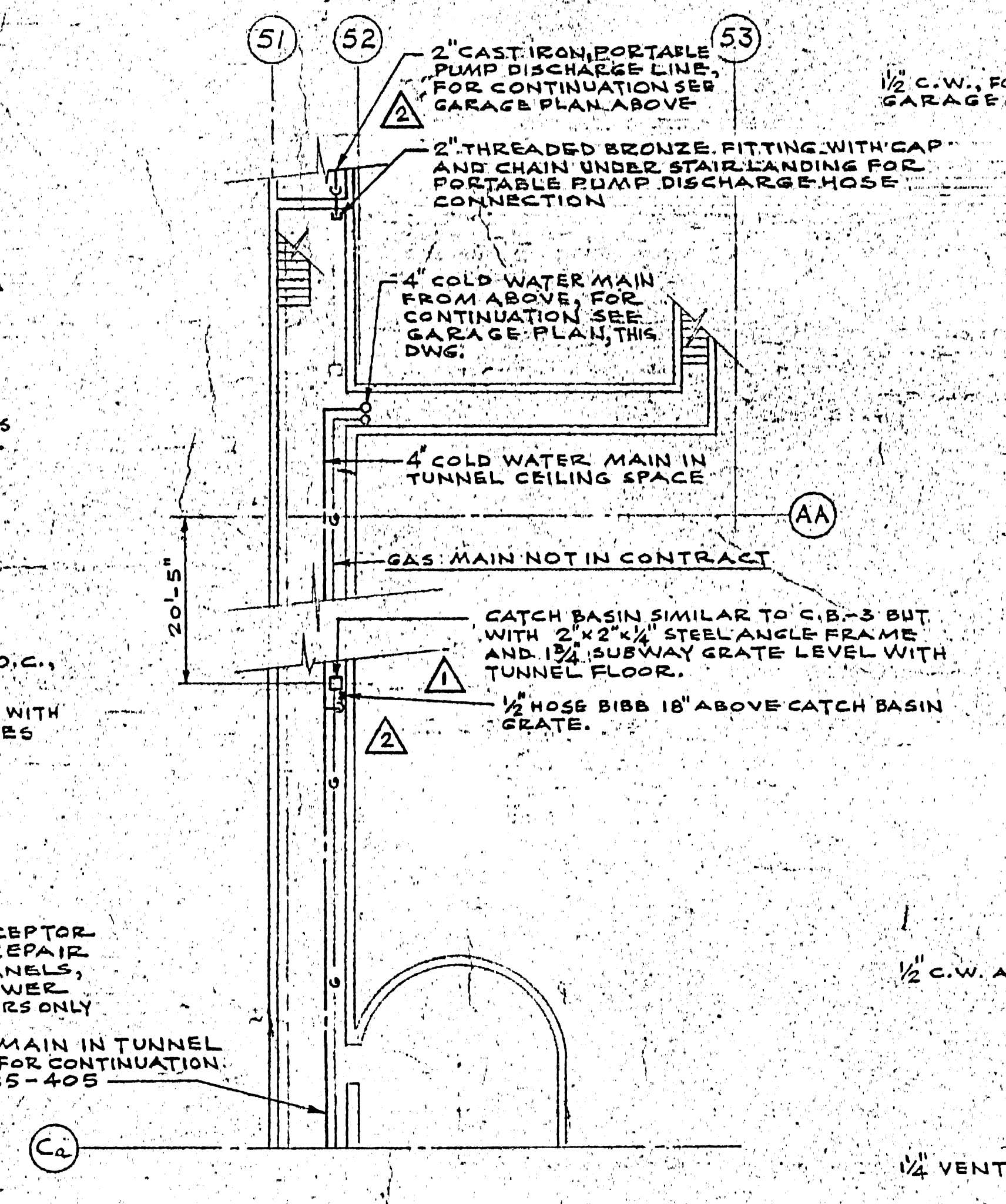
SERVICE PROJECTION
MAIN FLOOR
SCALE 1/8" = 1'-0"

52



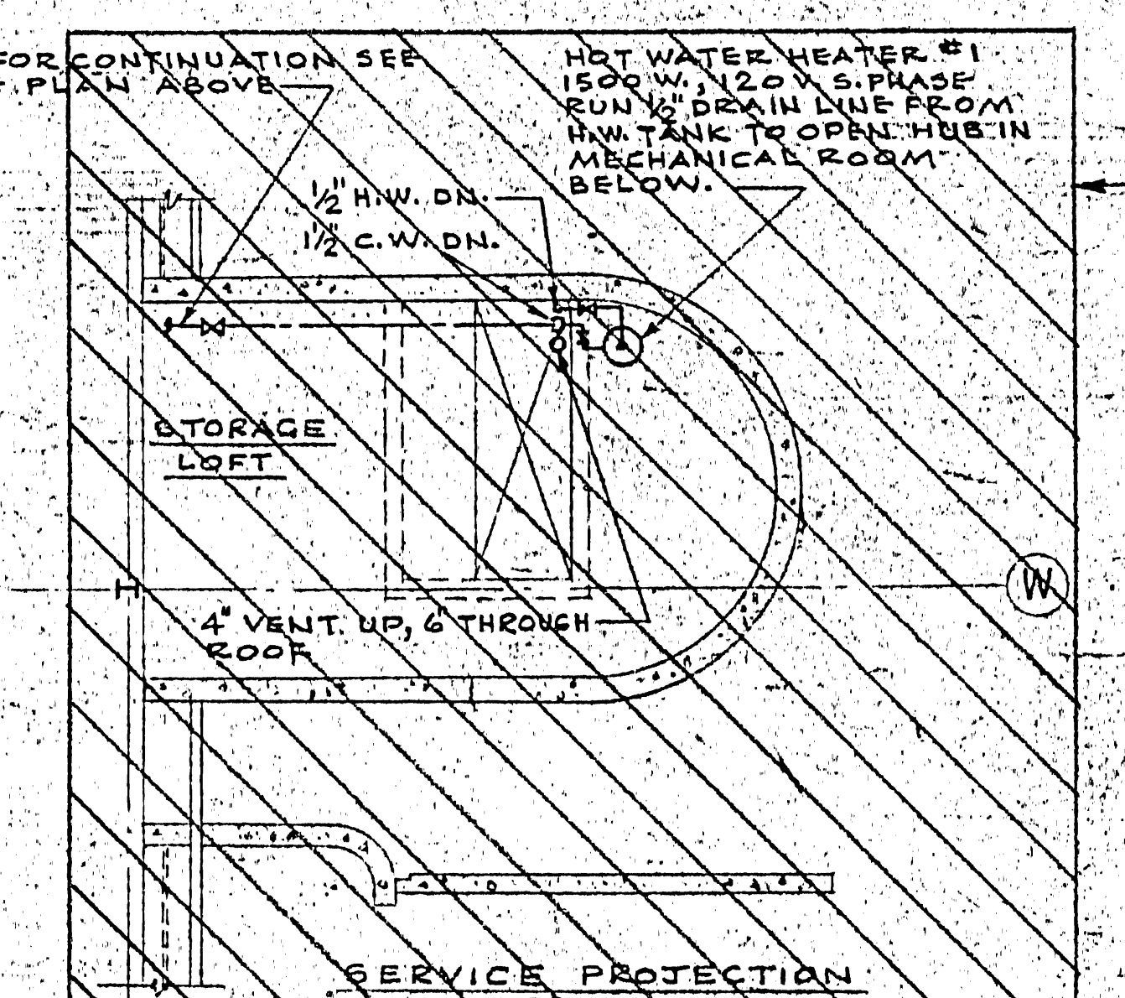
NOTE:
UPPER VENTS FOR OIL INTERCEPTOR LOCATED INSIDE OVERHAUL & REPAIR SHOP ONLY, CREOSOTED WOOD PANELS, STYROFOAM INSULATION AND LOWER VENTS FOR OUTSIDE INTERCEPTORS ONLY

OIL INTERCEPTOR
SCALE 1/4" = 1'-0"

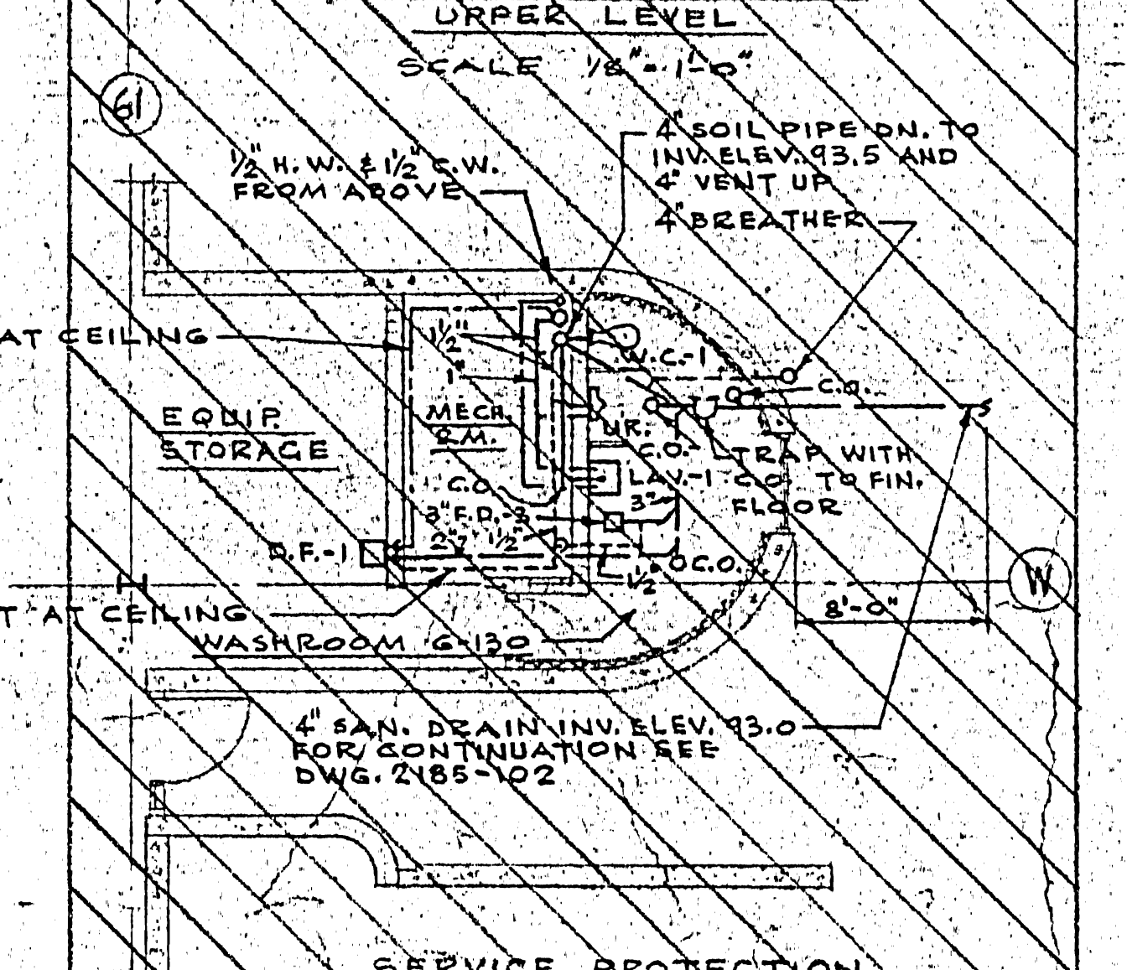


TUNNEL PLAN
SCALE 1/16" = 1'-0"

SHADED AREA NOT IN CONTRACT



SERVICE PROJECTION
UPPER LEVEL
SCALE 1/8" = 1'-0"



SERVICE PROJECTION
MAIN FLOOR
SCALE 1/8" = 1'-0"

61

2185-402

REGISTERED PROFESSIONAL ENGINEER
MECHANICAL
J. T. F. THORPE
PROVINCE OF ONTARIO

LICENSED TO PRACTICE
IN THE
PROVINCE OF MANITOBA
My Licence Expires: 10 Jan. 1963

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
20.9.69		3	AS BUILT	J.L.
7/6/68	5	△2	REVISED PER PROPOSED NOTICE OF CHANGE # 17	J.L.
23/5/68	4	△1	REVISED PER PROPOSED NOTICE OF CHANGE # 12	J.L.
29/3/68	3		FOR CONSTRUCTION	
19/1/68	2		FOR TENDER	
OCT. 20/67	1		FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

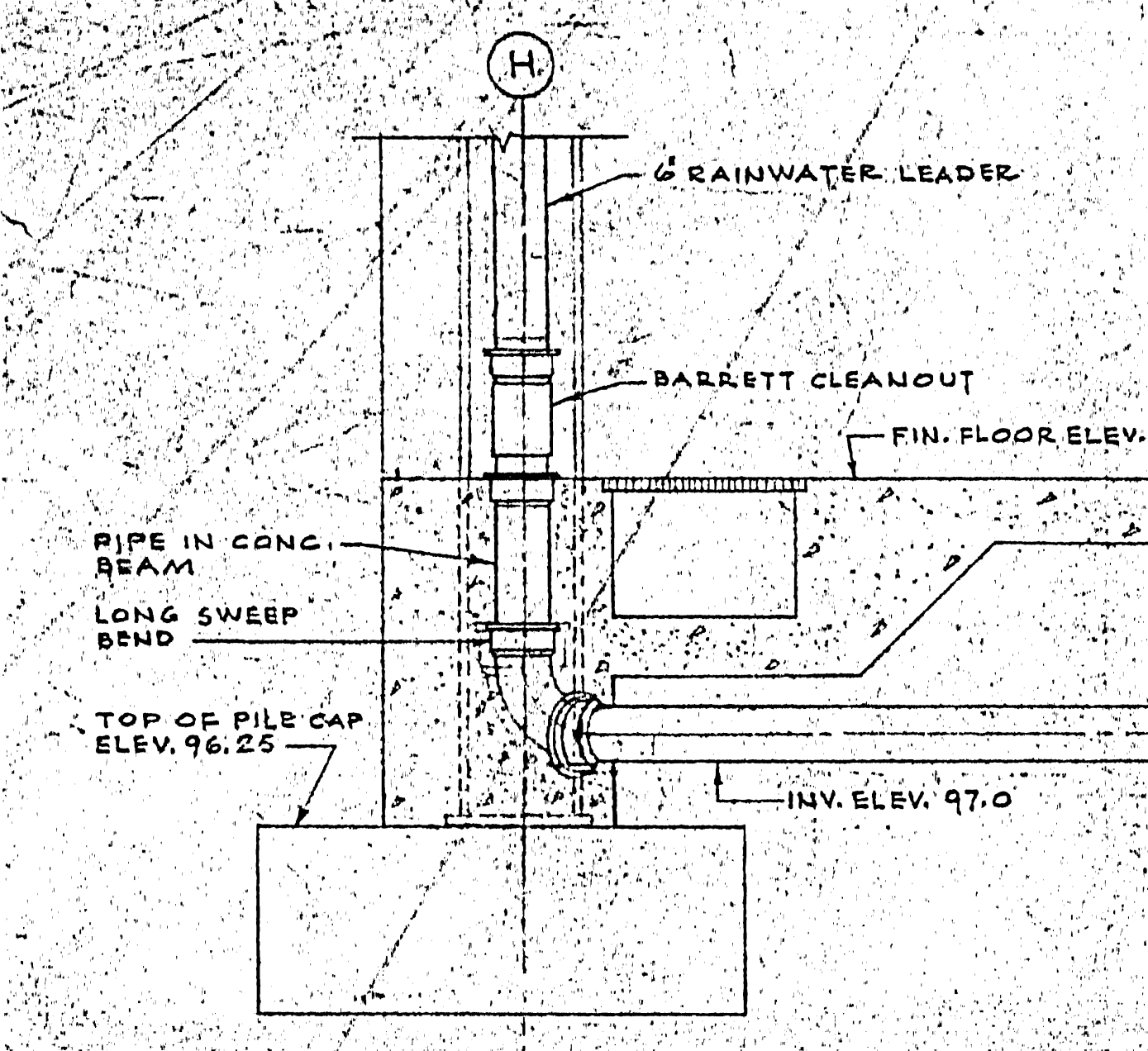
TRANSIT STORAGE AND SHOP FACILITIES

GARAGE & SERVICE BAY
PLUMBING & DRAINAGE - PLAN & DETAILS

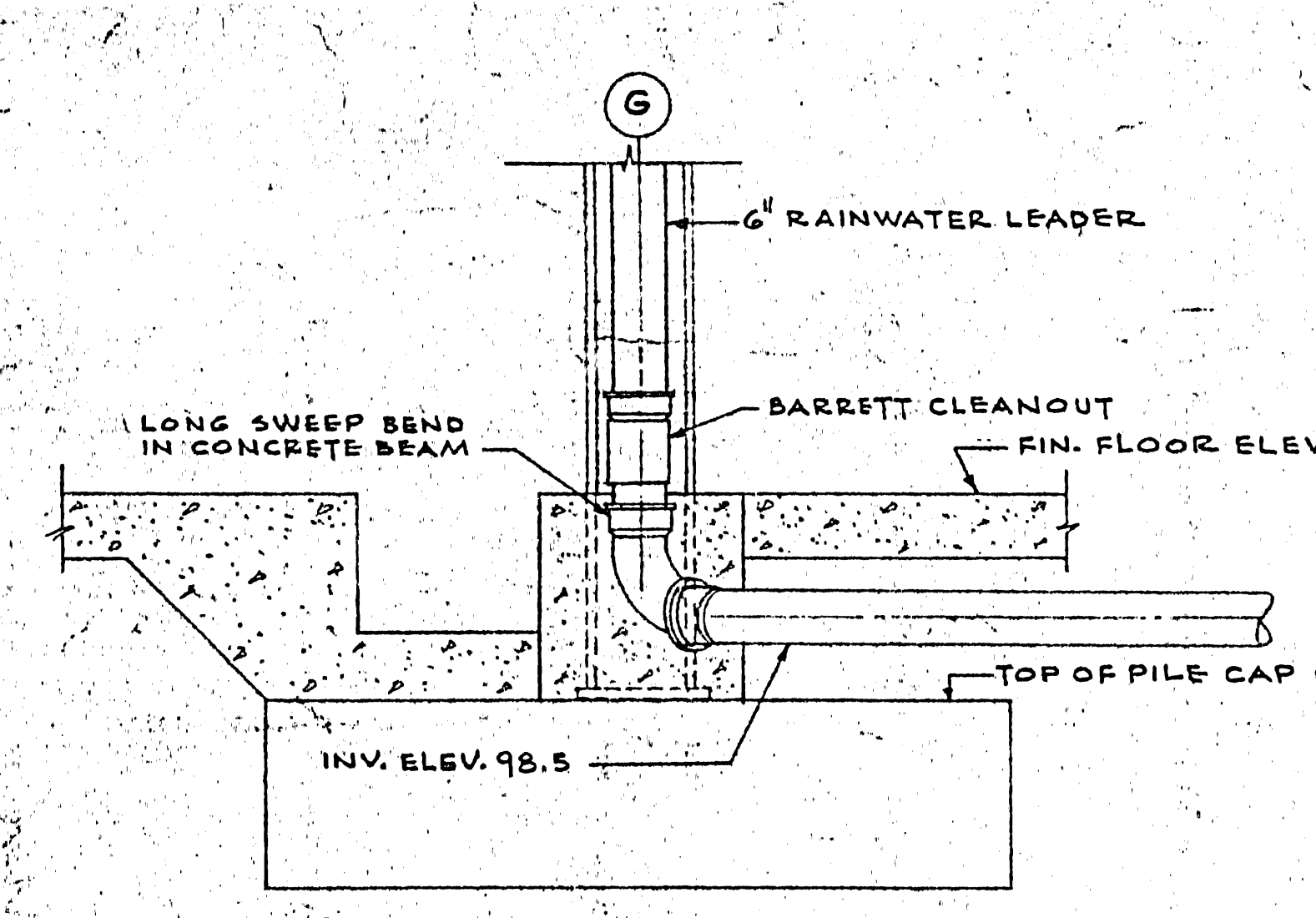
CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT
DRAWN BY J. L.
CHECKED J.T.T.
FILE No.
SHEET No.
DATE AUGUST 67
SCALE AS SHOWN
DRAWING No. 2185-402
MECHANICAL



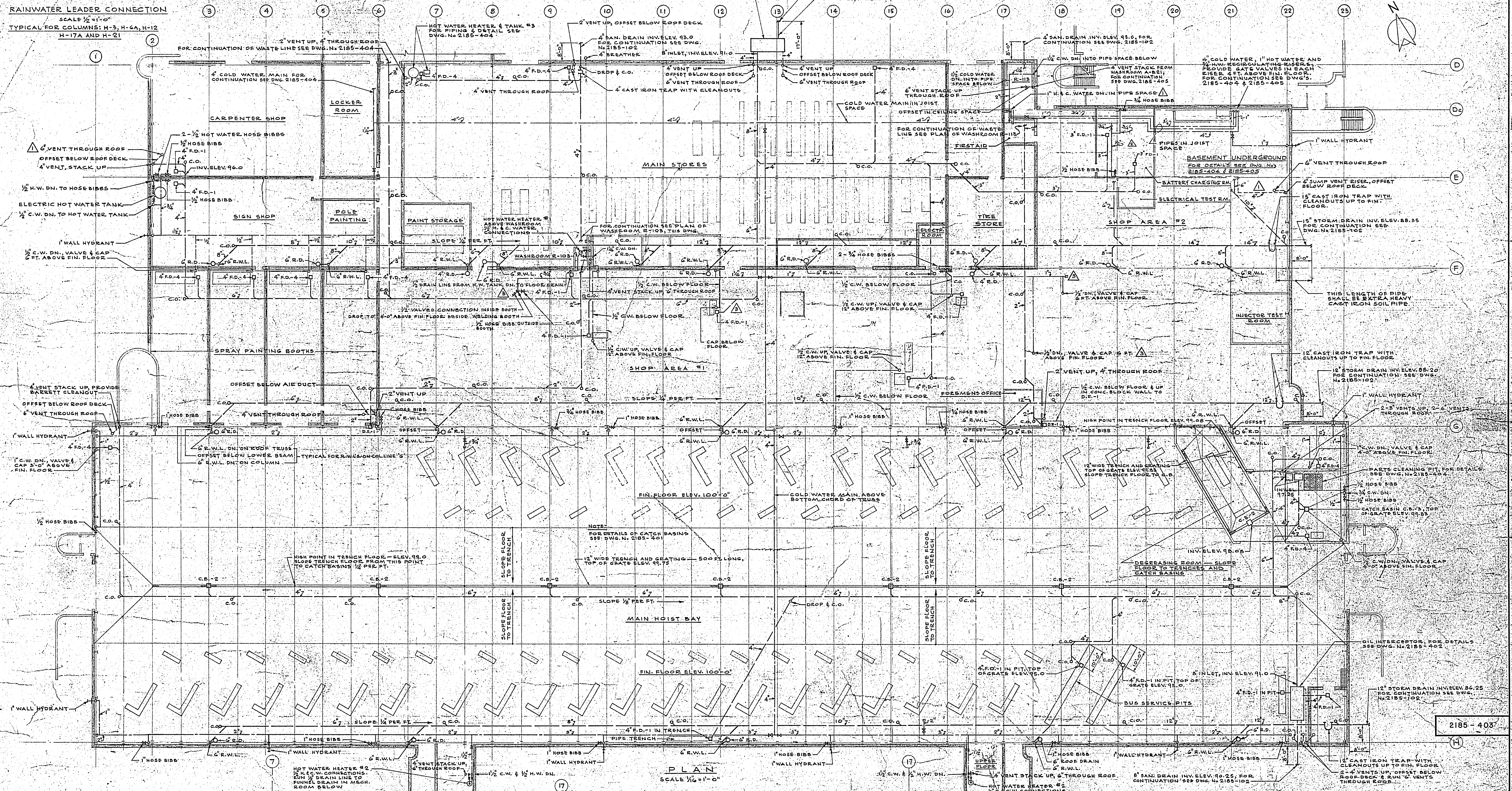
RAINWATER LEADER CONNECTION
SCALE 1/2"=1'-0"
TYPICAL FOR COLUMNS: H-3, H-6A, H-12
H-17A AND H-21



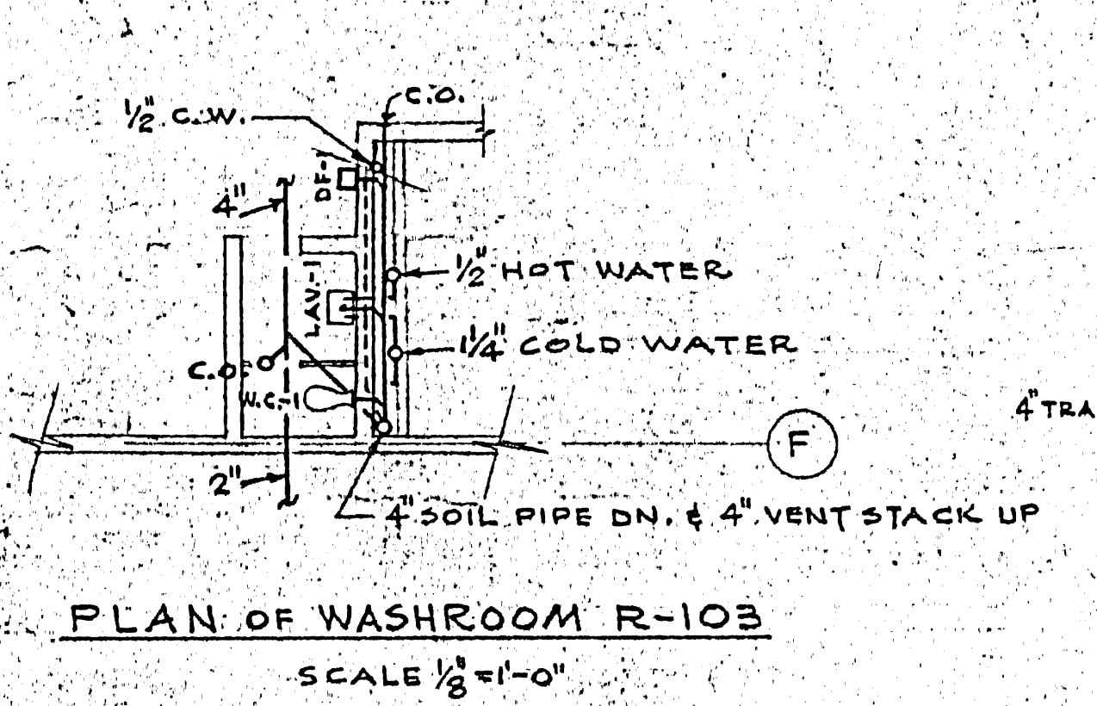
RAINWATER LEADER CONNECTION
SCALE 1/2"=1'-0"
TYPICAL FOR COLUMNS: G-3, G-7, G-12, G-17 AND G-21

ELECTRIC HOT WATER TANK (1 REQUIRED) △3
SUPPLY AND INSTALL FACTORY INSULATED COPPER ELECTRIC HOT WATER TANK RUUD MODEL CE 52, 40 IMP. GAL. CAPACITY, COMPLETE WITH TWO (2) 3000 WATTS, 208 V., SINGLE PHASE ELEMENTS, CONTROL THERMOSTATS AND TEMPERATURE AND PRESSURE RELIEF VALVE. PROVIDE DRAIN LINE FROM RELIEF VALVE, TERMINATE 6" ABOVE FIN. FLOOR.

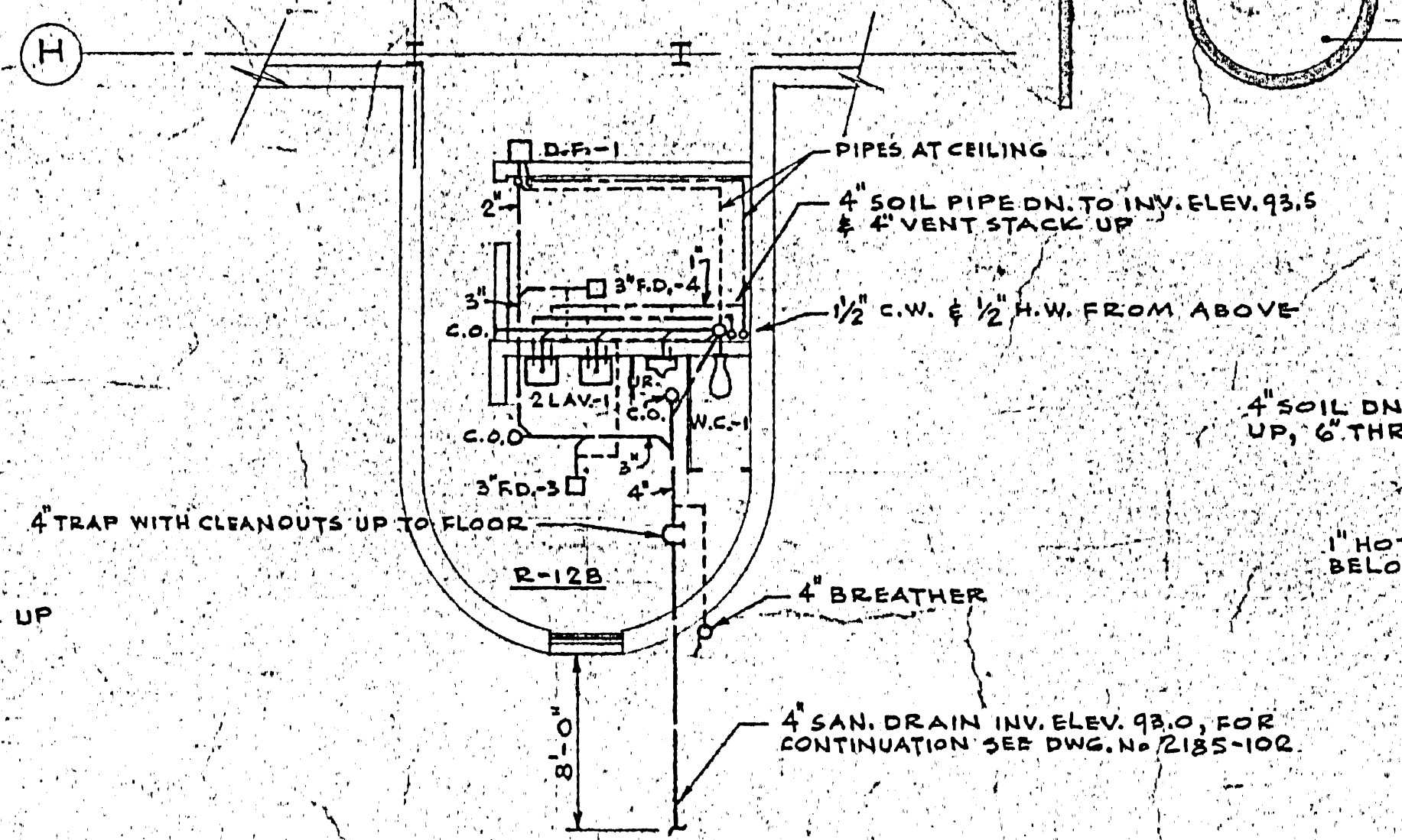
NOTE:
LOCATE WALL HYDRANTS 12" ABOVE FIN. GRADE OR 12" ABOVE TOP OF BERM WHERE APPLICABLE



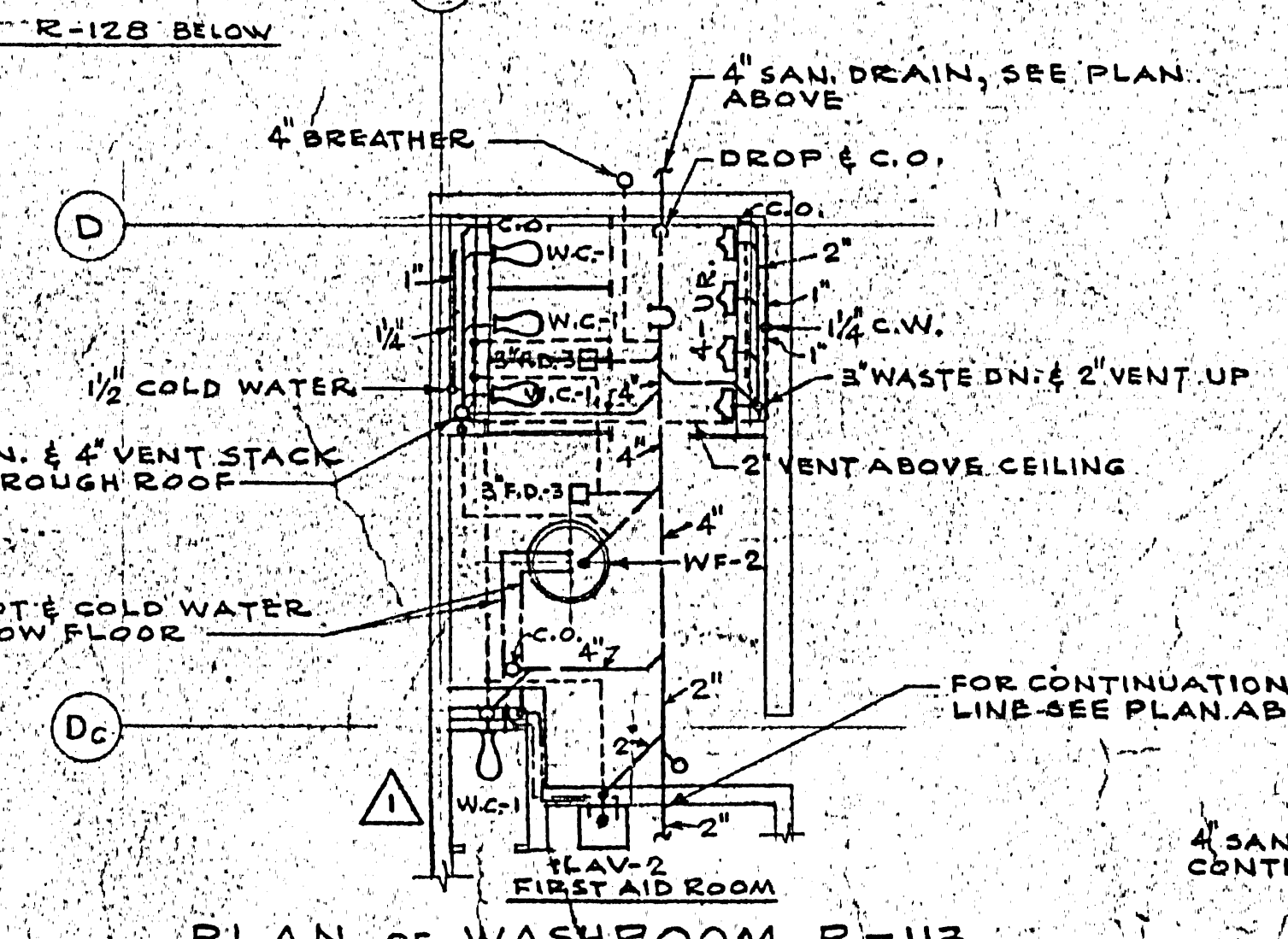
PLAN
SCALE 1/16"=1'-0"



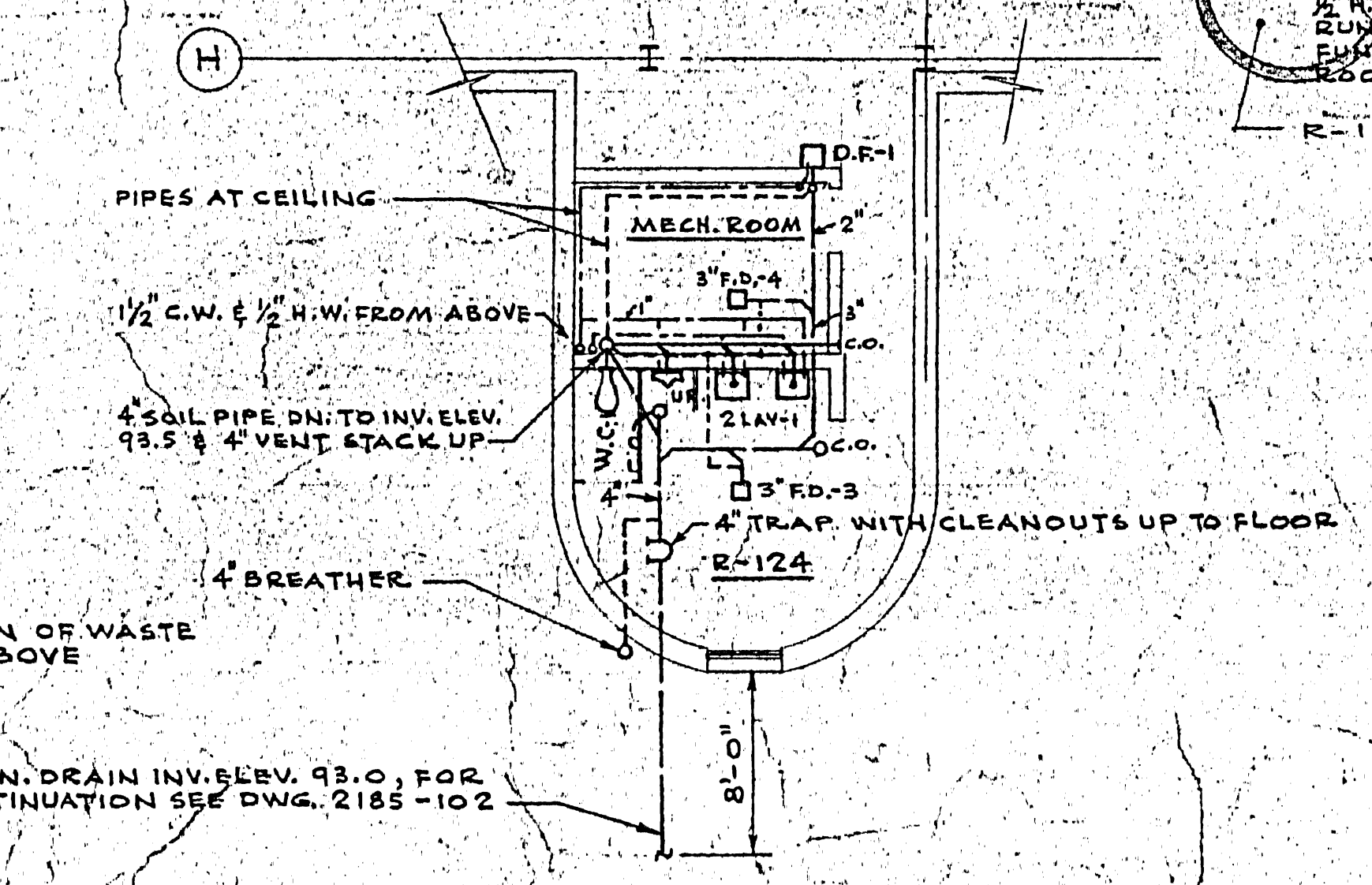
PLAN OF WASHROOM R-103
SCALE 1/8"=1'-0"
NOTE: FOR CONTINUATION OF SERVICE PIPING SEE PLAN ABOVE



PLAN OF WASHROOM R-128
SCALE 1/8"=1'-0"



PLAN OF WASHROOM R-113
SCALE 1/8"=1'-0"
NOTE: FOR CONTINUATION OF HOT & COLD WATER PIPING SEE PLAN ABOVE



PLAN OF WASHROOM R-124
SCALE 1/8"=1'-0"

2185 - 403

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
30.9/69		4	AS BUILT	J.L.
5/8/69	6	3	ONE (1) ELECTRIC HOT WATER TANK DELETED, FOUR (4) - 1/2 VALVED COLD WATER CONNECTIONS ADDED.	J.L.
4/2/69	5	2	BATTERY CHARGING ROOM ENLARGED	IFE
4/6/68	4	1	REVISED PER PROPOSED NOTICE OF CHANGE #21	J.L.
29/3/68	3		REVISED PER ADDENDUM No 2 & 3 - FOR CONSTRUCTION	J.L.
19/1/68	2		FOR TENDER	
OCT.20/67	1		FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES
OVERHAUL & REPAIR SHOP
PLUMBING & DRAINAGE - PLAN & DETAILS

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

MECHANICAL
J. T. F. THORPE

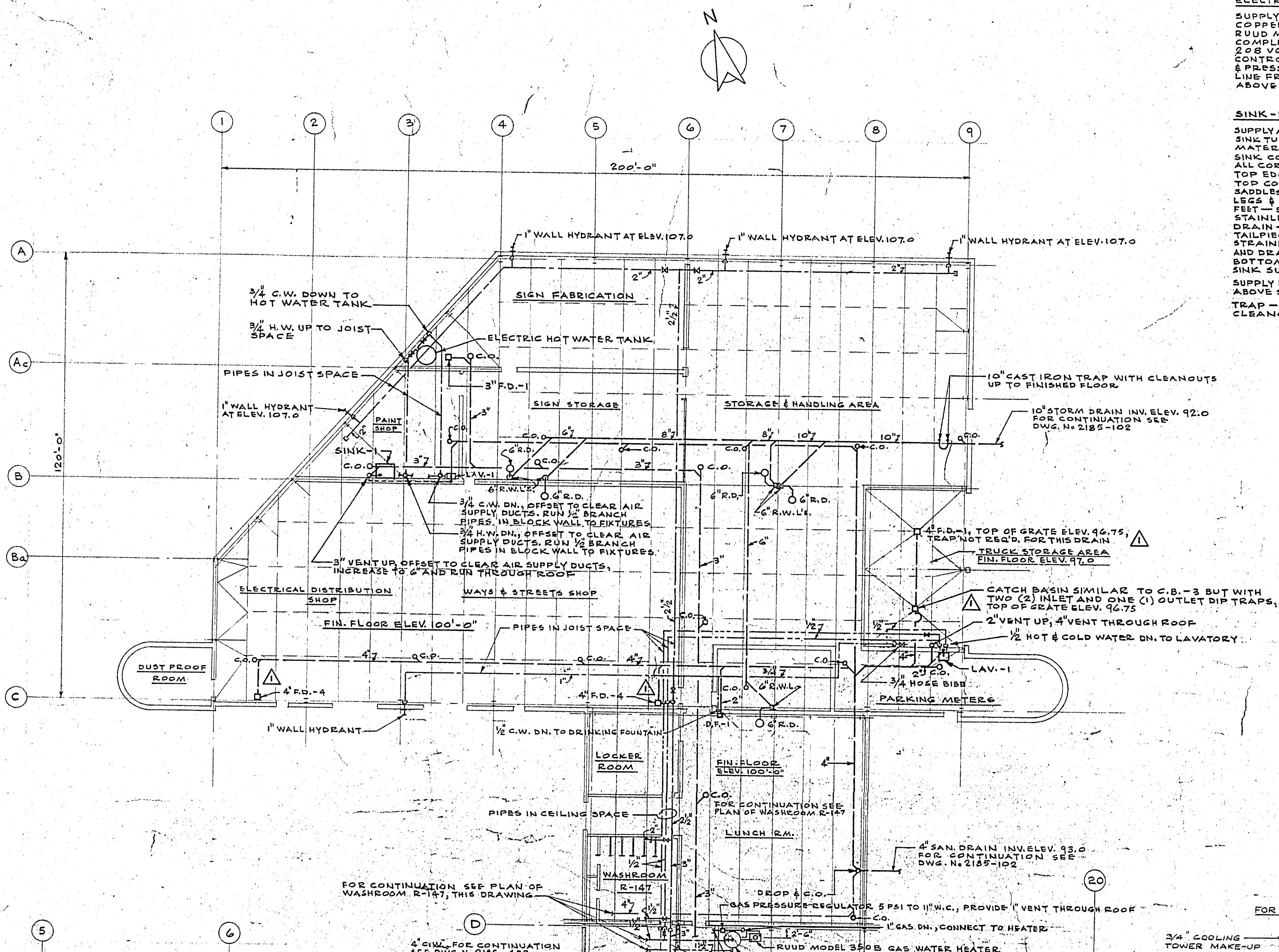
LICENSED TO PRACTICE
IN THE
PROVINCE OF MANITOBA
My Licence Expires: 10 Jan. 1968

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY J. L.
CHECKED J.T.T.
FILE No.
SHEET No.
DATE AUGUST '67
SCALE AS SHOWN
DRAWING No. 2185-403
MECHANICAL

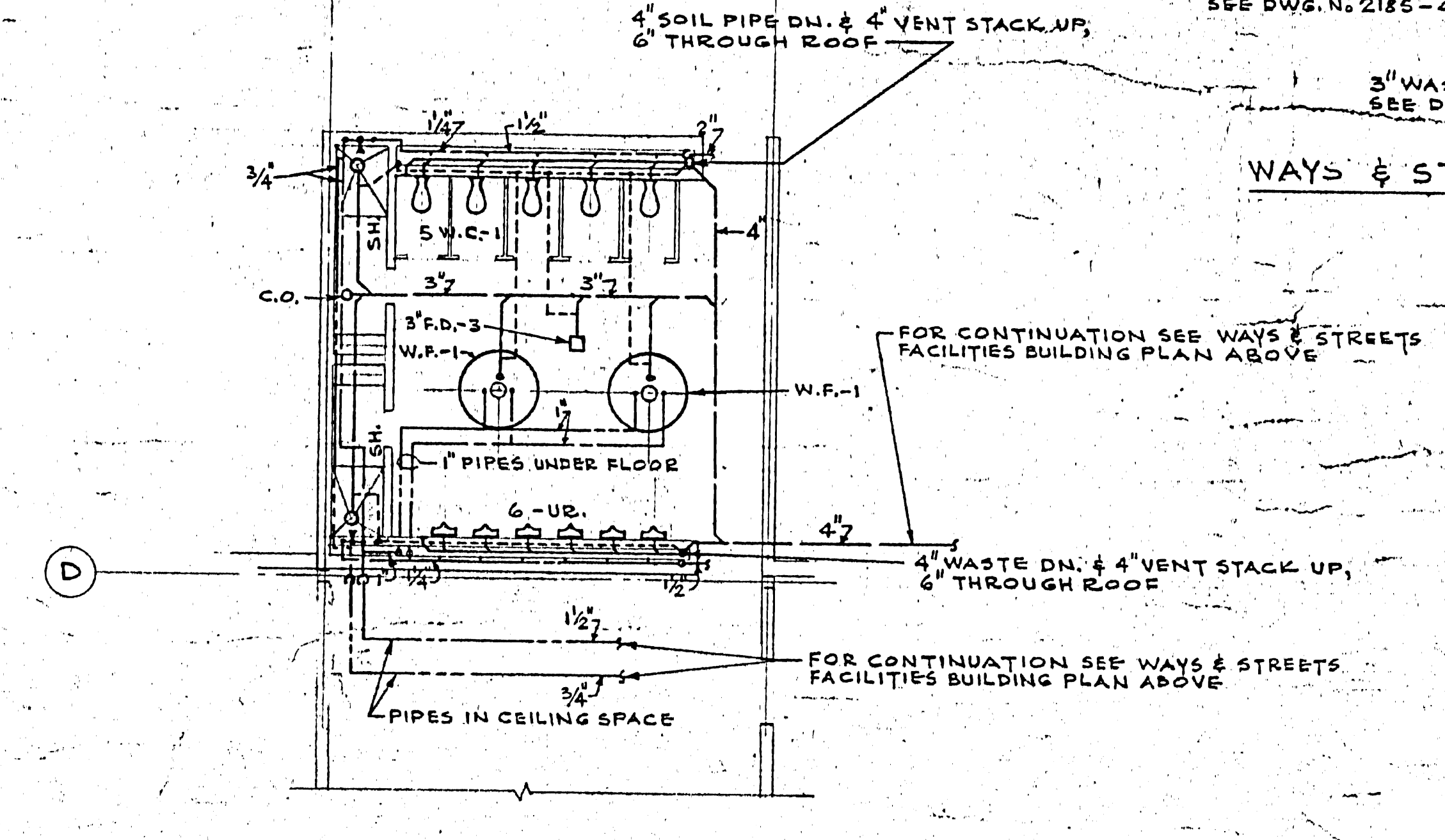
421 OSBORNE ST.
address
TRANSIT STORAGE & SHOP FACILITIES
project no.
2185-403
sheet no.
OVERHAUL & REPAIR SHOP - PLUMBING & DRAINAGE - PLAN & DETAILS
description

421 OSBORNE ST.
address
TRANSIT STORAGE & SHOP FACILITIES
project no.
2185-404
sheet no.
WAYS & STREETS FACILITIES BLDG - PLUMBING & DRAINAGE - PLAN & DETAILS
description



WAYS & STREETS FACILITIES BUILDING PLAN

SCALE 1/16"=1'-0"



PLAN OF WASHROOM R-147

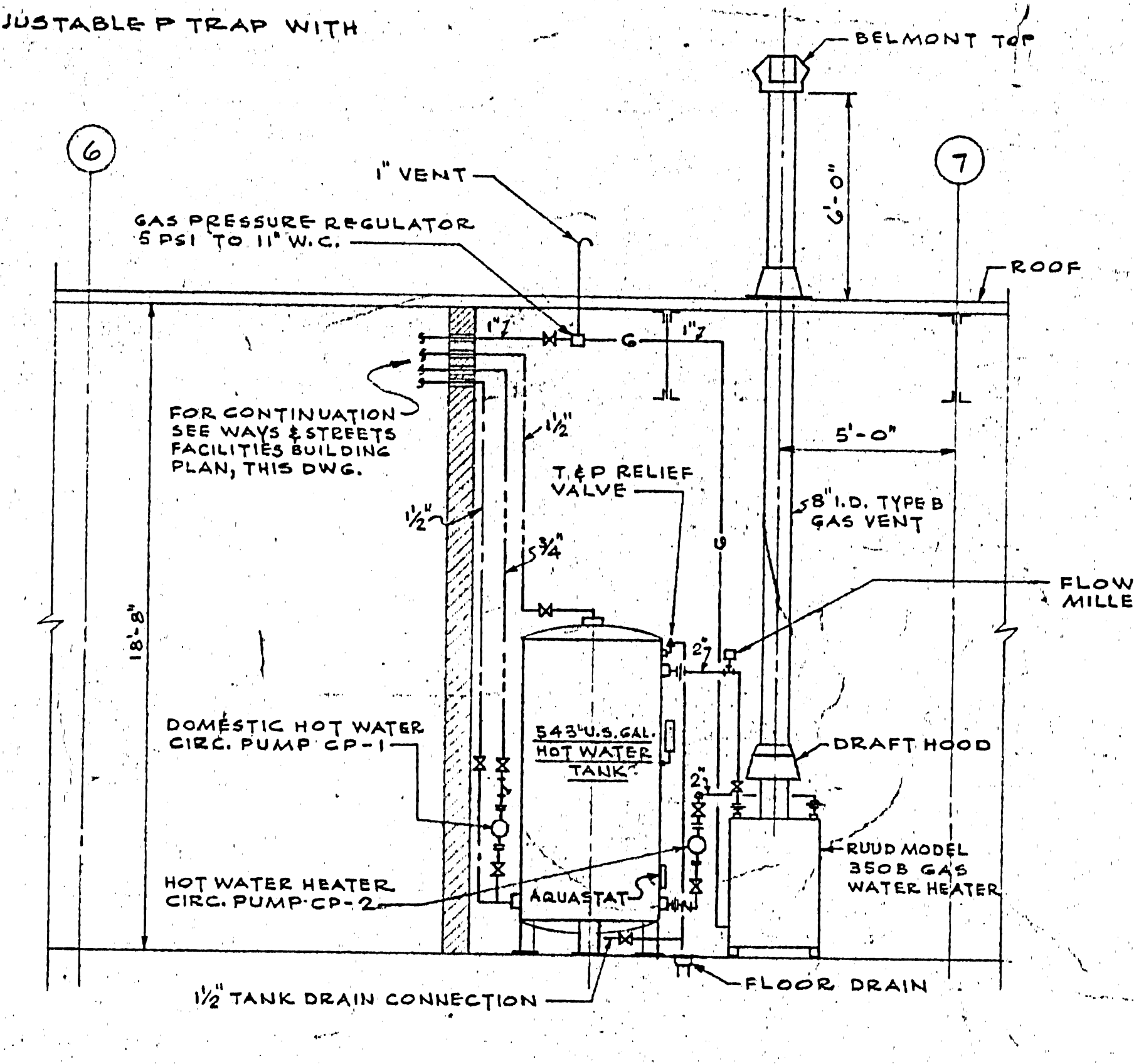
SCALE 1/8"=1'-0"

ELECTRIC HOT WATER TANK

SUPPLY AND INSTALL FACTORY INSULATED COPPER ELECTRIC HOT WATER TANK RUUD MODEL CE52, 40 IMP. GAL. CAPACITY, COMPLETE WITH TWO (2) 3000 WATTS, 208 VOLT, SINGLE PHASE ELEMENTS, CONTROL THERMOSTATS AND TEMPERATURE & PRESSURE RELIEF VALVE. PROVIDE DRAIN LINE FROM RELIEF VALVE, TERMINATE 6" ABOVE FIN. FLOOR.

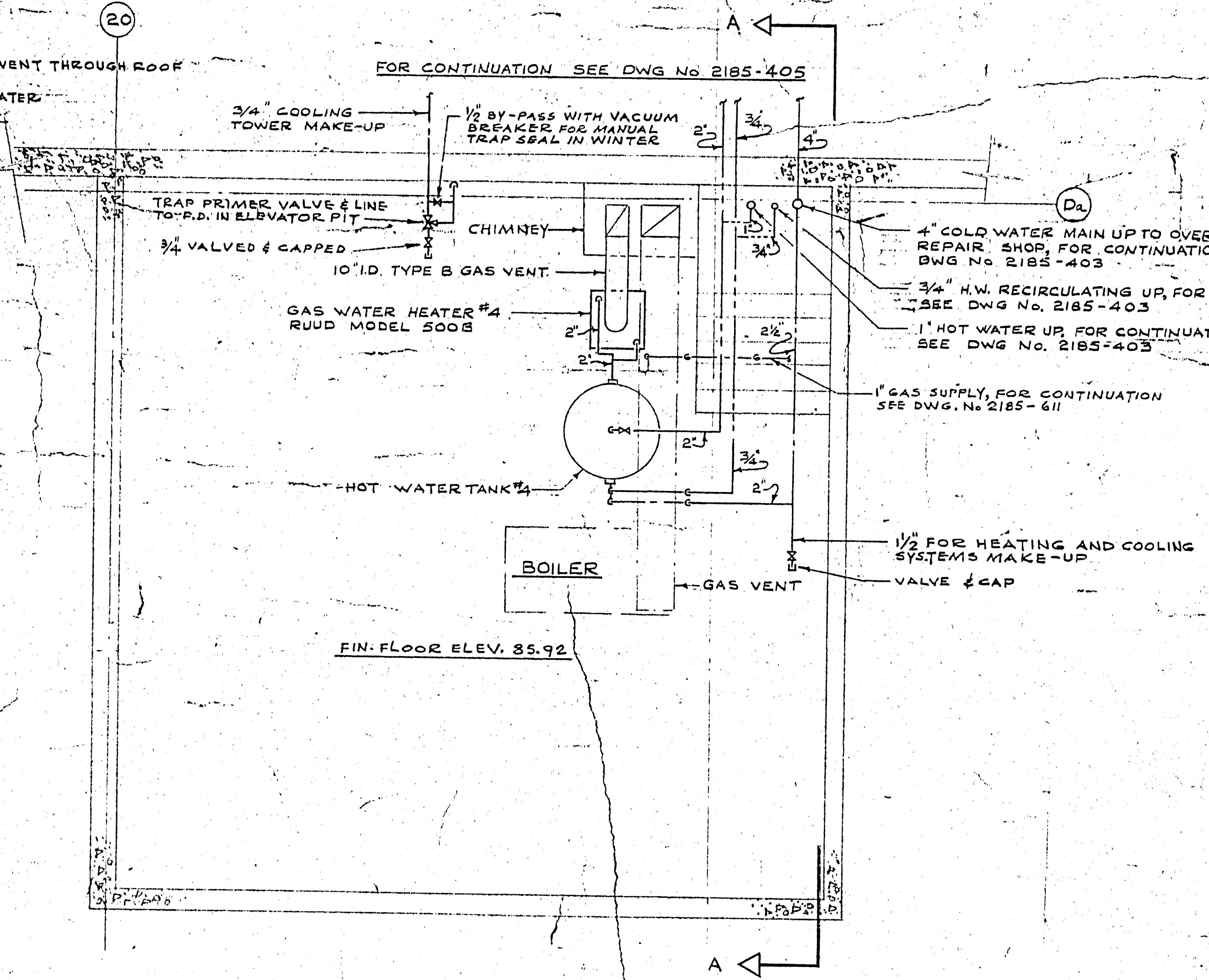
SINK-1

SUPPLY AND INSTALL STAINLESS STEEL SINK, SIZE 60" LONG x 48" WIDE x 35" HIGH, SINK TUB — 12" DEEP.
MATERIAL — STAINLESS STEEL TYPE 316, 14 GAUGE.
SINK CONSTRUCTION — ALL WELDED, TO CONFORM TO CSA SPECIFICATIONS, ALL CORNERS COVED.
TOP EDGES — ROLLED ON 3/4" RADIUS.
TOP CORNERS — RADIUSED.
SADDLES — 12 GAUGE GALVANIZED IRON, ENDS CUT BACK.
LEGS & BRACES — 1 5/8" O.D. STAINLESS STEEL TUBING — SIX REQUIRED.
FEET — STERLING OR HARALSON WITH BEVELLED TUBING AND STAINLESS STEEL STUD SLEEVE.
DRAIN — 1 1/2" SIZE, COMPLETE WITH STAINLESS STEEL TAILPIECE, STANDING OVERFLOW AND 16 GAUGE PERFORATED STRAINER, SINK BOTTOM SHALL SLOPE TO DRAIN - DO NOT CREASE, AND DRAIN SHALL BE LOCATED IN CORNER AT LOWEST POINT OF BOTTOM.
SINK SUPPLIER — HOSPITAL & KITCHEN EQUIPMENT COMPANY, TORONTO.
SUPPLY FITTING — CRANE CH-8556 MOUNTED ON BLOCK WALL ABOVE SINK, 12" FROM RIGHT HAND CORNER.
TRAP — CRANE C-5103 CAST BRASS ADJUSTABLE P TRAP WITH CLEANOUT.



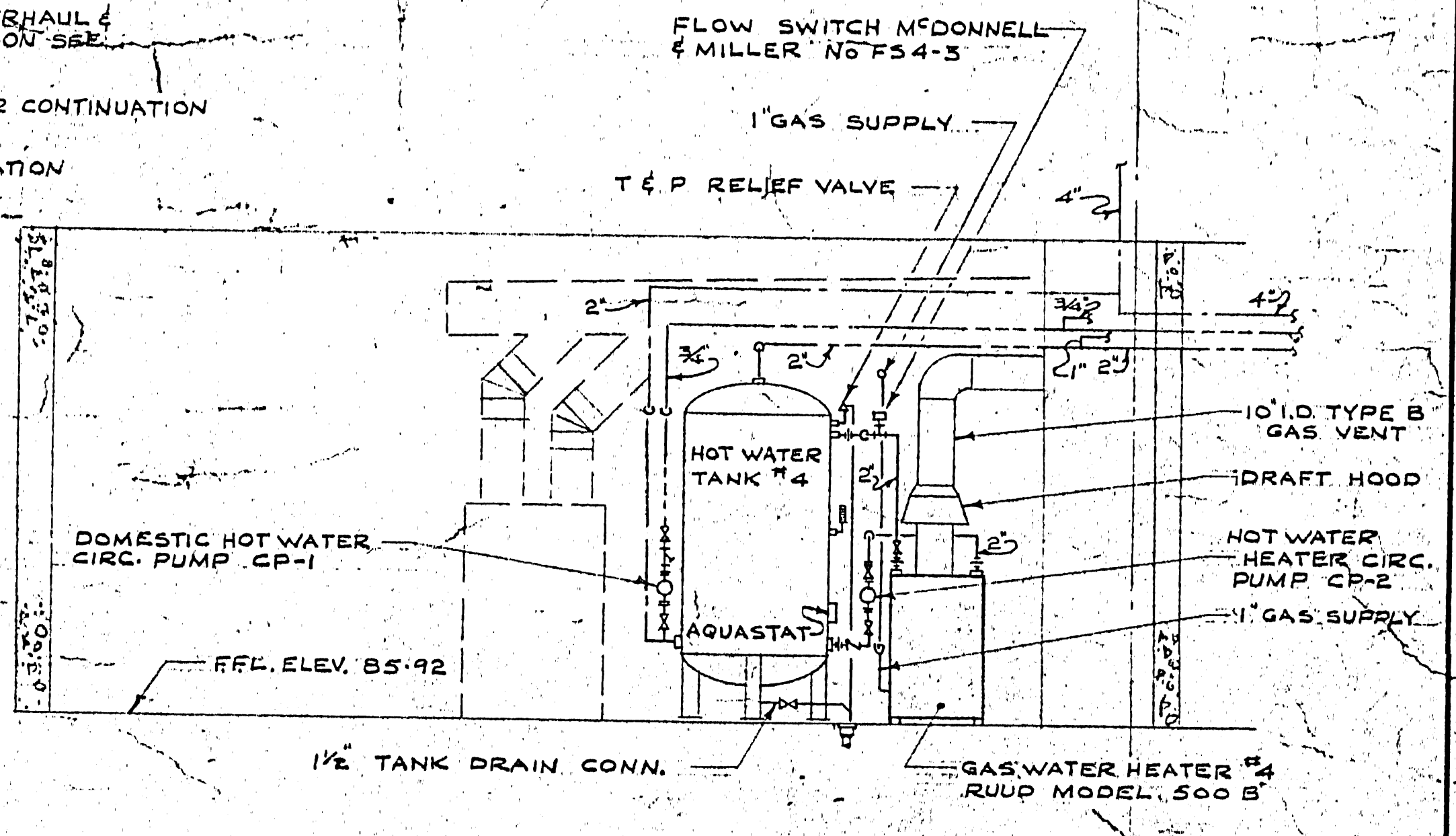
DETAIL OF HOT WATER HEATER AND TANK #3

N.T.S.



MECHANICAL ROOM PLAN

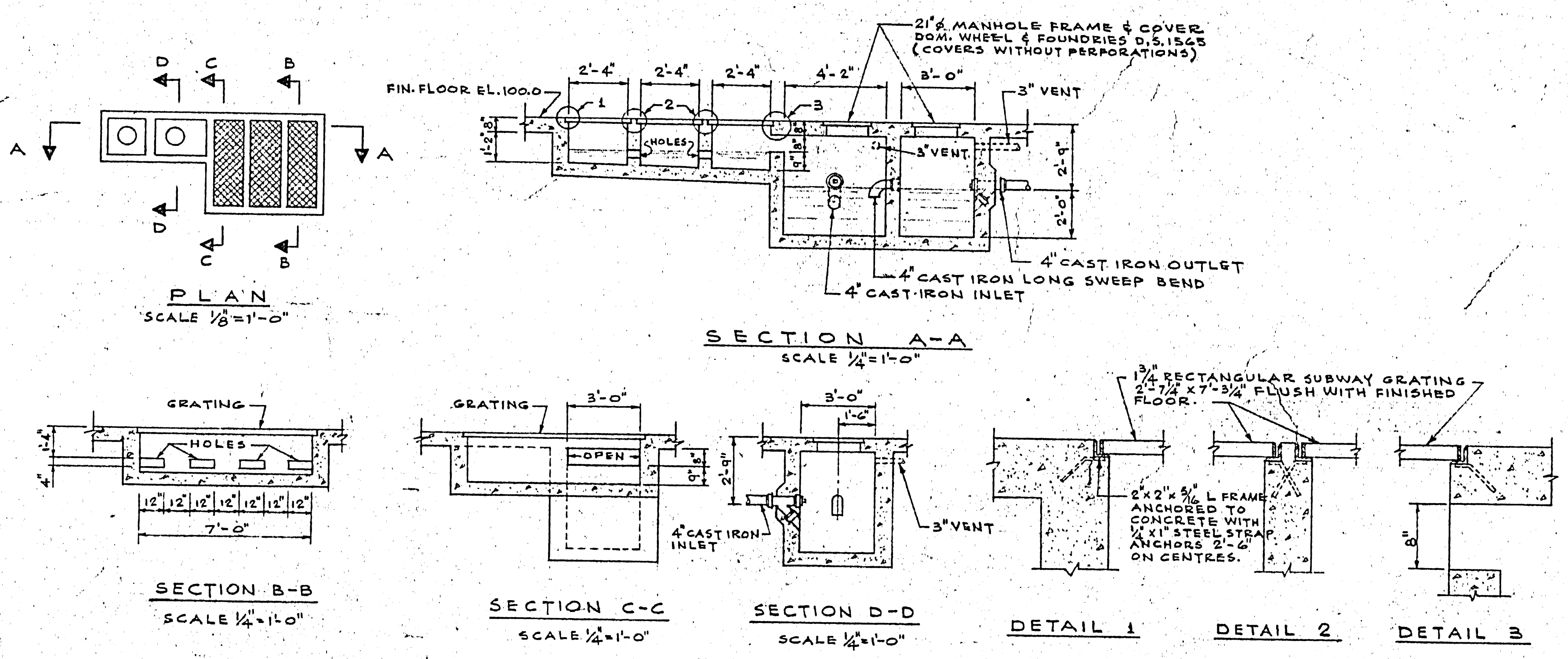
SCALE 1/4"=1'-0"



SECTION A-A

SCALE 1/4"=1'-0"

2185-404



PLAN
SCALE 1/8"=1'-0"

SECTION A-A
SCALE 1/4"=1'-0"

SECTION B-B
SCALE 1/4"=1'-0"

SECTION C-C
SCALE 1/4"=1'-0"

SECTION D-D
SCALE 1/4"=1'-0"

DETAIL 1

DETAIL 2

DETAIL 3

PARTS CLEANING PIT— PLAN, SECTIONS AND DETAILS

NOTE: FOR LOCATION OF PARTS CLEANING PIT SEE DWG. No 2185-403

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
30.9.69		3	AS BUILT	J.L.
7/6/68	5	2	REVISED PER PROPOSED NOTICE OF CHANGE # 17	J.L.
23/5/68	4	1	REVISED PER PROPOSED NOTICE OF CHANGE # 12	J.L.
29/3/68	3		REVISED PER ADDENDUM No 2 & 3 - FOR CONSTRUCTION	J.L.
19/1/68	2		FOR TENDER	
OCT.20/67	1		FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

WAYS & STREETS FACILITIES BUILDING
PLUMBING & DRAINAGE — PLAN & DETAILS

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS-
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

J. T. F. THORPE

LICENSED TO PRACTICE
IN THE
PROVINCE OF MANITOBA
My Licence Expires: 10 Jan. 1968

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY J.L.
CHECKED J.T.F.
FILE No.
SHEET No.
DATE AUGUST '67
SCALE AS SHOWN
DRAWING No. 2185-404
MECHANICAL

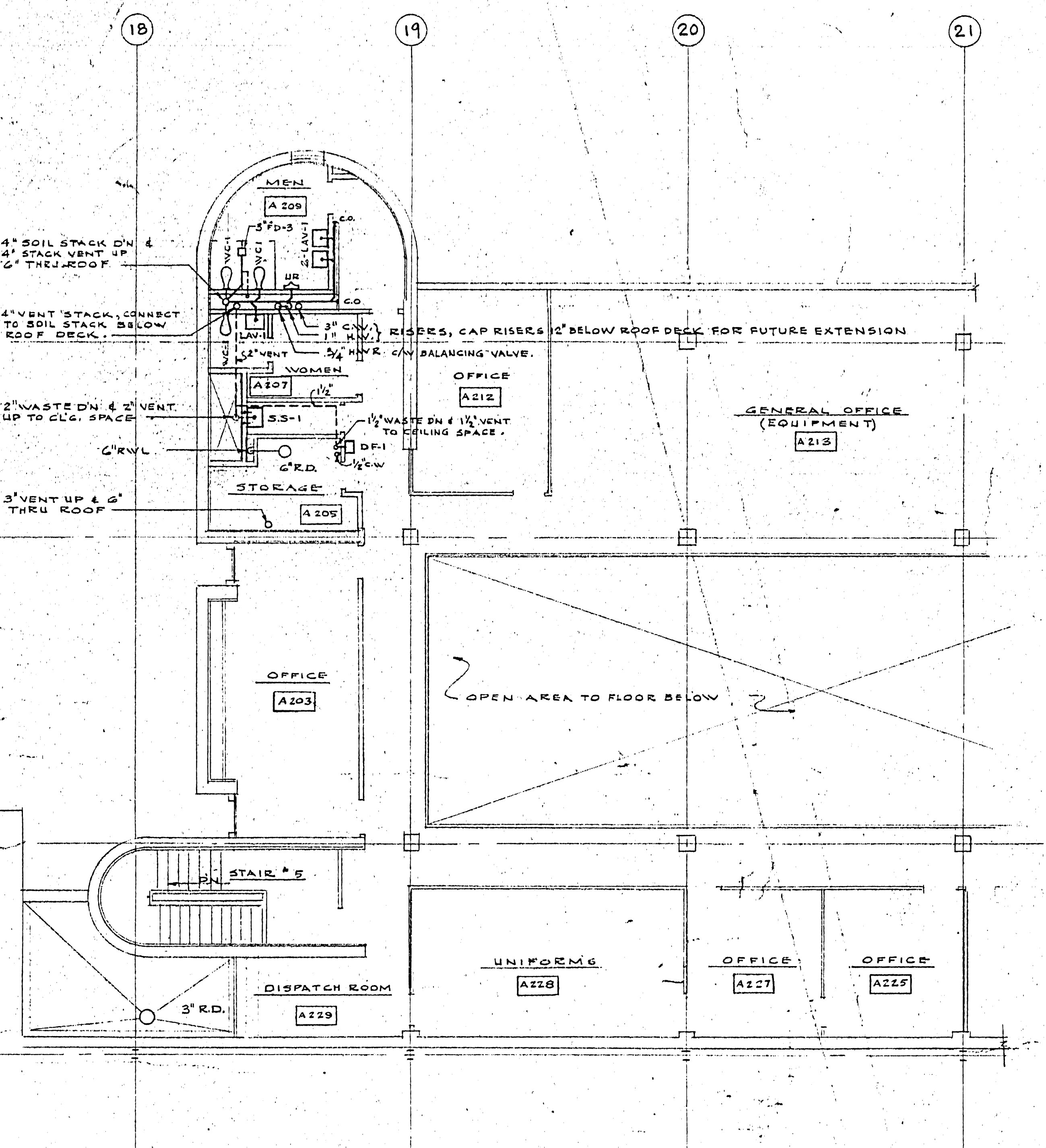
421 Osborne. St.
address

Transit Storage & Shop Facilities

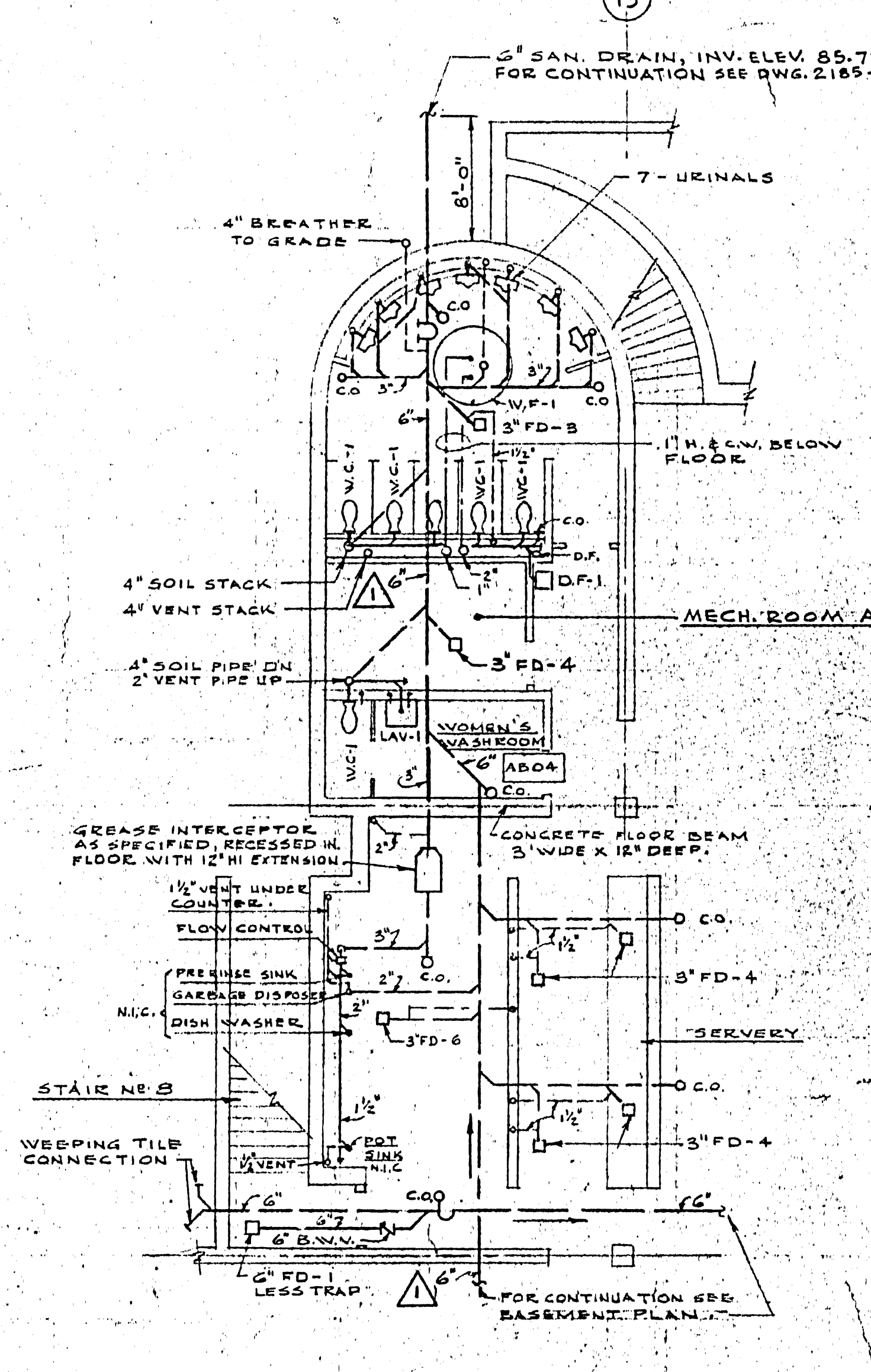
project no.

2185-405
sheet no.

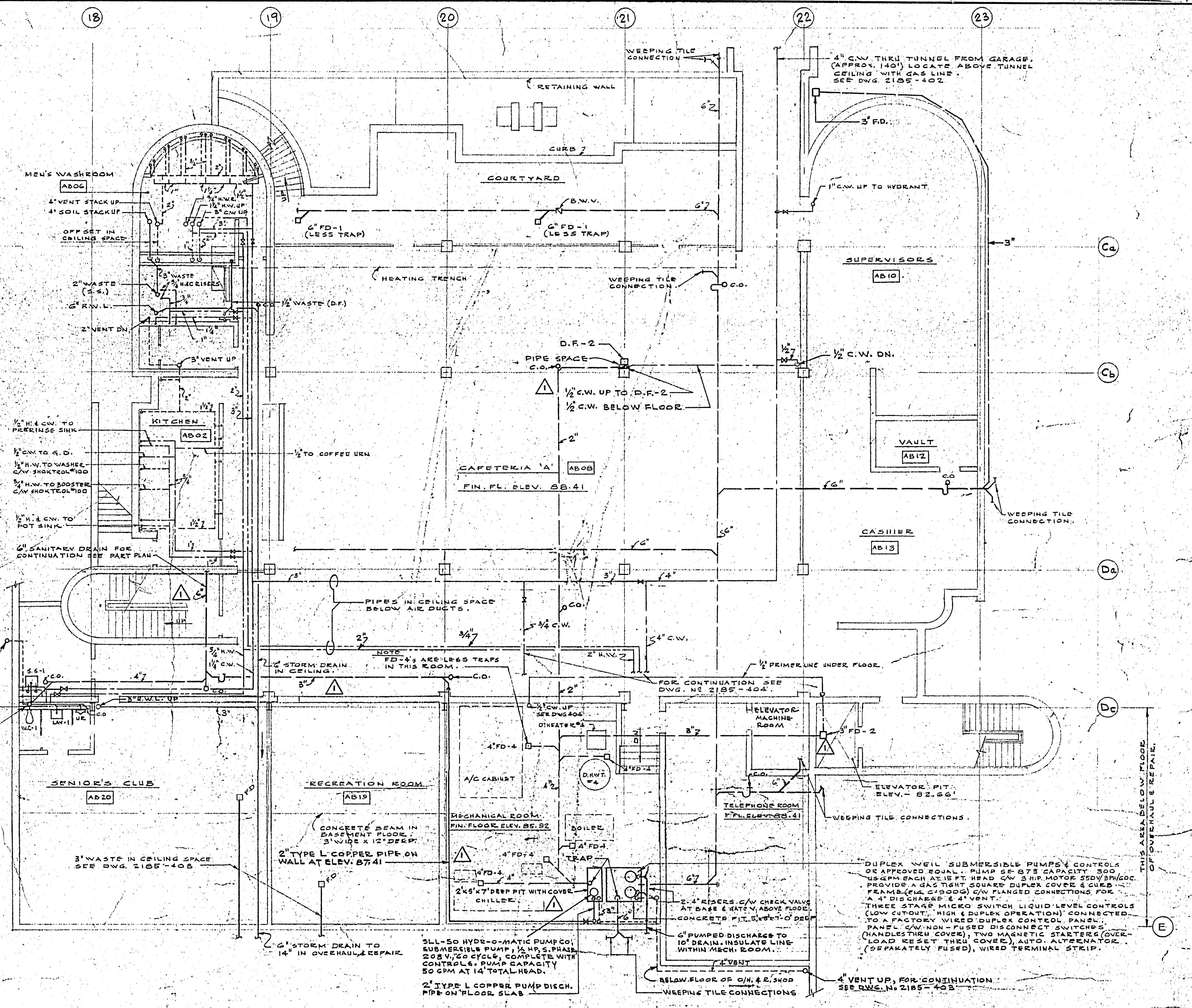
Administration Bldg - Plumbing & Drainage Details; Basement, Main & Second Floor - Plan
description



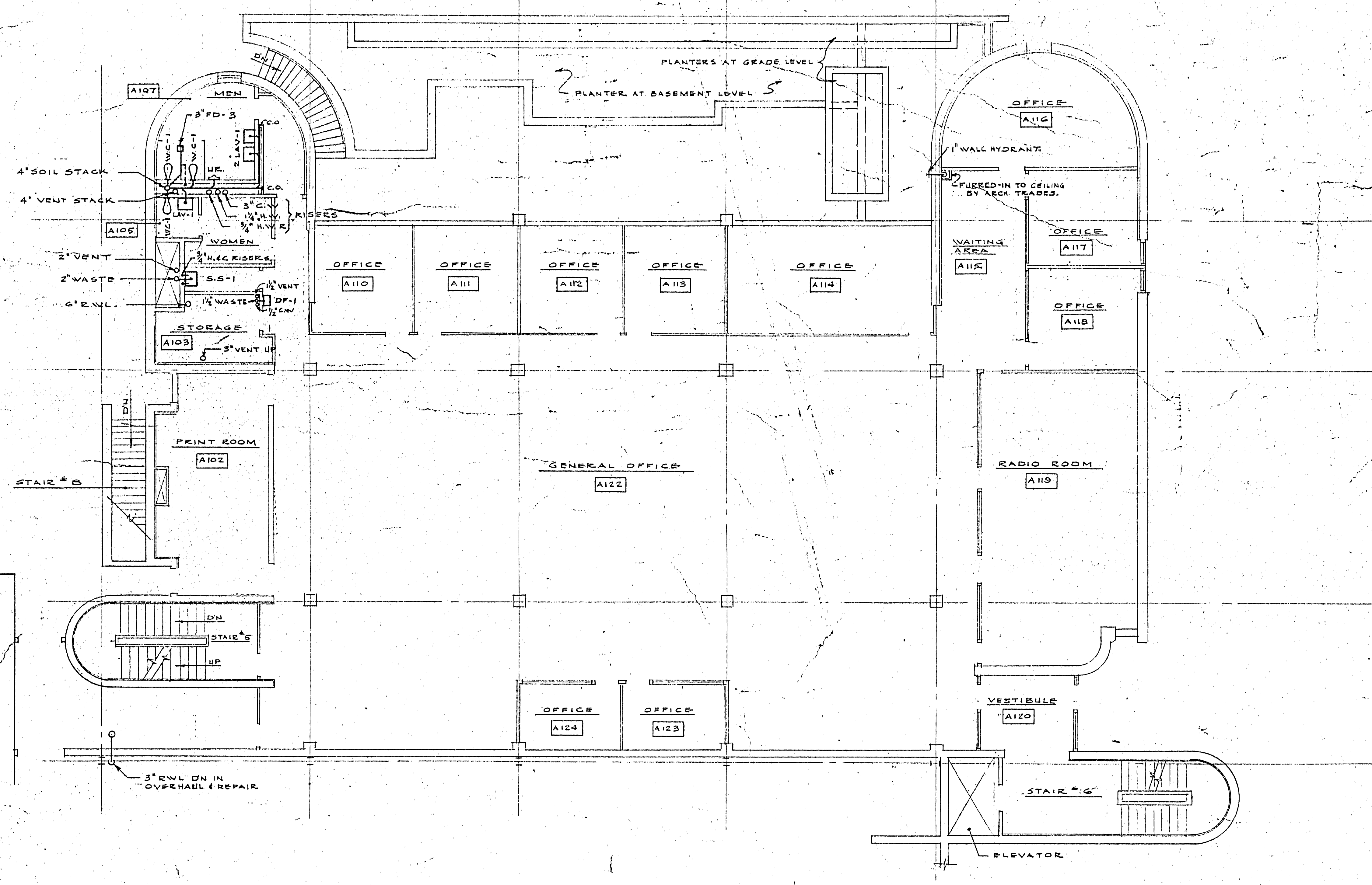
SECOND FLOOR PLAN
SCALE 1/8" = 1'-0"



PART BASEMENT FLOOR PLAN
SCALE 1/8" = 1'-0"



BASEMENT FLOOR PLAN
SCALE 1/8" = 1'-0"



MAIN FLOOR PLAN
SCALE 1/8" = 1'-0"

2185-405

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
30.9.69		2	AS BUILT	J.L.
23/5/68	4	1	REVISED PER PROPOSED NOTICE OF CHANGE # 12	J.L.
29/3/68	3		REVISED PER ADDENDUM No. 3 - FOR CONSTRUCTION	J.L.
19/1/68	2		FOR TENDER	
OCT. 20/67	1		FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

ADMINISTRATION BUILDING
PLUMBING & DRAINAGE
BASEMENT, MAIN & SECOND FLOOR — PLAN & DETAILS

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

J. T. F. THORPE

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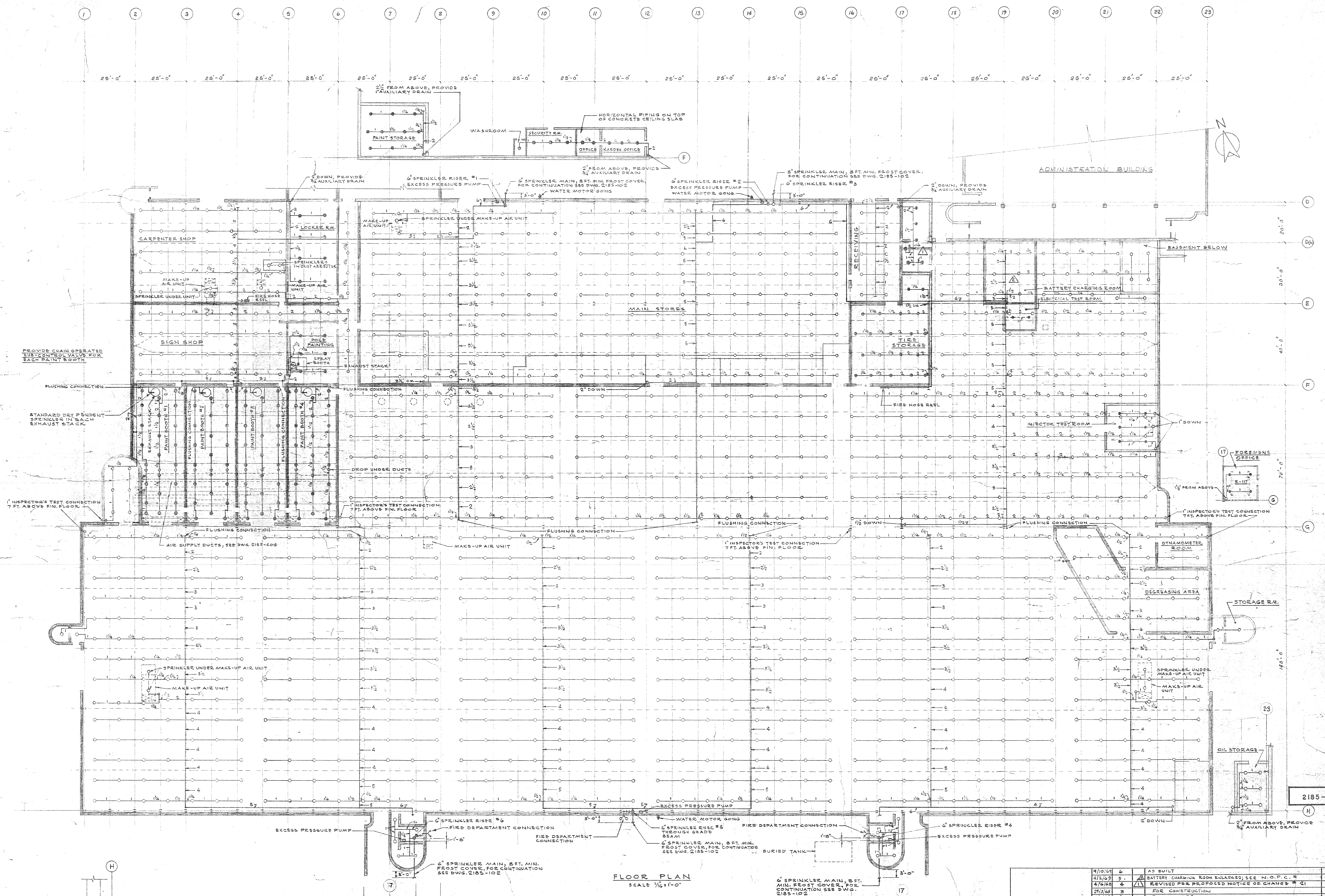
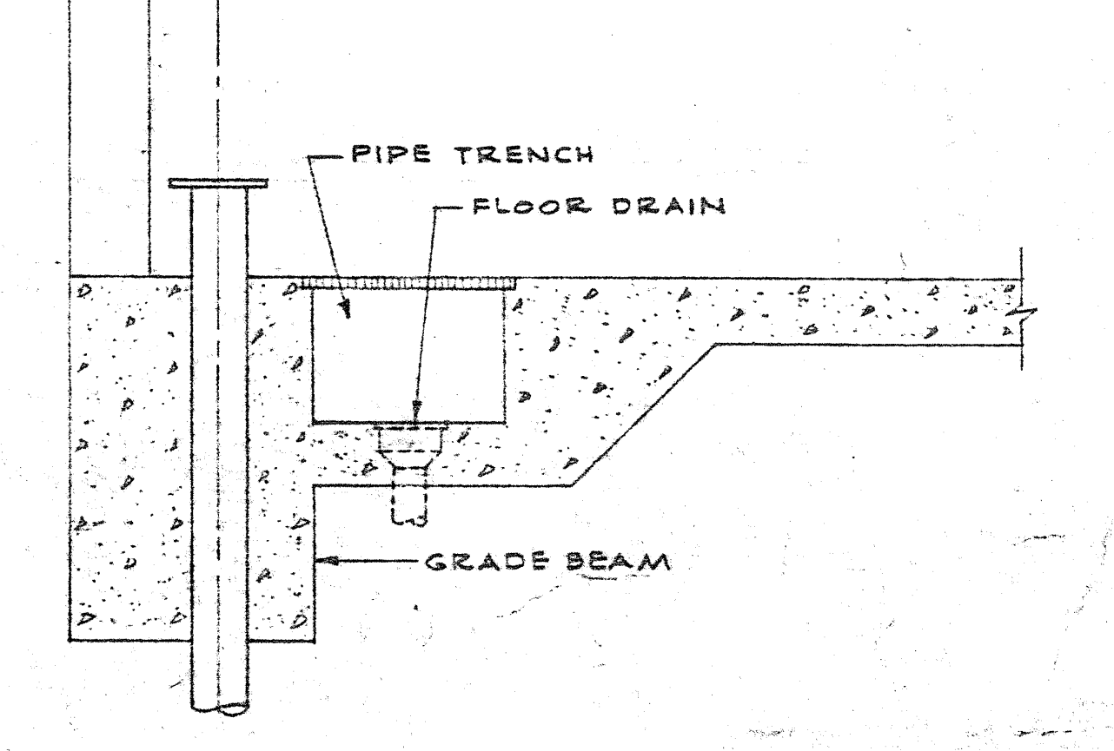
APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

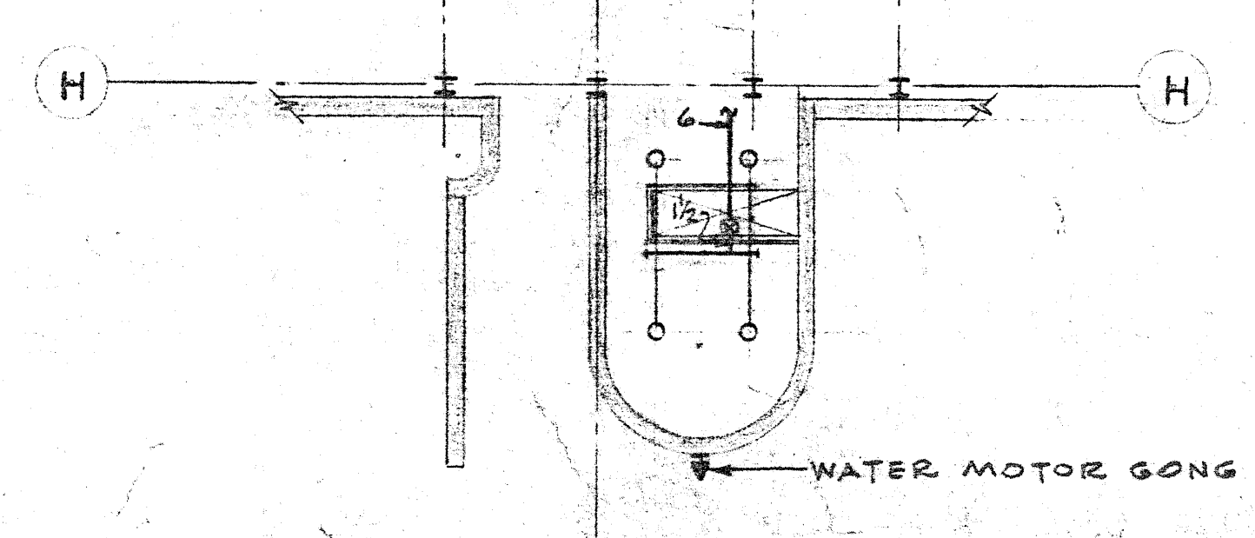
DRAWN BY J. L.
CHECKED J.T.T.
FILE No.
SHEET No.
DATE AUGUST '67
SCALE 1/8" = 1'-0"
DRAWING No. 2185-405
MECHANICAL



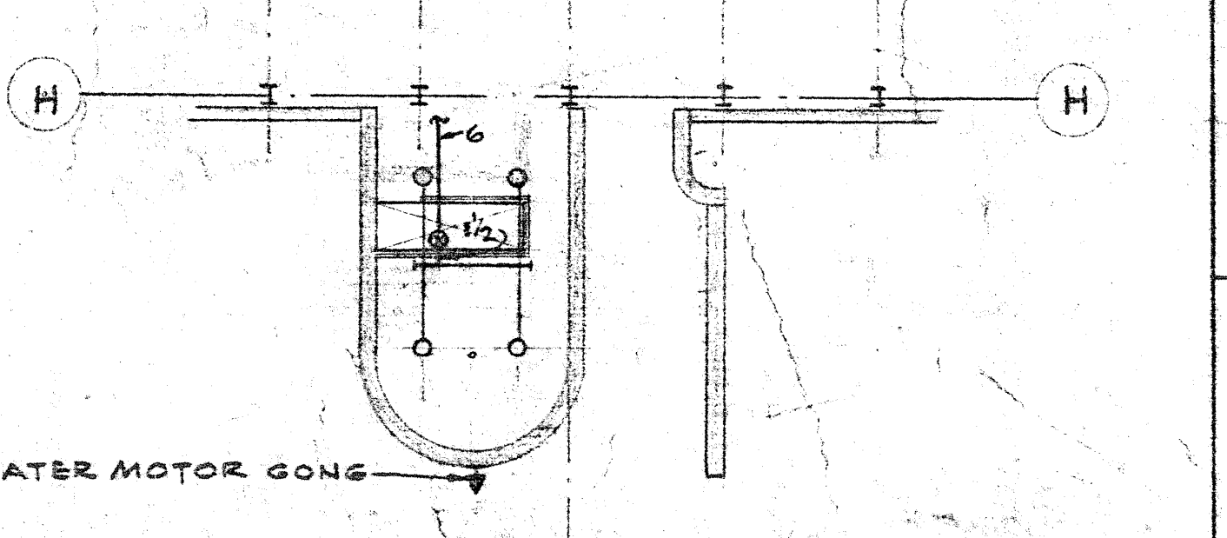
FLOOR PLAN
SCALE 1/16"=1'-0"



SPRINKLER RISER #5 PASSING THROUGH GRADE BEAM
SCALE ½"=1'-0"



SERVICE PROJECTION—UPPER FLOOR
SCALE 1/16"=1'-0"



SERVICE PROJECTION—UPPER FLOOR
SCALE 1/16"=1'-0"

NOTES:

1. IN BATTERY CHARGING ROOM AND DEGREASING AREA ALL SPRINKLERS, SPRINKLER PIPING, FITTINGS, HANGERS AND HANGER RODS SHALL BE CORROSION-RESISTANT WITH PROTECTIVE COATING TO C.U.A. APPROVAL.

2. SPRINKLER PROTECTION IN TIRE STORAGE ROOM SHALL BE HYDRAULICALLY DESIGNED, BASED ON SPRINKLER DENSITY OF 0.30 GPM/SQ.FT. OVER THE AREA OF THE ROOM — 1,800 SQ.FT.

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
9/10/69	6		AS BUILT	J.L.
4/2/69	5	2	BATTERY CHARGING ROOM ENLARGED; SEE N.O.P.C. #	IFE
4/6/68	4	1	REVISED PER PROPOSED NOTICE OF CHANGE # 21	J.L.
29/3/68	3		FOR CONSTRUCTION	
19/1/68	2		FOR TENDER	
OCT. 20/67	1		FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

OVERHAUL & REPAIR SHOP
FIRE PROTECTION - PLAN & DETAILS

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

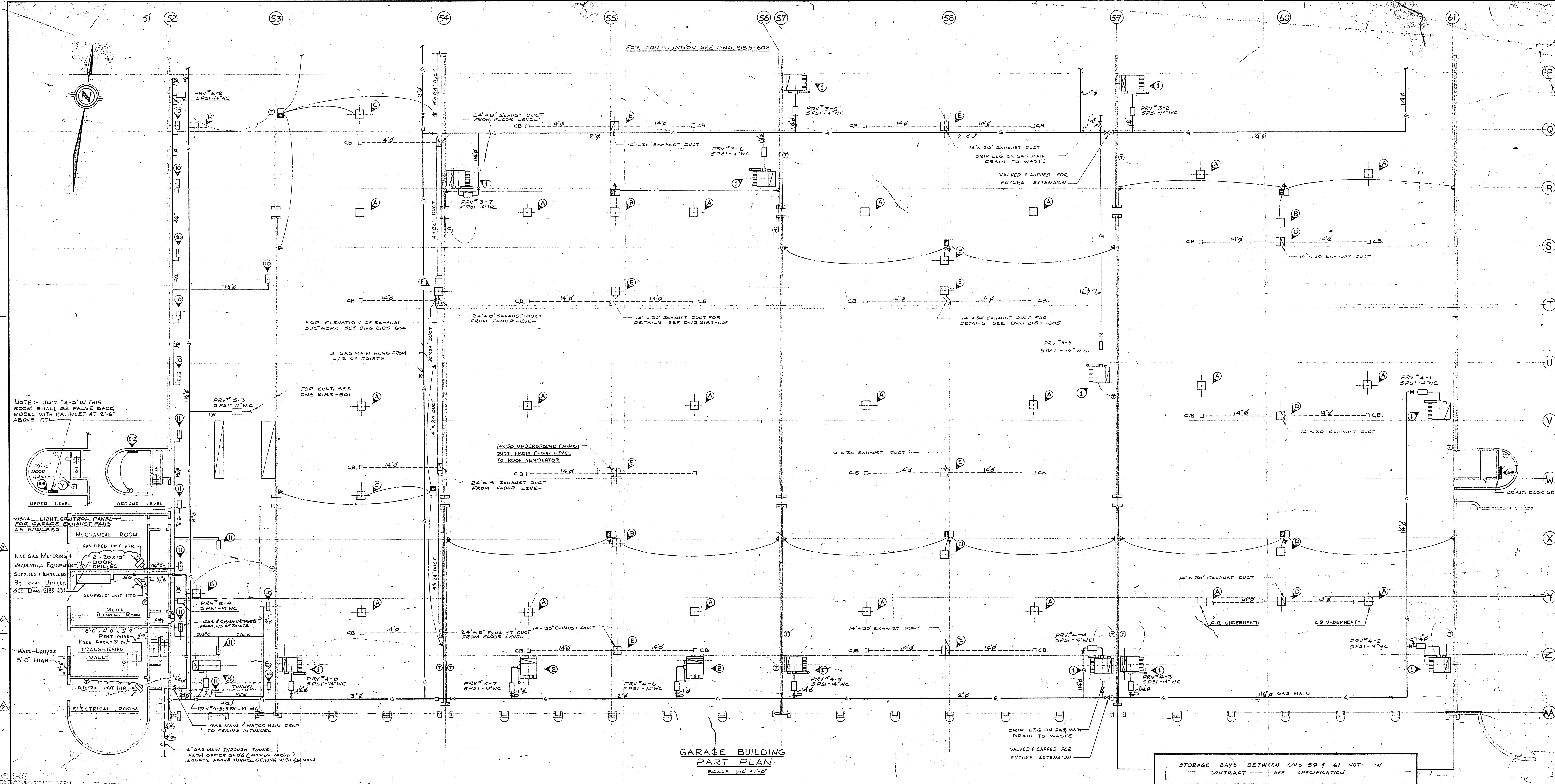
ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

J. T. F. THORPE

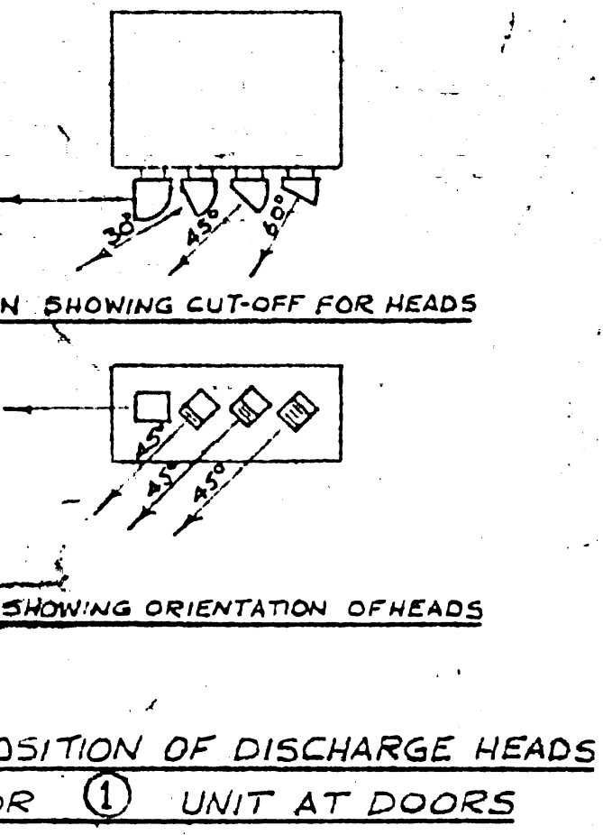
LICENSED TO PRACTICE
IN THE
PROVINCE OF MANITOBA
My Licence Expires: 10 Jan. 1968

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

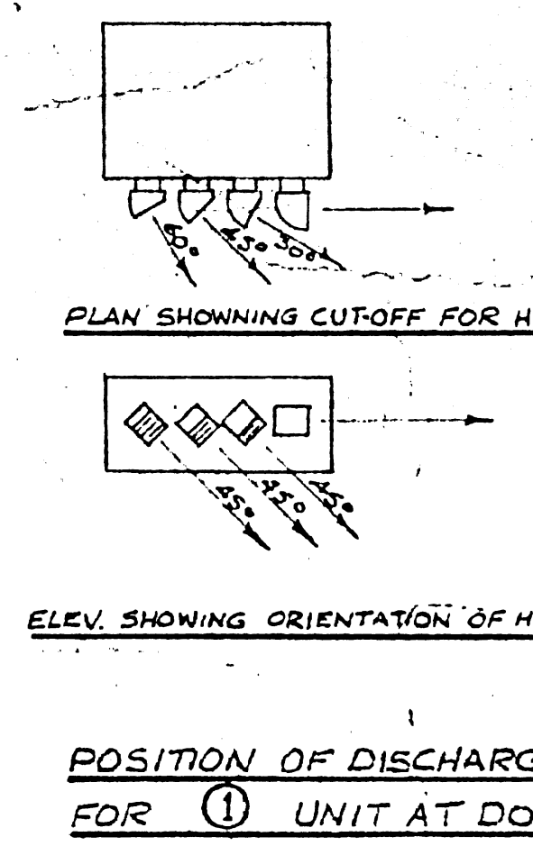
DRAWN BY J. L.
CHECKED J.T.T.
FILE No.
SHEET No.
DATE AUGUST '67
SCALE 1/16" = 1'-0"
DRAWING No. 2185-503
MECHANICAL



GARAGE BUILDING
PART PLAN
SCALE 1/16" = 1'-0"

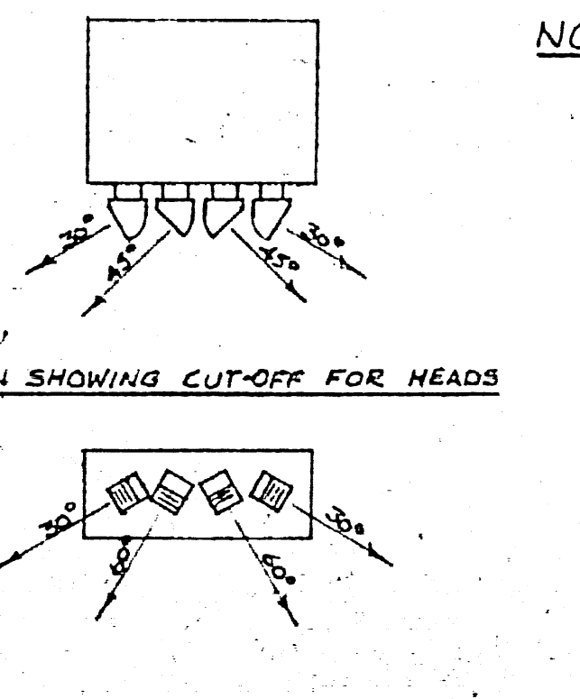


POSITION OF DISCHARGE HEADS FOR ① UNIT AT DOORS (WEST UNIT)



POSITION OF DISCHARGE HEADS FOR ① UNIT AT DOORS (EAST UNIT)

NOTE — ARROWS INDICATE DIRECTION OF AIR FLOW



POSITION OF DISCHARGE HEADS FOR REST OF ① & ② UNITS

FAN SUPPLIED BY UNIT SUPPLIER

FAN SCHEDULE

SYMBOL	MANUFACTURER MODEL No.	CFM. RATING	MOTOR RPM	MOTOR HP	FAN SP	MIN. SQ INSIDE CURB	SYSTEM	REMARKS	LOCATION
A	# 15-D3-SR	2520	1,300	1/2	1/8	23"	ROOF	CURB TO MATCH FAN BASE	GARAGE
B	# 30-K-SR	7,820	725	2	1/8	31"	STANDBY	"	"
C	# 22-G-SR	4,740	950	1	1/8	25"	"	"	"
D	# 24-G-SR	4,470	825	1	1/2	27"	UNDER GROUND	"	"
E	# 24-G-SR	4,050	775	1	1/2	27"	"	"	"
F	# CS. SIZE 300	9,897	765	3	3/4	32½"	"	"	
G	# 12-B3-SR	1,390	1,400	1/4	1/4	19"	ROOF	"	OVERHAUL & REPAIR & SERVICE BAY
H	# 16-C-SR	1893	1,100	1/3	1/4	19½"	"	"	"
J	# 16-B-SR	1,770	1,050	1/4	1/4	19½"	"	"	WAYS & SERVICES
K	# 12-A2-SR	935	1,100	1/6	1/4	19"	"	"	OVERHAUL & REPAIR
L	# 12-B3-SR	1,220	1,300	1/4	1/4	19"	"	"	WAYS & SERVICES & OVERHAUL & REPAIR
M	# 16-C-SR	2,000	1,150	1/3	1/4	19½"	"	"	OVERHAUL & REPAIR
N	# 12-A1-SR	470	800	1/6	1/4	19"	"	"	" "
P	# 16-A-SR	1,175	900	1/6	3/8	19½"	"	"	" "
Q	# 18-E-SR	2,720	1,150	3/4	3/8	19½"	"	"	" "
R	# 16-B-SR	1,633	1,000	1/4	1/4	19½"	"	"	" "
S	# 16-A-SR	1,280	850	1/6	1/4	19½"	"	"	WAYS & SERVICES
U	# 12-A1-SR	637	900	1/6	1/4	19"	"	"	WAYS & SERVICES & OVERHAUL & REPAIR
V	# 22-D-SR	3190	800	1/2	3/8	25"	"	"	OVERHAUL & REPAIR
W	# 73-UCD	150	1,600	1/25	1/4	10"	"	"	OVERHAUL & REPAIR & GARAGE
X	# 81-UCD	120	1,040	1/40	1/4	11"	"	"	OVERHAUL & REPAIR
Y	# 102-UCD	390	1,030	1/20	1/4	15"	"	"	GARAGE
Z	# 108-CW	360	860	1/12	1/4	12"	WALL	"	OVERHAUL & REPAIR
AA	# CS SIZE 300	9,328	686	2	1/2	32½"	ROOF	"	" "
AB	# W-12-1/20	425	1140	1/20	1/4	19"	INJECTOR RM. ROOF	"	" "
AC	# TYPE B SIZE 330	14,398	726	5	5/8	—	SIDE WALL	CURB TO MATCH FAN OUTLET DUCTING	" "
AD	# TYPE B SIZE 330	13,772	702	5	5/8	—	" "	"	" "
AE		3,990	1,836	3	3½	—	—	"	" "
AF		2,850	1,562	3	3	—	—	"	" "
AG		4,528	1,380	5	3½	—	—	"	" "
AH		4,811	1,402	5	3½	—	—	"	" "
AJ		774	1,857	1	1 3/4	—	—	"	" "
AK	# TYPE "XB" SIZE 11	1,056	1,128	1	2½	—	—	"	" "
AL	TYPE "XB" SIZE 11	1,056	783	1/3	1	—	—	"	" "
AM	TYPE "X.S." SIZE 11	1,056	814	1/3	1	—	—	"	" "

GAS FIRED HEATER SCHEDULE

SYMBOL	MANUFACTURER MODEL No	STND. CFM.	MOTOR H.P.	EXTERNAL S.P.	RATED INPUT MBH	RATED OUTPUT MBH	EXH'R H.P.	LOCATION	REMARKS
1	# TD-M-100	10,690	5	5/8"	1,250.0	1,000.0	½ HP	GARAGE	
2	# TD-M-75	8,020	5	5/8"	938.0	750.0	⅓ H.P.	"	
3	# RA 27	22,000	15	5/8"	3625.0	2900.0		SERVICE BAY	
4	# TD-M-75	7,500	3	5/8"	938.0	750.0	⅓ HP	OVERHAUL & REPAIR	
5	# RA-12	3,500	2	5/8"	578.0	462.0		" "	
6	# TD-M-50	5,350	2	5/8"	625.0	500.0	⅓ HP	" "	
7	# RA-33	32,500	20	5/8"	5,445.0	4,536.0		" "	
8	# DOOR HEATER	6,000	2	—	750.0 @ 7" W.C.	600.0		WAYS & STREETS	* INTERLOCKED WITH DOORS
9	# DF-125	—	—	—	125.0	100.0		" "	½ H.P. DUCT BLOWER TO UNIT.
13	# RA-36-400-PHV	40,000	30	1¼"	6,600.0	5280.0		OVERHAUL & REPAIR	
14	# TDM-50	5,350	2	3/4"	625.0	500.0	⅓ HP	LUNCH ROOM	

ELECTRIC HEATER SCHEDULE

SYMBOL	MANUFACTURER MODEL No.	K.W. RATING	VOLTS	PHASE	REMARKS	LOCATION
E-1	RFC-630 P	3	208	1	WALL MOUNTED UNITS	WAYS & SERVICES & GARAGE & OVERHAUL & REPAIR
E-2	RFC-640 P	4	208	1	" " "	WAYS & SERVICES & GARAGE
E-3	CUV-1018	17.92	208	3	UNIT VENTILATOR F.A. INLET AT F.F.L.	GARAGE
E-4	WCH-630T-12T	3	208	1	4 - 6'-0" LENGTH UNITS PER WINDOW	WAYS & SERVICES
E-5	C.U.H.-106	6	208	3	FORCED FLOW UNIT	" "
E-6	CUV-1220	20.16	208	3	UNIT VENTILATOR F.A. UNIT AT F.F.L.	" "
E-7	CUV-1015	15.12	208	3	" "	" "
E-8	KCF-45 CI	5	208	3	CONVECTION CABINET HEATER	GARAGE

INFRA-RED HEATER SCHEDULE

SYMBOL	MANUFACTURER MODEL No	BTU PER HR.	REMARKS
10	60-FN-AKHY	50,000	ANGLE MOUNTED
11	60-FN-AKHY	50,000	HORZ. MOUNTED

LEGEND

-⊡-	INFRA-RED HEATER INSTALLED WITH REFLECTOR ASSEMBLY
▬	ELECTRIC HEATING UNIT
Ⓣ	THERMOSTAT
◨	CARBON MONOXIDE ANALYZER & MONITOR
▲	AIR SAMPLING HEAD

NOTE
1. CATCH BASINS AND CONCRETE PLENUM INSTALLED BY GENERAL CONTRACTOR
2. FOR DETAILS OF MAKE-UP AIR UNITS, INFRA-RED HEATERS, VENTILATING AND EXHAUST SYSTEMS SEE DWG. 2185-605
3. ALL 14"x30" EXHAUST DUCTS RISE FROM CONCRETE PLENUM IN FLOOR TO ROOF VENTILATOR FOR DETAILS SEE DWG. 2185-605
4. ALL GAS DISTRIBUTION PIPING PASSING THROUGH FIRE WALLS ON COLUMN LINES 51 TO 59 INCLUSIVE SHALL BE SLEEVED & PACKED WITH ASBESTOS ROPE AT THE FIRE WALL.

2185 - 601

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
24/11/69	5		AS BUILT	R. McC
10/5/68	4	2	REVISED AS PER CHANGE ORDER # 13	DAC.
29/3/68	3	1	REVISED AS PER ADDENDA 1 TO 5; FOR CONSTRUCTION	W.O'L.
19/1/68	2	0	FOR TENDER	
20/10/67	1	0	FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

GARAGE & SERVICE BAY
HEATING & VENTILATING — PLAN & SCHEDULES

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross & Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

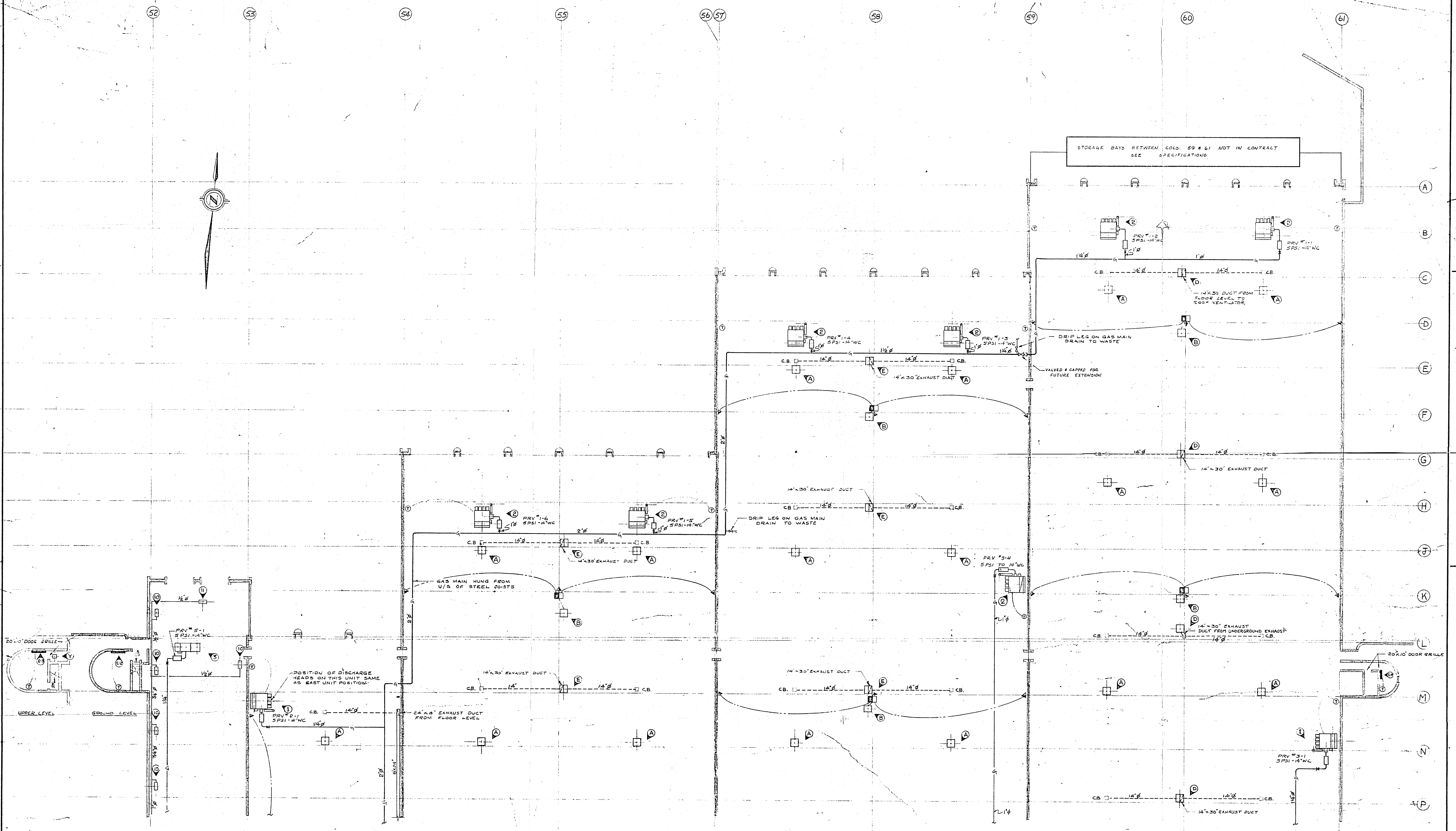
J. T. F. THORPE
MECHANICAL

LICENSED TO PRACTICE IN THE PROVINCE OF MANITOBA
My Licence Expires: 10 Jan. 1968

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY	W G O'Keefe	DATE	AUGUST '67
CHECKED	J.T.T.	SCALE	1/16" = 1'-0"
FILE No.		DRAWING No.	2185 - 601 MECHANICAL
SHEET No.			

TRANSTEX 13 400-8-66



FOR CONTINUATION SEE DWG. 2185-601

GARAGE BUILDING
PART PLAN
SCALE 1/16"=1'-0"

NOTES:
1. GAS DISTRIBUTION PIPING MUST BE SLEEVED & PACKED WITH ASBESTOS ROPE WHEN PASSING THRU FIRE WALLS AT COLUMN LINES 52 TO 59 INCLUSIVE.
2. FOR SCHEDULES OF HEATING AND VENTILATING UNITS SEE DWG E-2185-601
3. FOR DETAILS OF MAKE-UP AIR UNITS, INFRA-RED HEATERS, VENTILATING AND EXHAUST SYSTEMS SEE DWG E-2185-605
4. FOR DETAILS OF DISCHARGE HEADS FOR MK1+2 MAKE-UP AIR UNITS SEE DWG E-2185-601
5. ALL 14"x30" EXHAUST DUCTS RISE FROM CONCRETE PLENUM IN FLOOR TO ROOF VENTILATOR FOR DETAILS SEE DWG E 2185-605

B-14
FILE
RETURN TO CIVIC
PROPERTIES BUILDING
INVENTORY.

2.	91	1

2185-602

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
24 NOV 69	4		AS BUILT	R. MCC.
29/3/68	3	0	FOR CONSTRUCTION	
19/1/68	2	0	FOR TENDER	
20/10/67	1	0	FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

GARAGE & SERVICE BAY
HEATING & VENTILATING — PLAN

CONSULTING PROFESSIONAL ENGINEERS
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10 DONALD STREET, WINNIPEG, MANITOBA

J. R. THORPE

LICENSED TO PRACTICE
IN THE
PROVINCE OF MANITOBA
My Licence Expires: 10 Jan. 1968

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

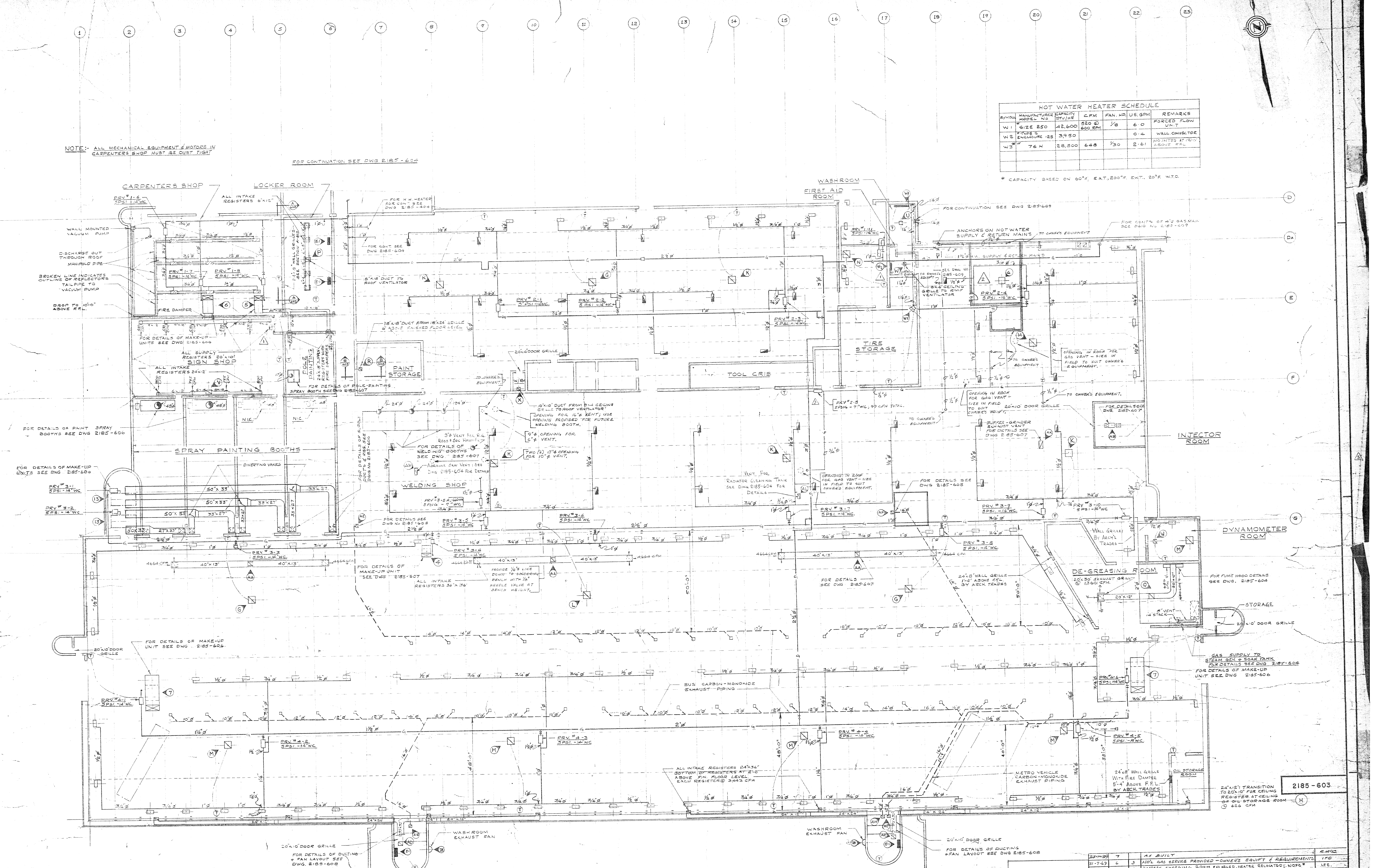
DRAWN BY W.G.K.
CHECKED J.T.T.
FILE No.
SHEET No.
DATE AUGUST '67
SCALE 1/16"= 1'-0"
DRAWING No. 2185-602
MECHANICAL

NOTE:- ALL MECHANICAL EQUIPMENT & MOTORS IN CARPENTERS SHOP MUST BE DUST TIGHT

FOR CONTNUATION SEE DWG 2185-604

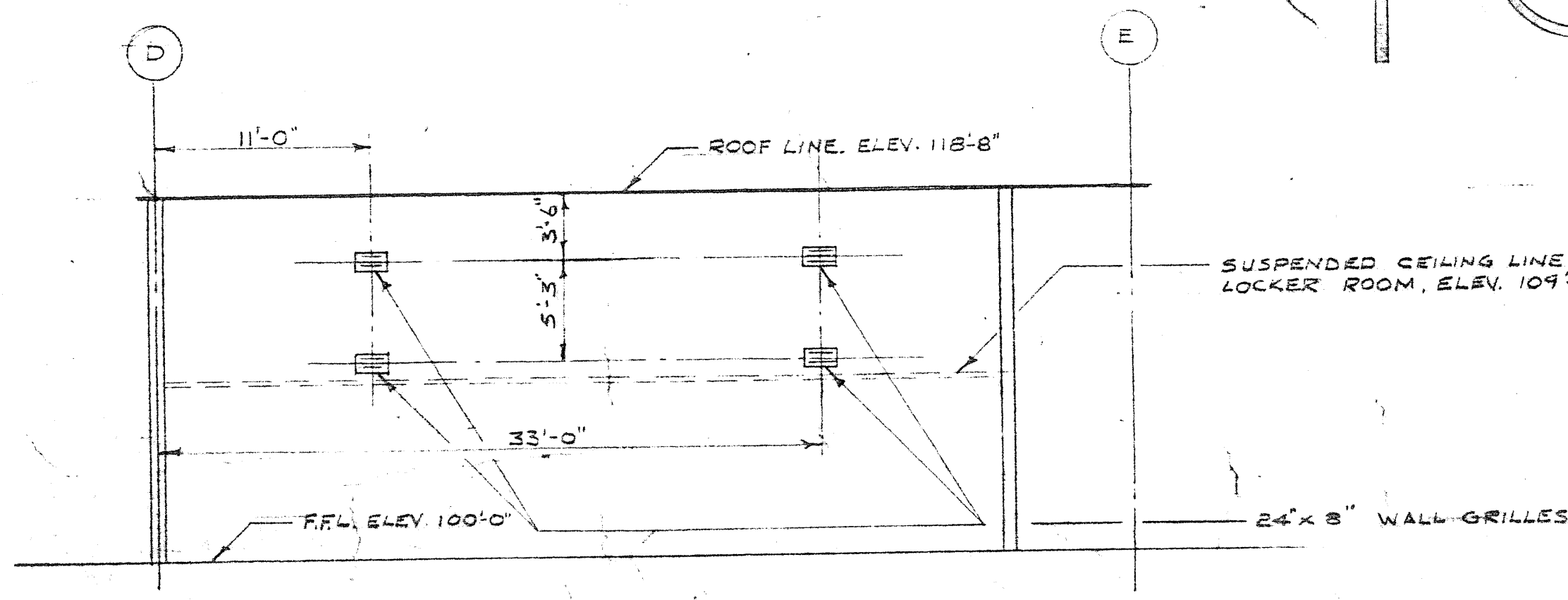
HOT WATER HEATER SCHEDULE						
SYMBOL	MANUFACTURER MODEL No	CAPACITY BTU/HR	CFM	FAN. HP.	U.S. GPM	REMARKS
W 1	# SIZE 250	42,600	520 @ 600 RPM	1/8	6·0	FORCED FLOW UNIT
W 2	# TYPE S ENCLOSURE 125	3,950			0·4	WALL CONVECTOR
W3*	# 76 H	28,500	648	1/30	2·61	MOUNTED AT 12'-0" ABOVE FFL.

* CAPACITY BASED ON 60°F. E.A.T., 200°F. E.W.T., 20°F. W.T.D.



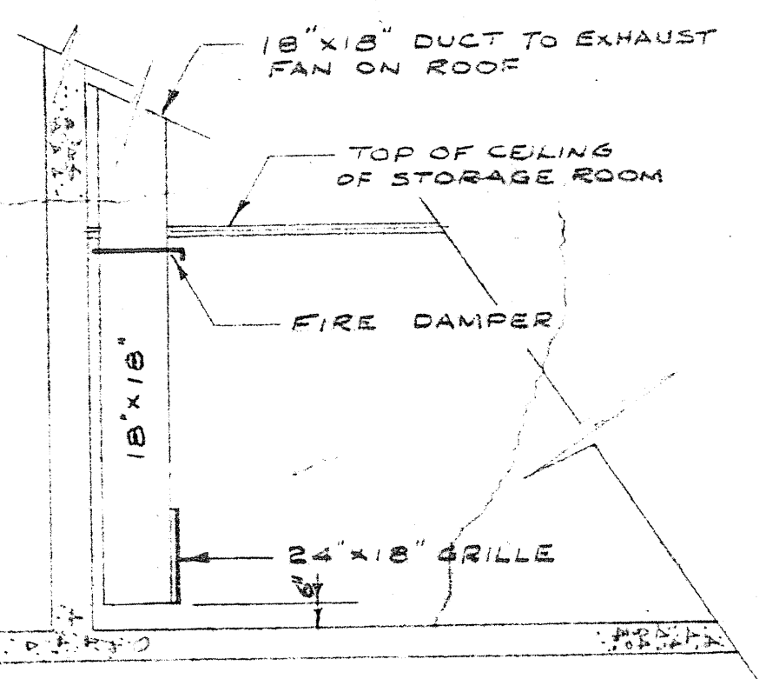
OVERHAUL & REPAIR BUILDING PLAN

1/16" = 1'-0"



SECTION (A/603)

SCALE 1/8" = 1'-0"



SECTION (B/603)

NOT TO SCALE

LEGEND

▭	INFRA-RED HEATER INSTALLED WITH REFLECTOR ASSEMBLY
◪	INFRA-RED HEATER INSTALLED WITHOUT REFLECTOR ASSEMBLY
▨	BURNER ASSEMBLY FOR CO-RAY-VAC HEATING SYSTEM
Ⓣ	THERMOSTAT.
■	ELECTRIC HEATER UNIT.

NOTE:-

1. ALL INFRA-RED UNITS LOCATED AT OUTSIDE WALLS TO BE ANGLE MOUNTED AS SHOWN ON DWG 2185-605
2. FOR DETAILS OF VENTILATORS & CURBS SEE DWG 2185-605
3. FOR HEATING & VENTILATING SCHEDULES SEE DWG 2185-601

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
~~[illegible]~~	7		AS BUILT	R.McC.
31·7·69	6	3	ADD'L GAS SERVICE PROVIDED – OWNER'S EQUIP'T & REQUIREMENTS	IFE
4/2/69	5	2	BATTERY CHARGING ROOM ENLARGED, HEATER RELOCATED; ~~NOPC~~ #	I.F.E.
7/6/68	4	1	PIPING REVISED, FIRST AID ROOM; DUCT REVISED, SIGN SHOP	
29/3/68	3	0	FOR CONSTRUCTION	
19/1/68	2	0a	FOR TENDER	
20/10/67	1	0	FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

OVERHAUL & REPAIR SHOP

HEATING & VENTILATING – PLAN & DETAILS

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
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10 DONALD STREET, WINNIPEG, MANITOBA

J. T. F. THORPE

LICENSED TO PRACTICE IN THE PROVINCE OF MANITOBA

APPROVED

DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY W. G. Kaiser

CHECKED J.T.T.

FILE No.

SHEET No.

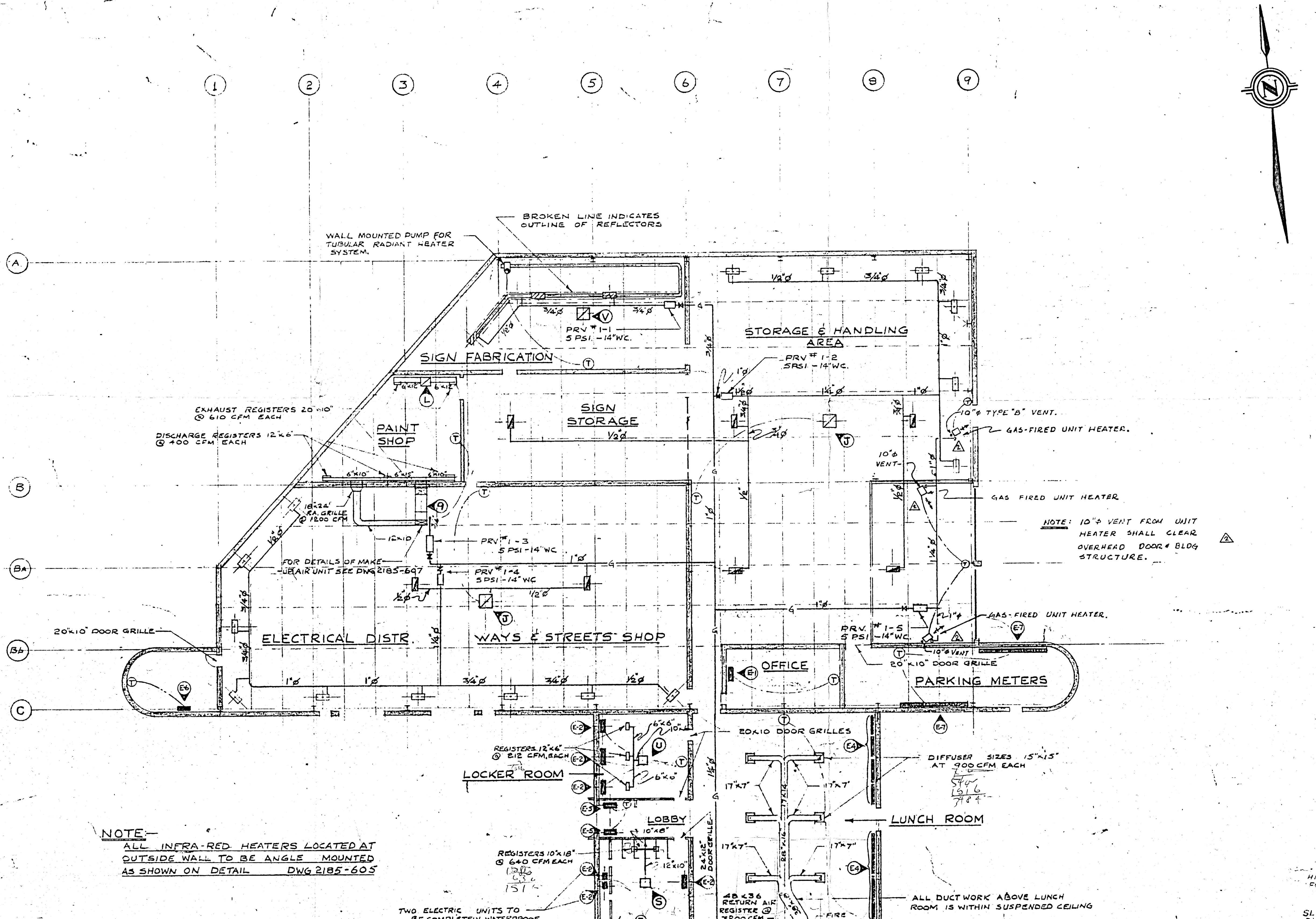
DATE AUGUST '67

SCALE AS SHOWN.

DRAWING No. 2185 – 603

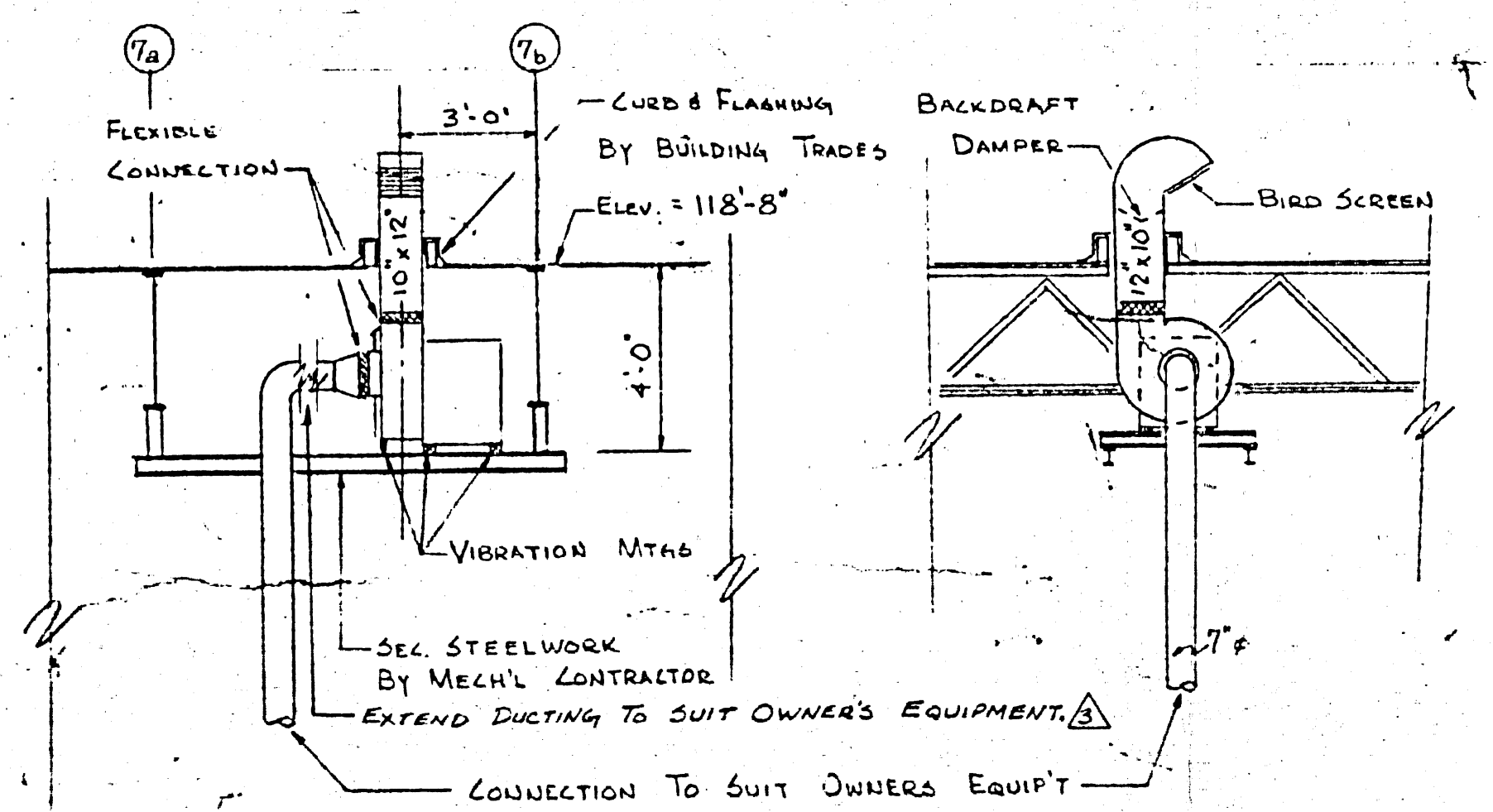
MECHANICAL

VENTILATING – PLAN & DETAILS

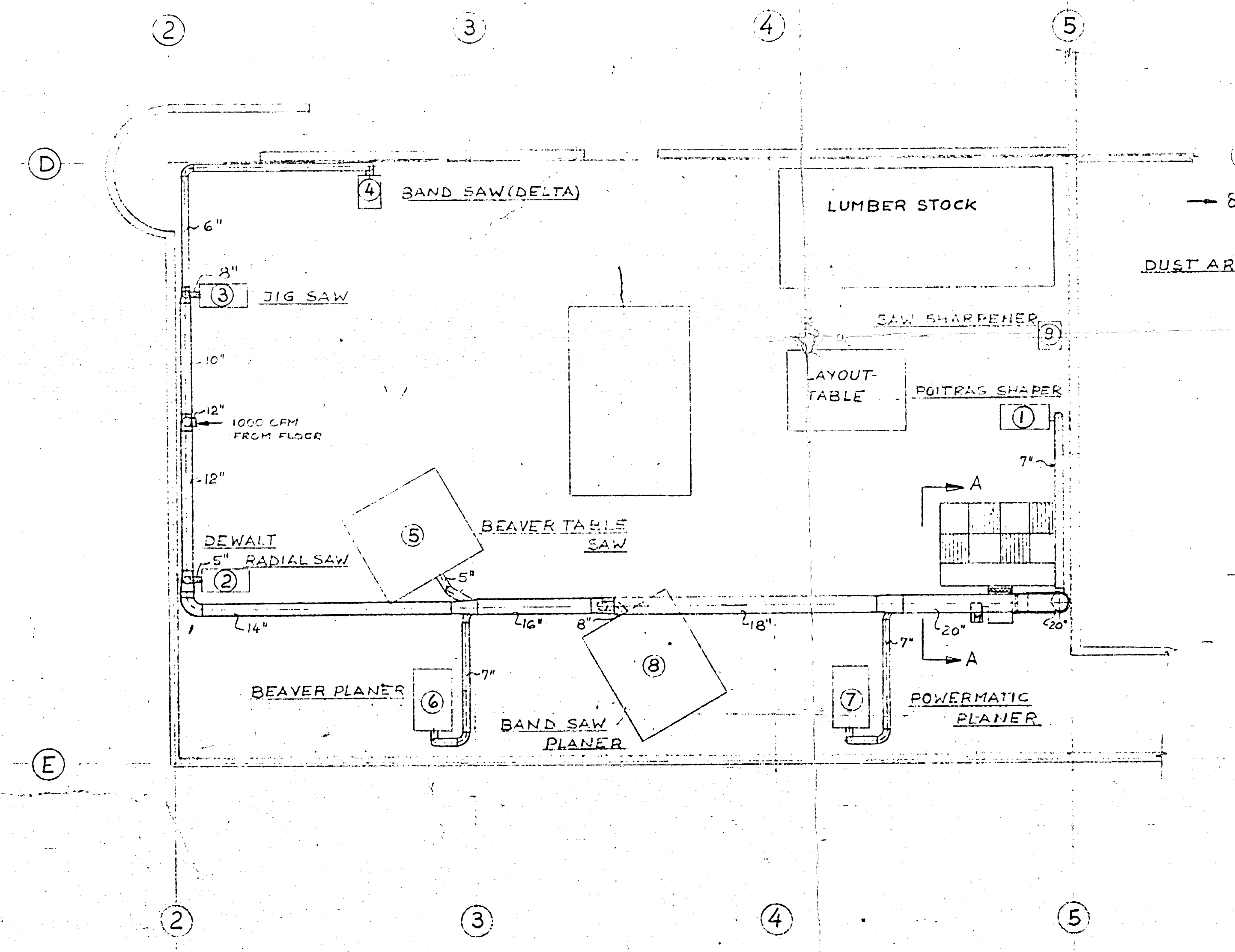


NOTE:-
ALL INFRA-RED HEATERS LOCATED AT OUTSIDE WALL TO BE ANGLE MOUNTED AS SHOWN ON DETAIL DWG 2185-605

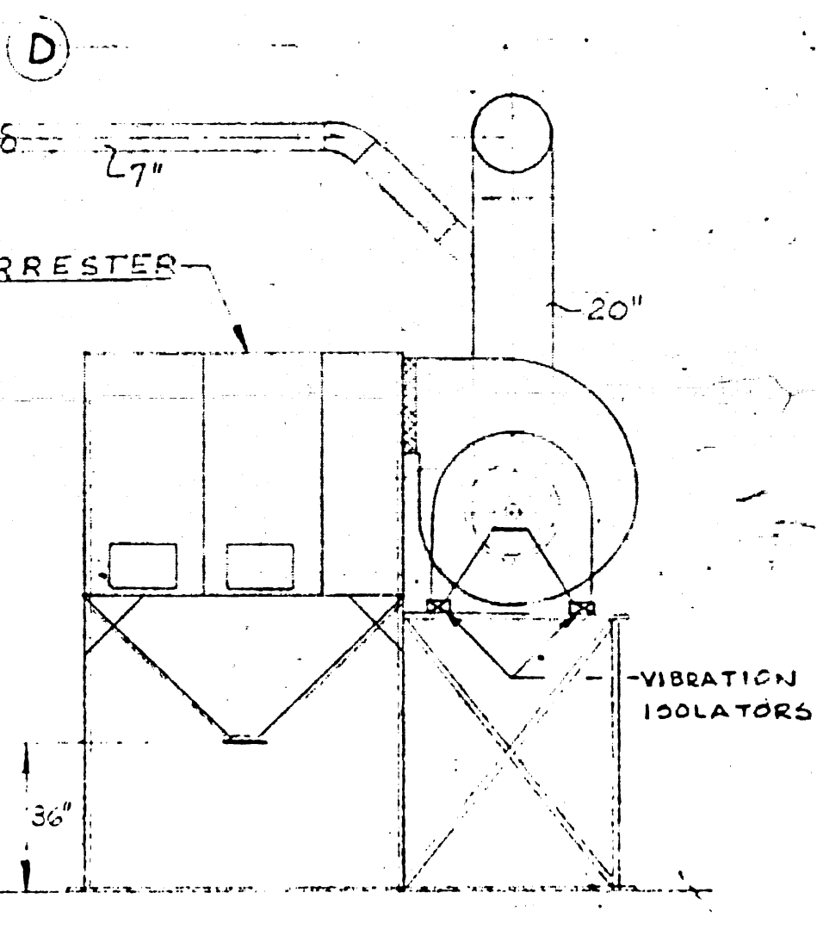
PLAN
WAYS & STREETS BUILDING
SCALE 1/16"=1'-0"



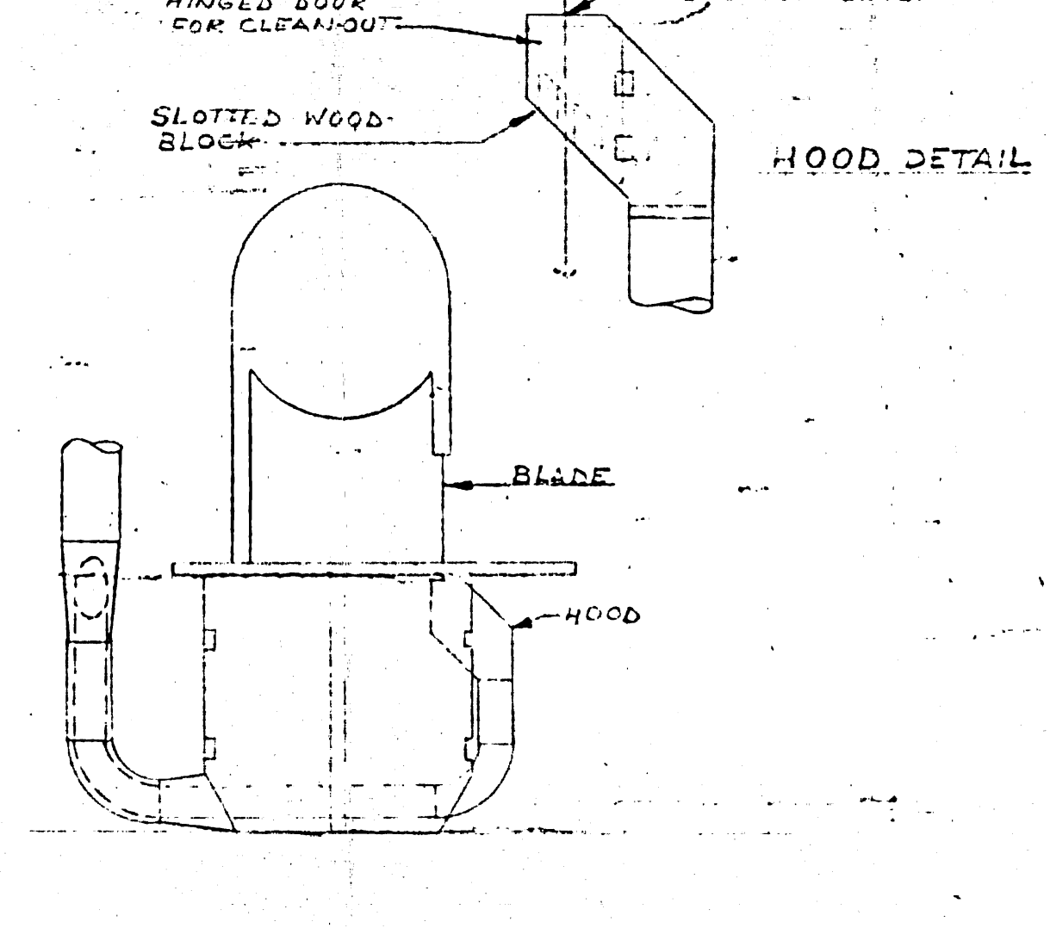
ABRASIVE SAW VENTILATION
OVERHAUL & REPAIR BUILDING
SCALE: 1/4" = 1'-0"



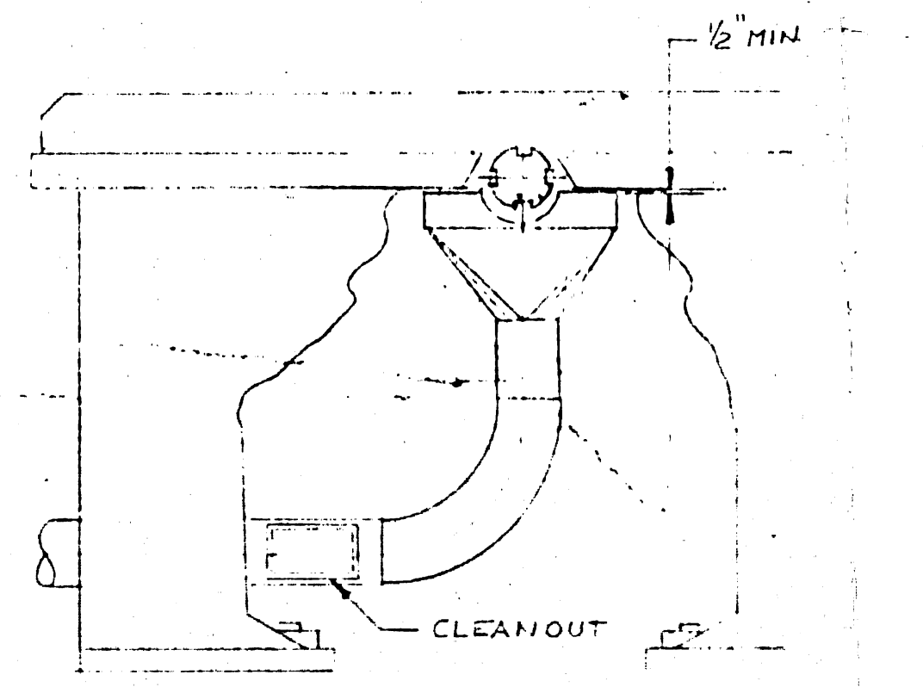
DUSTCOLLECTION CARPENTER'S SHOP



SECTION A-A
SCALE 1/4"-1'-0"



BAND SAW EXHAUST DUCT
N.T.S.



TYPICAL PLANER EXHAUST DUCT
N.T.S.

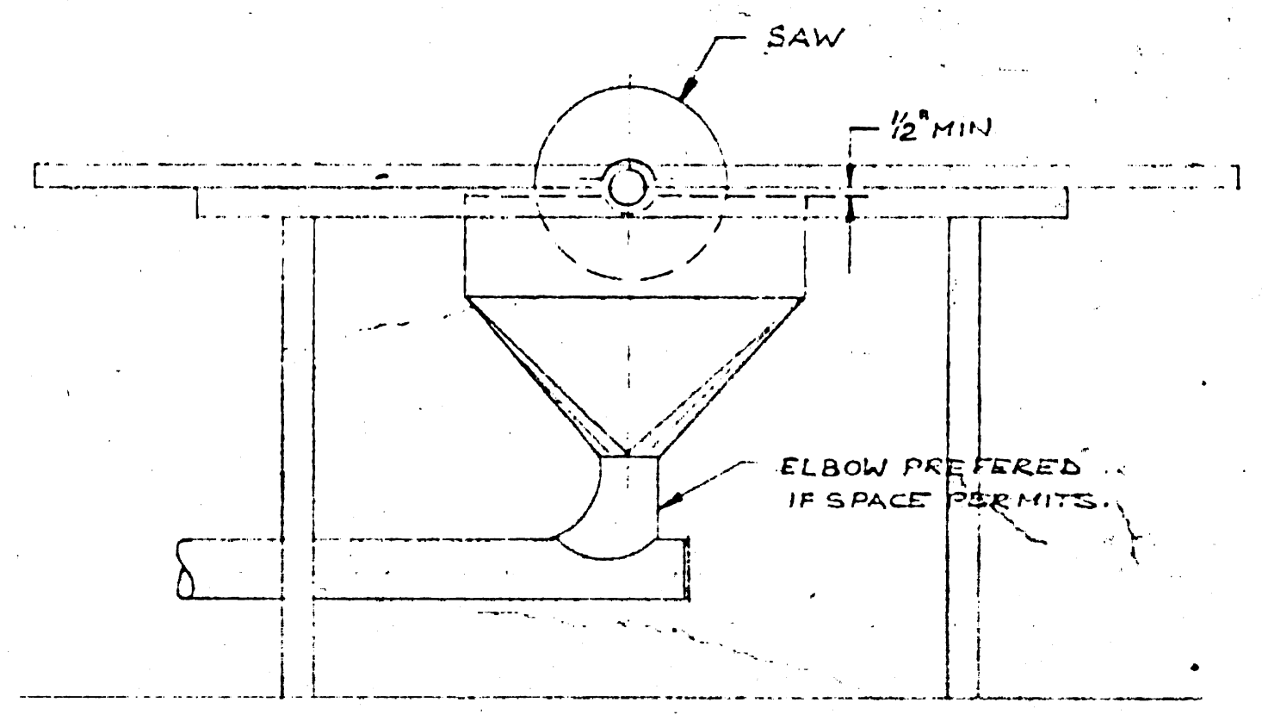
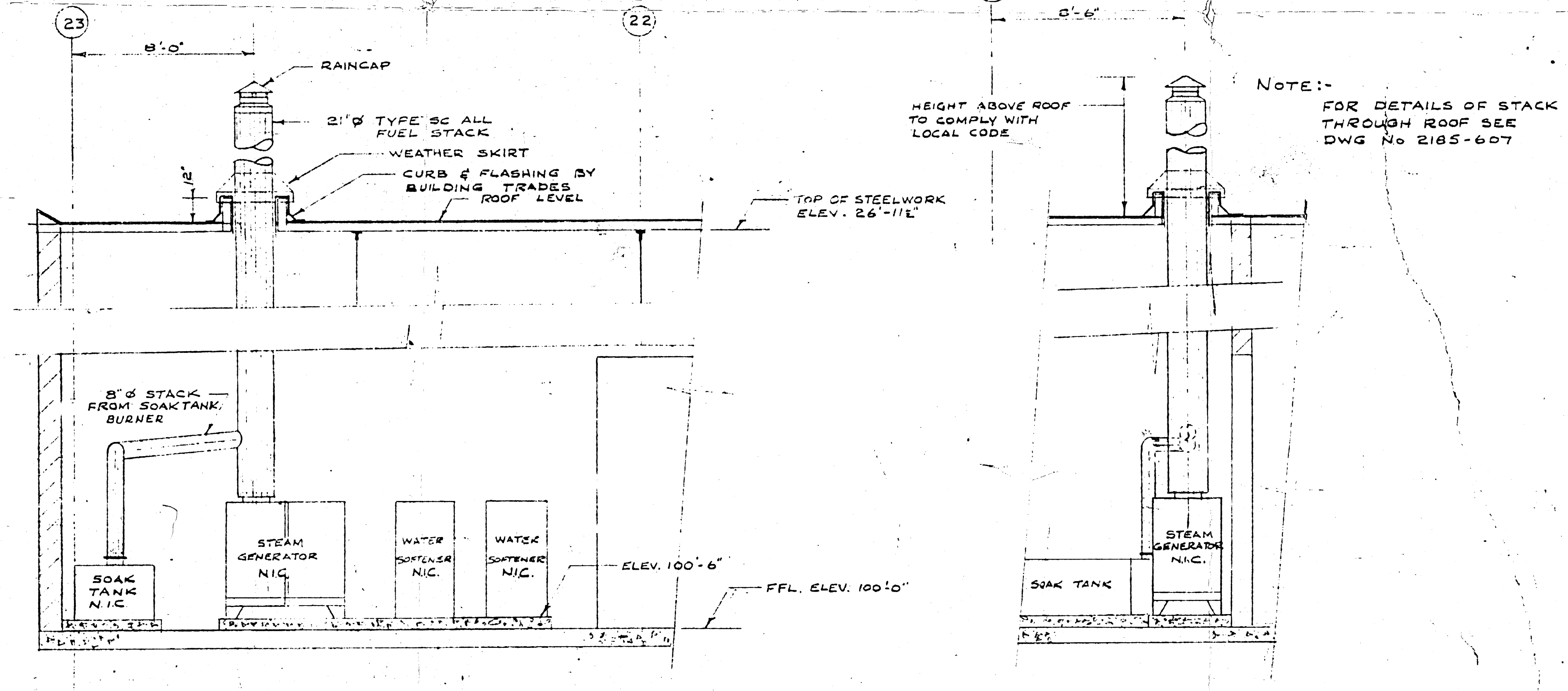
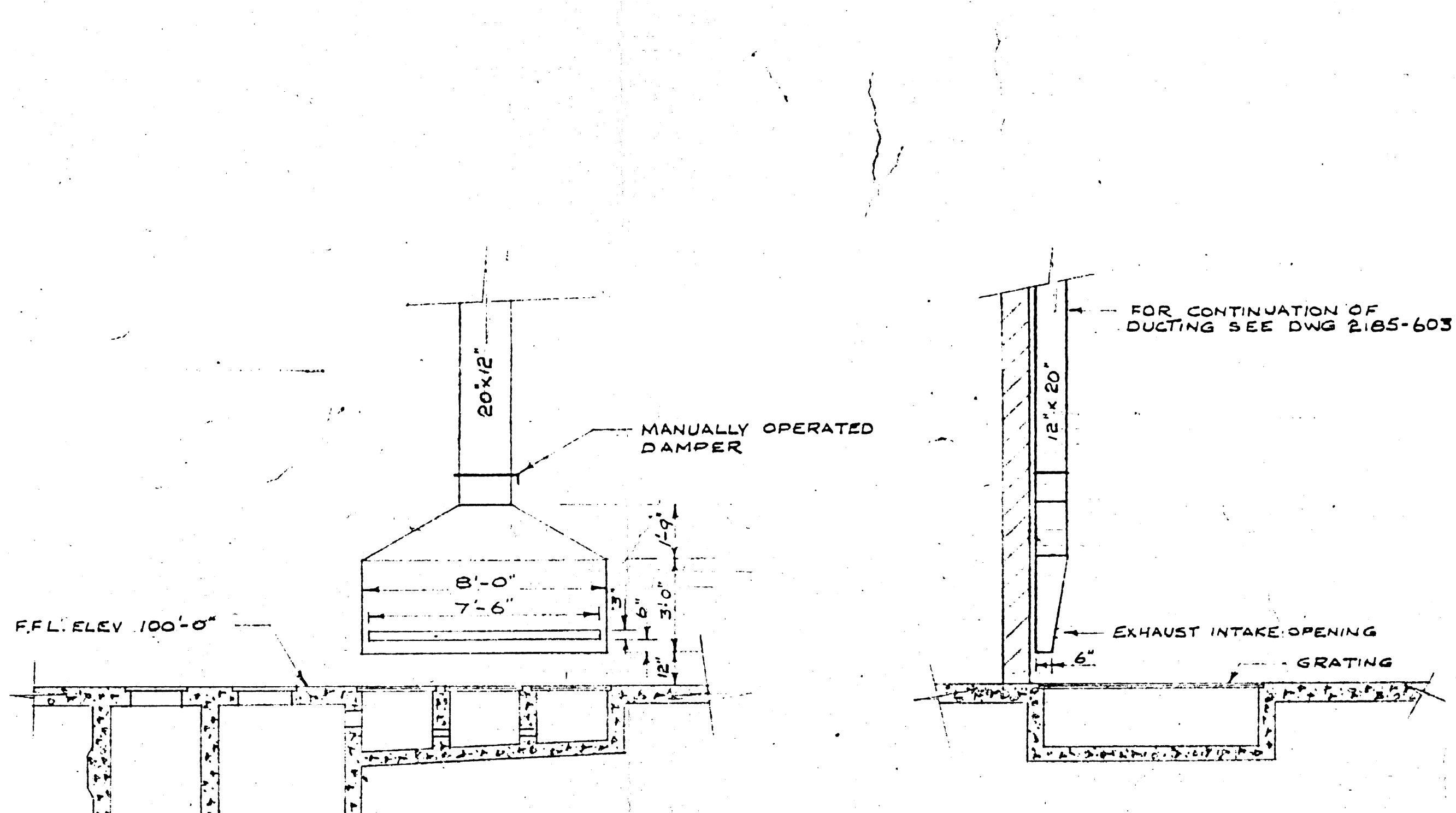


TABLE SAW EXHAUST DUCT
N.T.S.



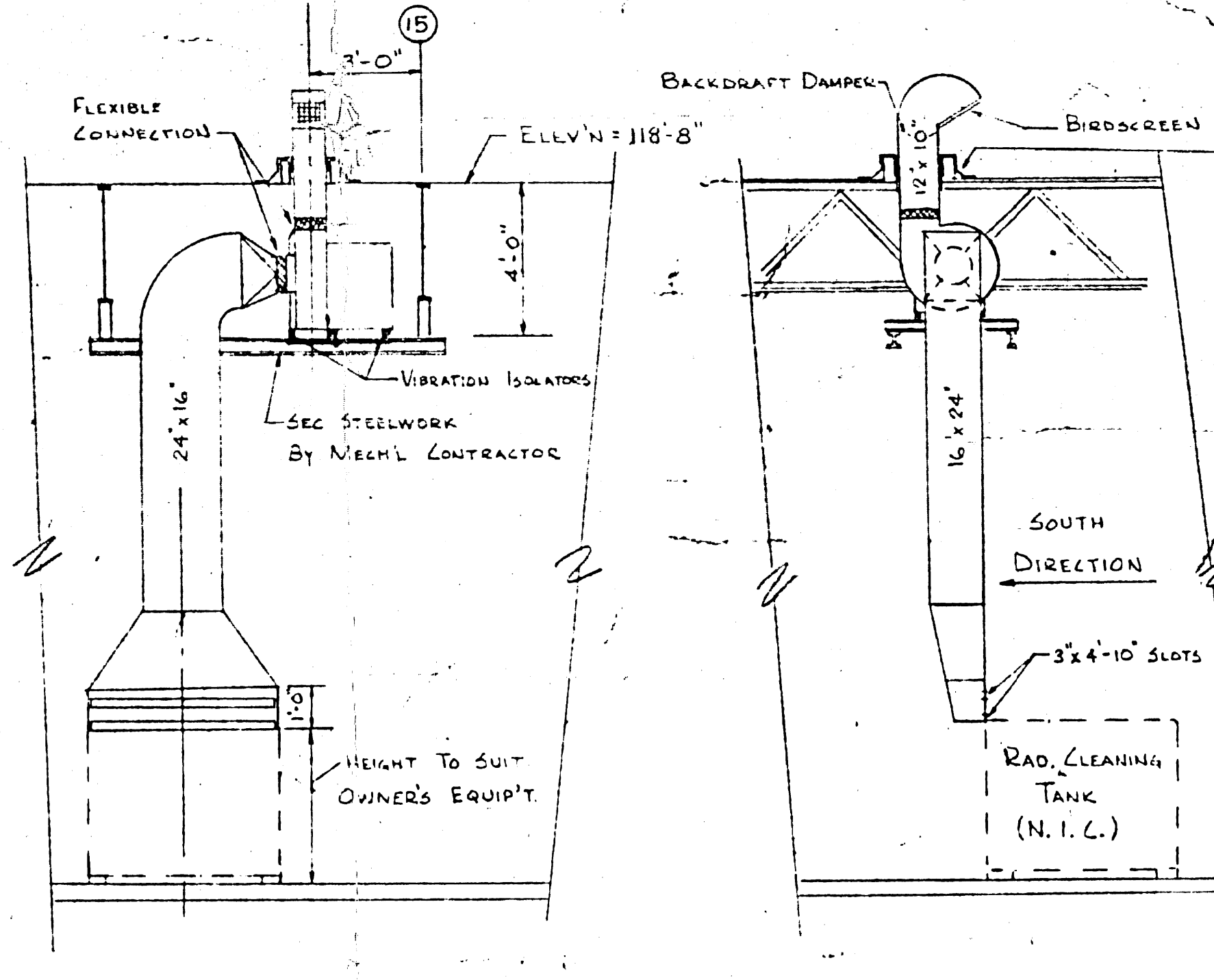
Note:-
FOR DETAILS OF STACK THROUGH ROOF SEE DWG No 2185-607

EQUIPMENT IN DEGREASING ROOM
OVERHAUL & REPAIR BUILDING
SCALE 1/4"=1'-0"



FOR DETAILS OF CLEANING PITS SEE DWG 2185-404

LAYOUT OF FUME HOOD IN DE-GREASING AREA
OVERHAUL & REPAIR BUILDING
SCALE 1/4"=1'-0"



RADIATOR CLEANING TANK VENTILATION SYSTEM
OVERHAUL & REPAIR BUILDING
SCALE: 1/4" = 1'-0"

2185-604

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
24.11.69	4		AS BUILT	R.McC.
31.7.69	5	3	REVISED TO SUIT OWNER'S EQUIPMENT AND REQUIREMENTS	I.F.E.
18.9.68	4	2	REVISED AS PER NOTICE OF PROPOSED CHANGE No 38	I.F.E.
29/5/68	3	1	REVISED AS PER ADDENDA 1 TO 5; FOR CONSTRUCTION	W.O'K.
19/1/68	2	0	FOR TENDER	
20/10/67	1	0	FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

WAYS & STREETS FACILITIES BUILDING
HEATING & VENTILATING — PLAN & DETAILS

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
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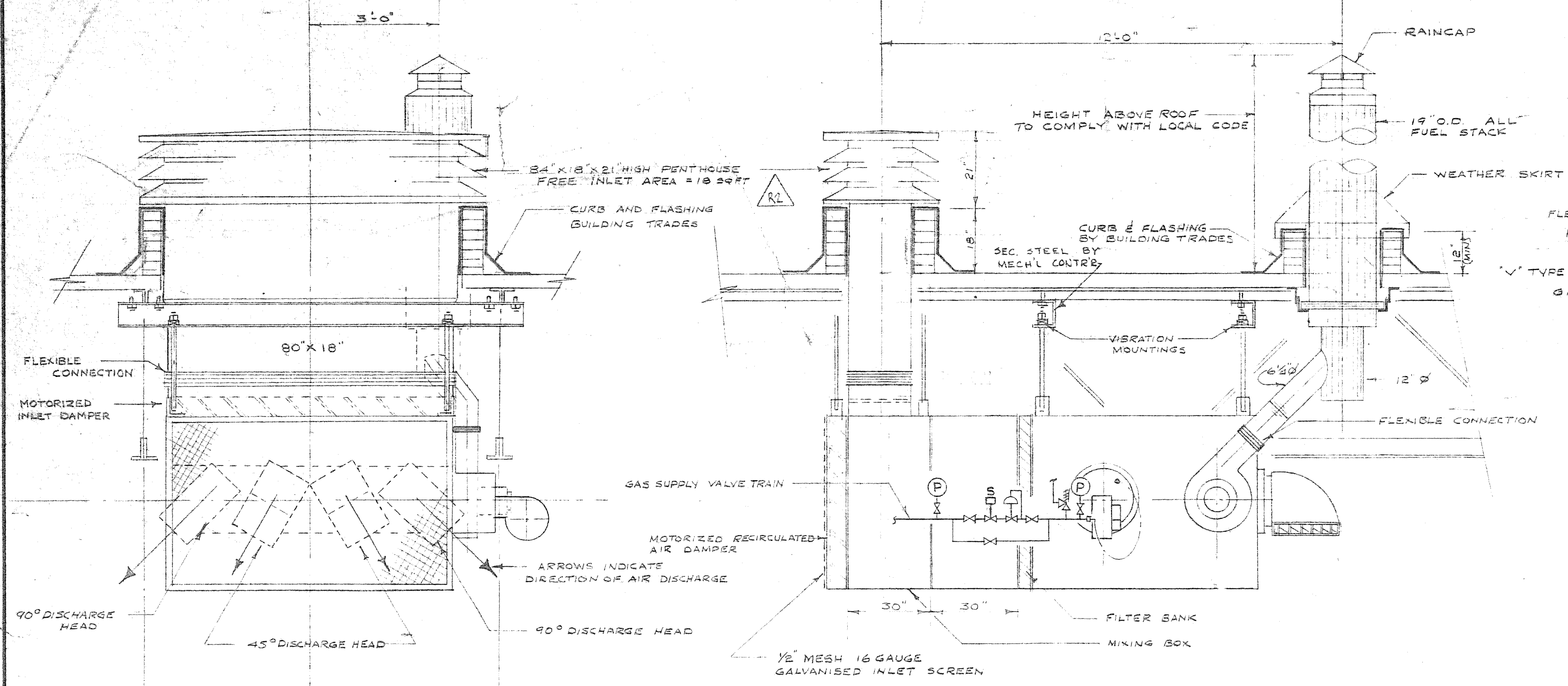
10 DONALD STREET, WINNIPEG, MANITOBA

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

LICENSED TO PRACTICE IN THE PROVINCE OF MANITOBA
My Licence Expires 10 Jan 1969

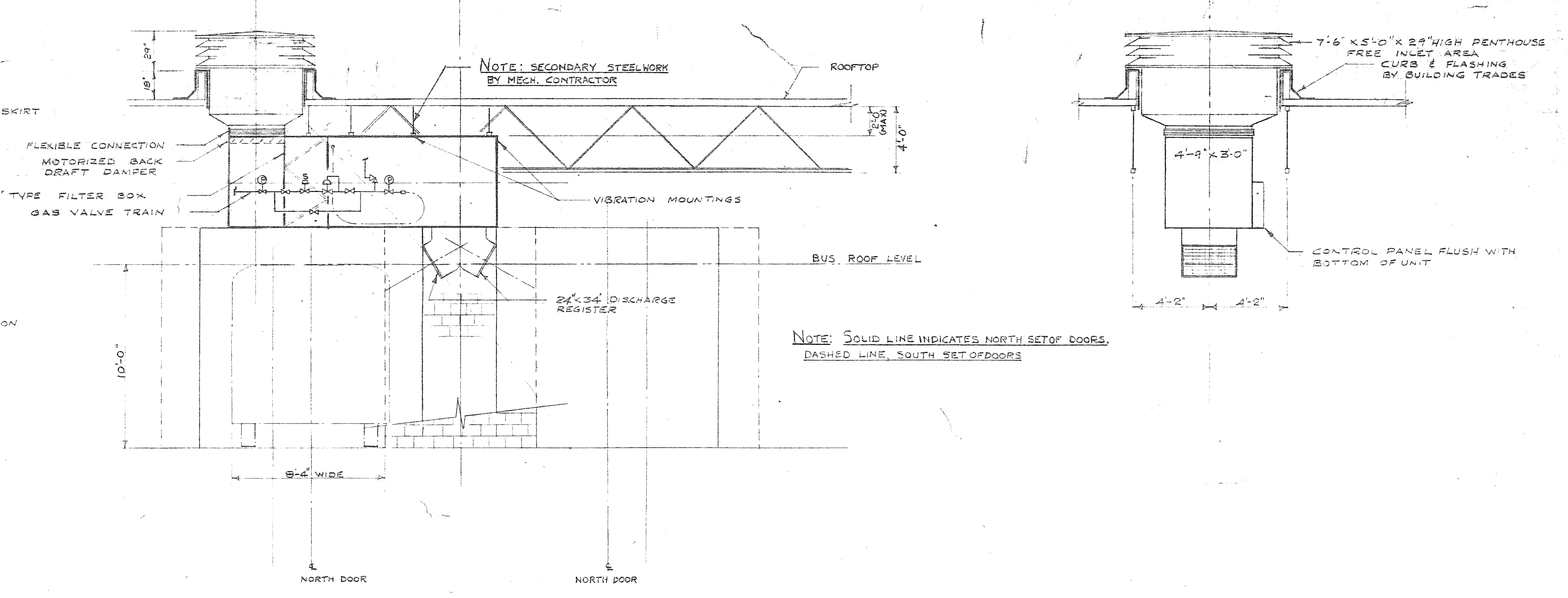
DRAWN BY W. O'Kane
CHECKED J.T.T.
FILE NO.
SHEET NO.
DATE AUGUST '67
SCALE AS SHOWN
DRAWING NO. 2185-604
MECHANICAL



Typical Arrangement Of Heating & Ventilating Unit # 1 R2

Garage Building

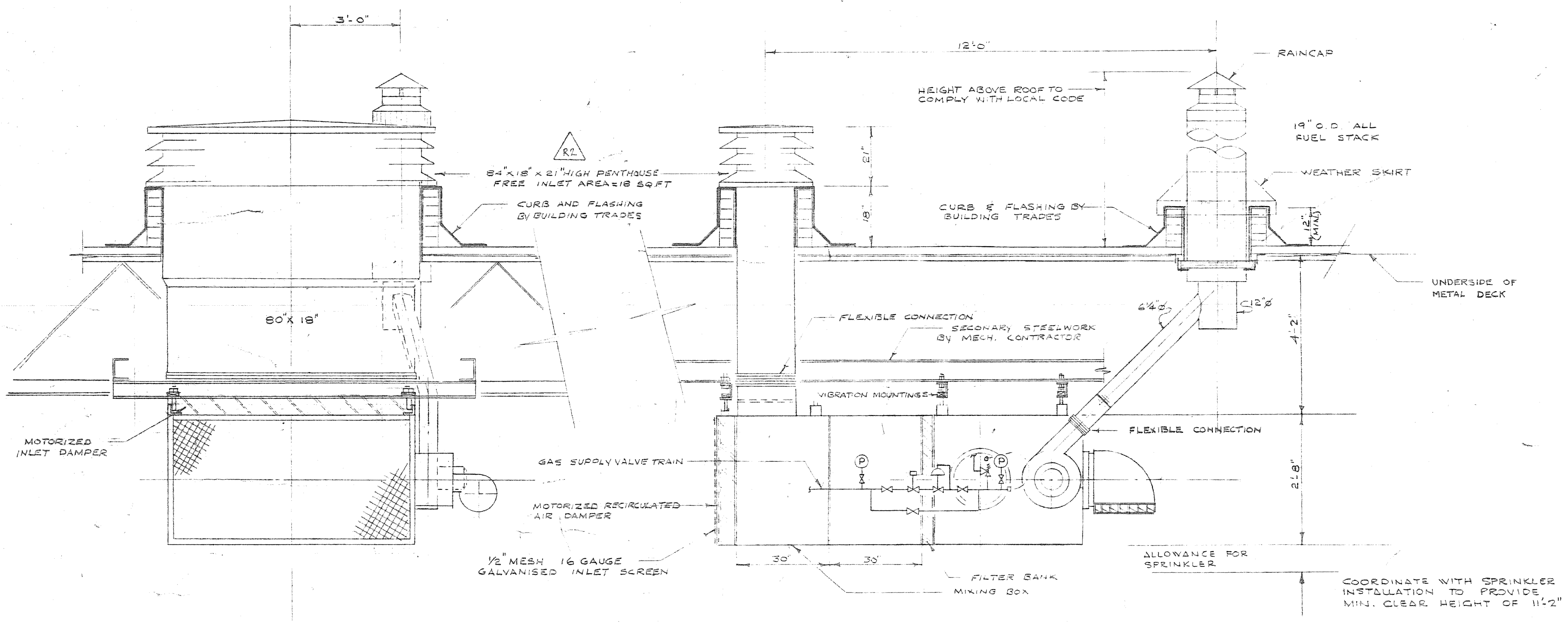
Scale ½" = 1'-0"



Note: Solid line indicates north set of doors.
Dashed line, south set of doors

Typical Arrangement Of Service Bay Direct Gas Fired Make-Up Air Units

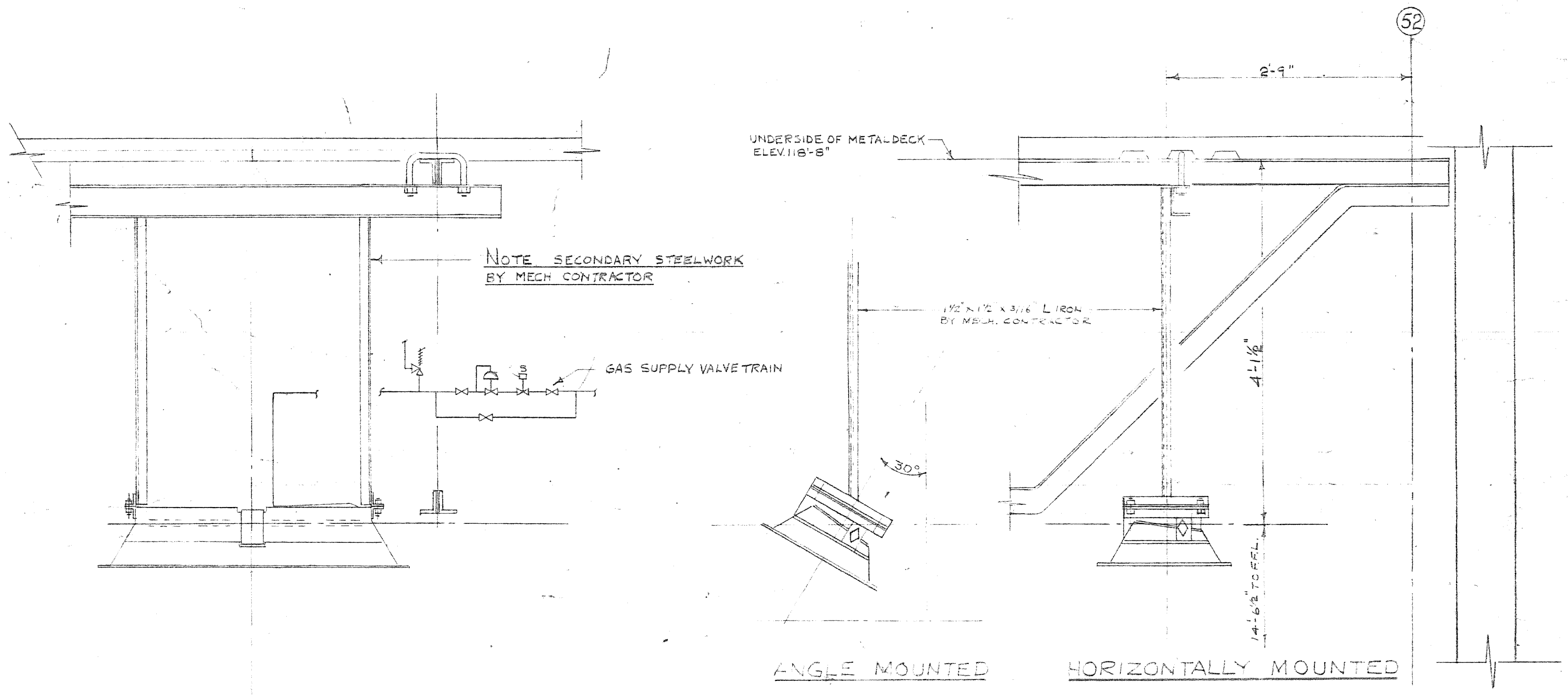
Scale ¼" = 1'-0"



Typical Arrangement Of Heating & Ventilating Unit # 2 R2

Garage Building

Scale ½" = 1'-0"

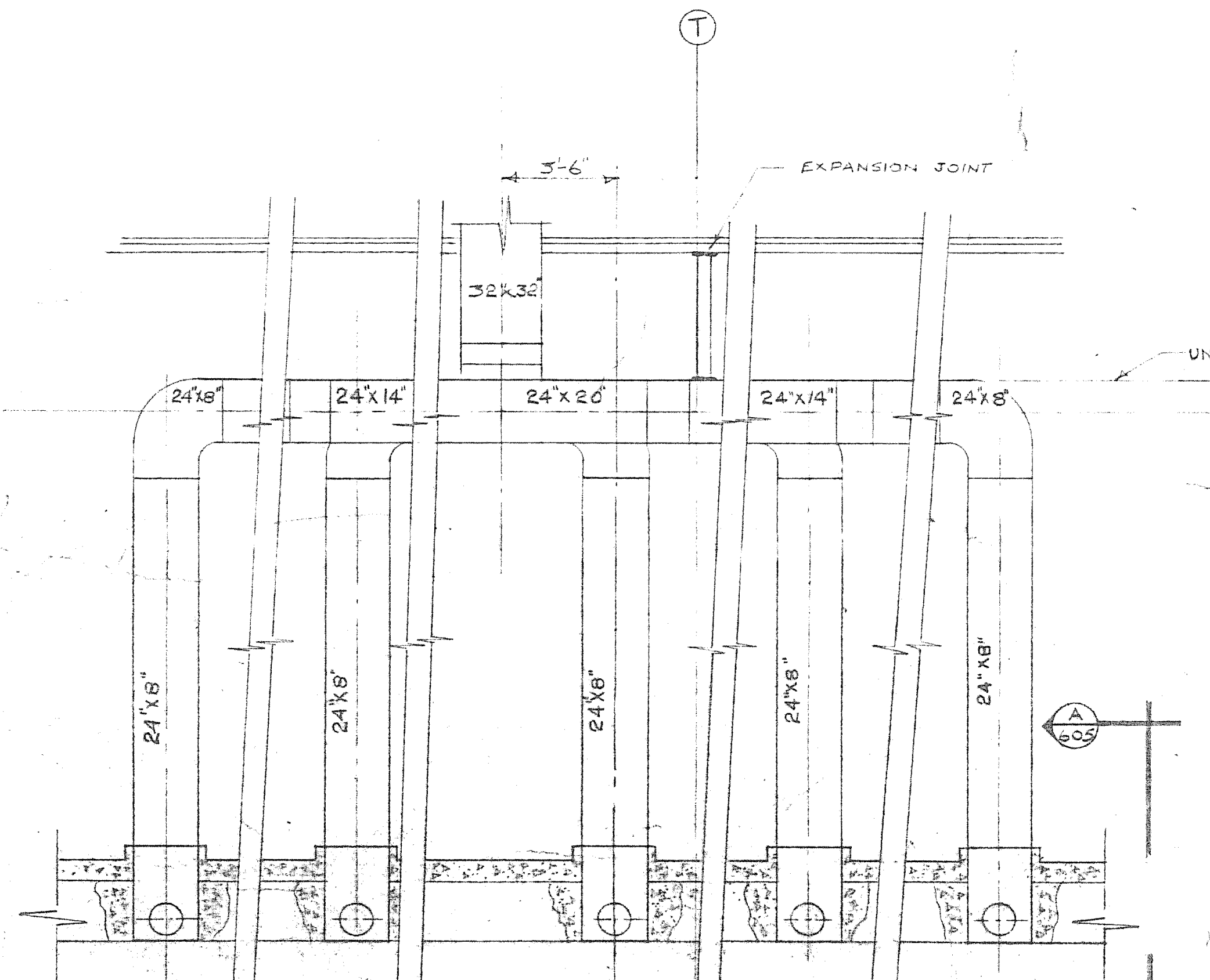


ANGLE MOUNTED

HORIZONTALLY MOUNTED

Typical Arrangement Of Infra-Red Gas Heater

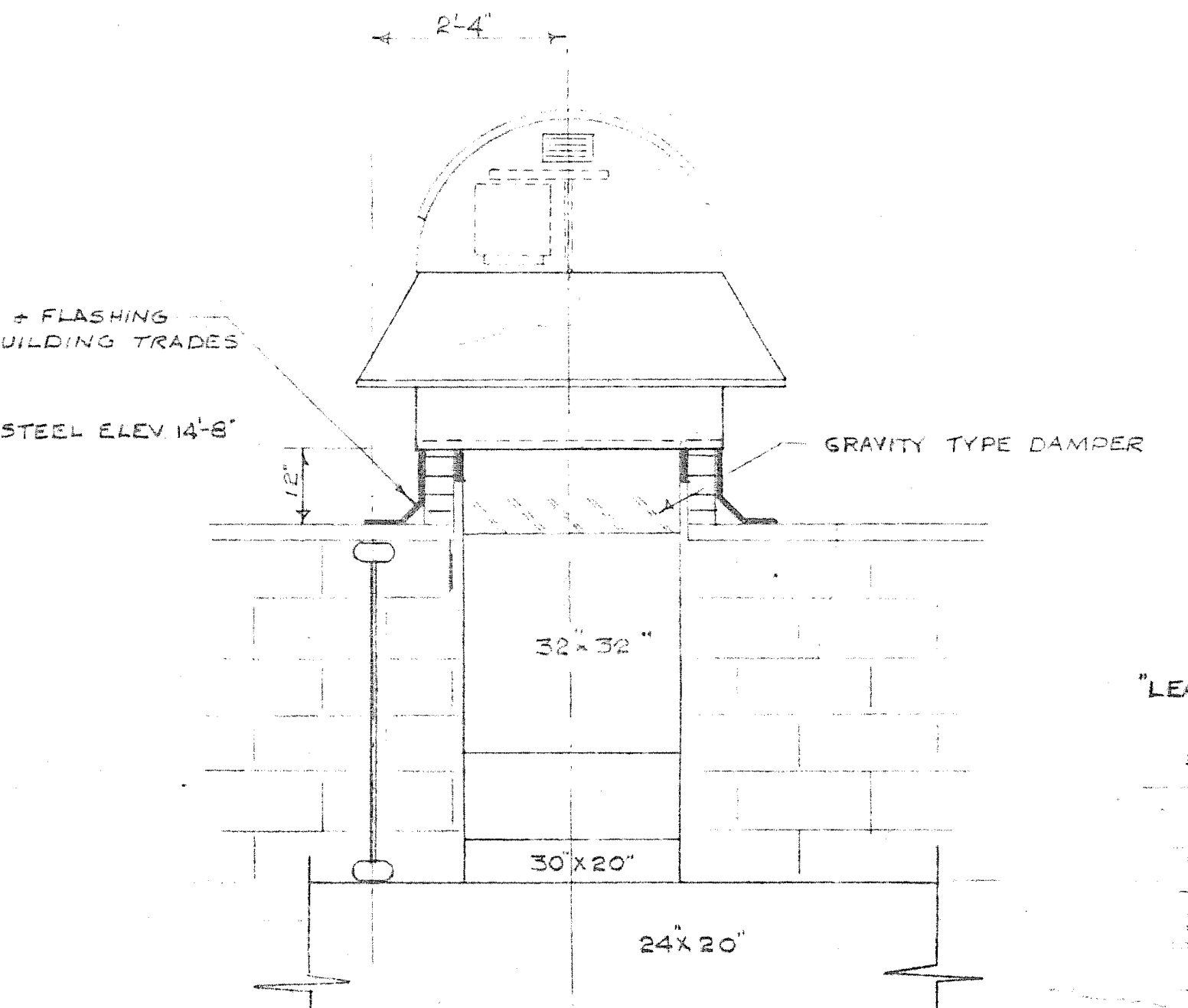
Scale 1" = 1'-0"



ELEVATION OF UNDERGROUND EXHAUST DUCTS AT WALL ON LINE 54

GARAGE BUILDING

SCALE ¼" = 1'-0"

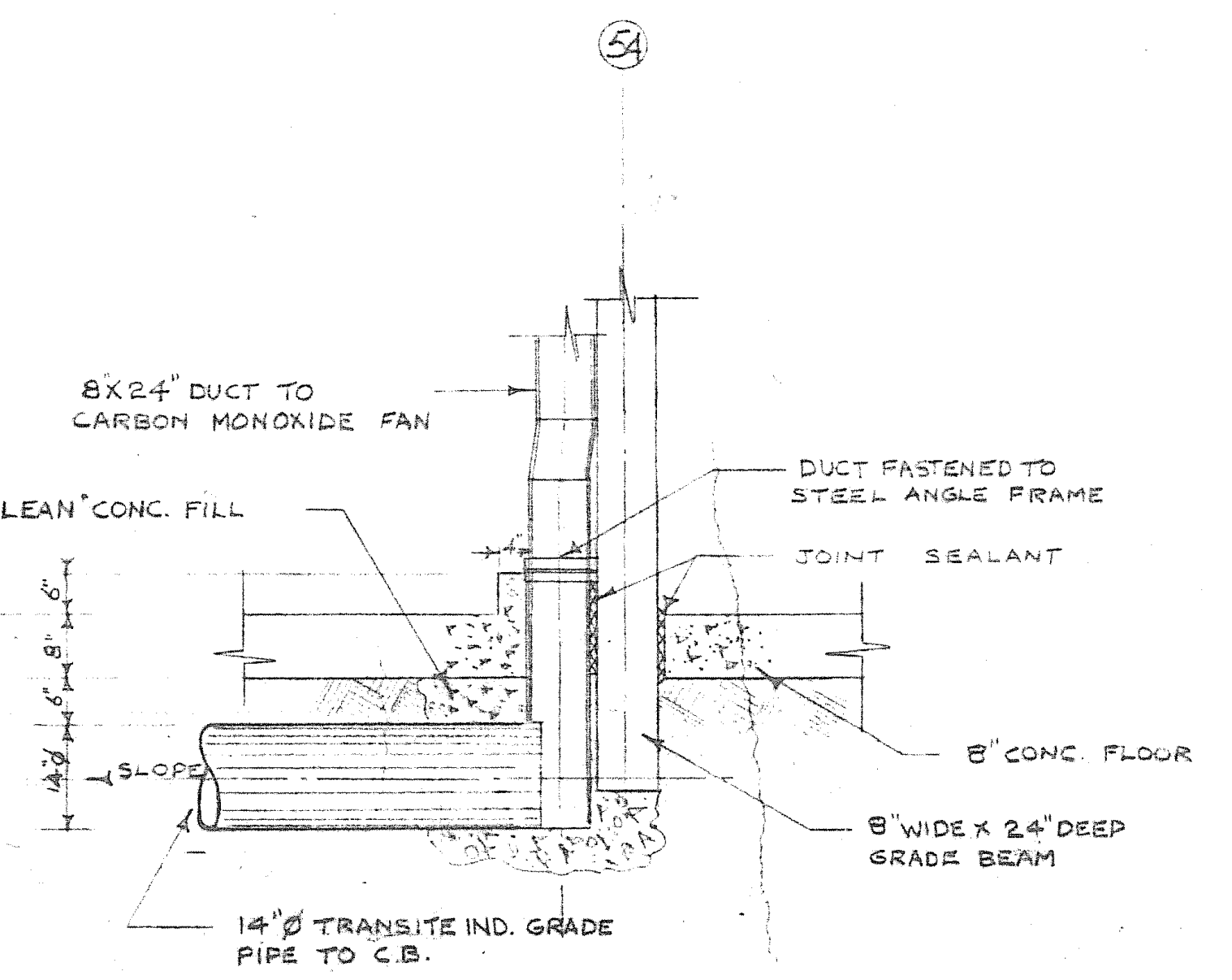


ARRANGEMENT OF ROOF VENTILATOR R2

AT WALL ON LINE 54

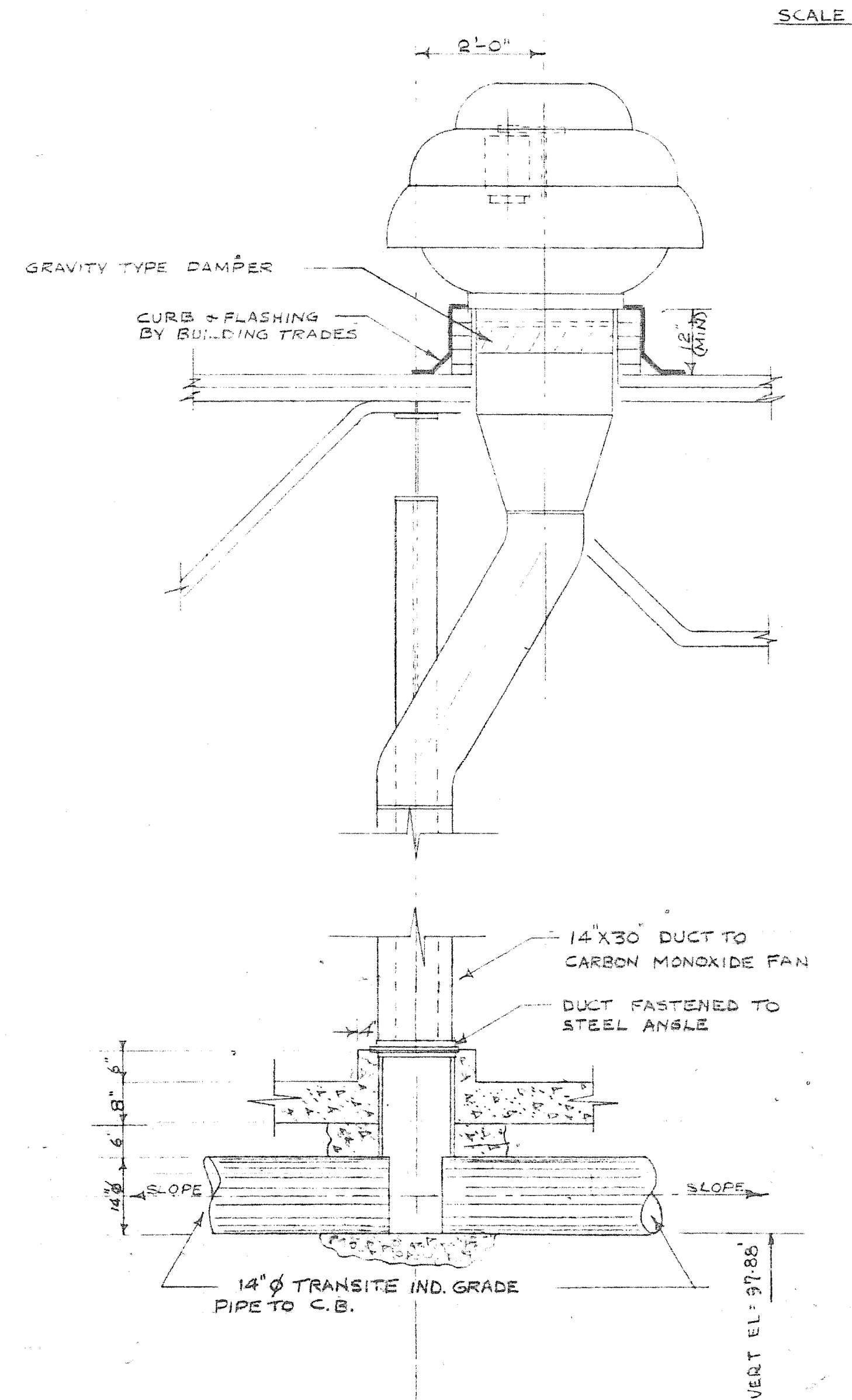
GARAGE BUILDING

SCALE ½" = 1'-0"



SECTION A/605

SCALE ½" = 1'-0"



Typical Arrangements Of Underground Duct & Ventilator At Columns R2

Garage Building

Scale ½" = 1'-0"

NOTE:-

1. NO WELDING OR DRILLING TO BUILDING STRUCTURE WILL BE PERMITTED
2. FOR TYPICAL CONTROL DIAGRAMS SEE DWG. 2185-614 & 615
3. ALL SECONDARY STEELWORK BY MECHANICAL CONTRACTOR

2185-605

MAY 1977

A. D. MARGISON ASSOCIATES LTD.
CONSULTING PROFESSIONAL ENGINEERS
SUITE 302—1320 YONGE STREET
TORONTO, ONTARIO M4T 1X2

NUMBER TEN ARCHITECTURAL GROUP
ARCHITECTS & PLANNERS 210-175 HARGRAVE ST. WINNIPEG, CANADA R3C 3R9 (204) 942-0981

APPROVED

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
1.11.79	6	2	AS BUILT - SEE H.&V. EQUIP. SHOP DRAWINGS	J.M.
9.5.77	5	1	GARAGE ADDITION - FOR TENDER	
24/11/69	4		AS BUILT	R.MCC
29/3/68	3	0	FOR CONSTRUCTION	
19/1/68	2	0	FOR TENDER	
20/10/67	1	0	FOR APPROVAL	

ISSUE OR REVISION

A. D. MARGISON
MAY 1977

J. T. F. THORPE

LICENSED TO PRACTICE IN THE PROVINCE OF MANITOBA
My Licence Expires: 10 Jan. 1968

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

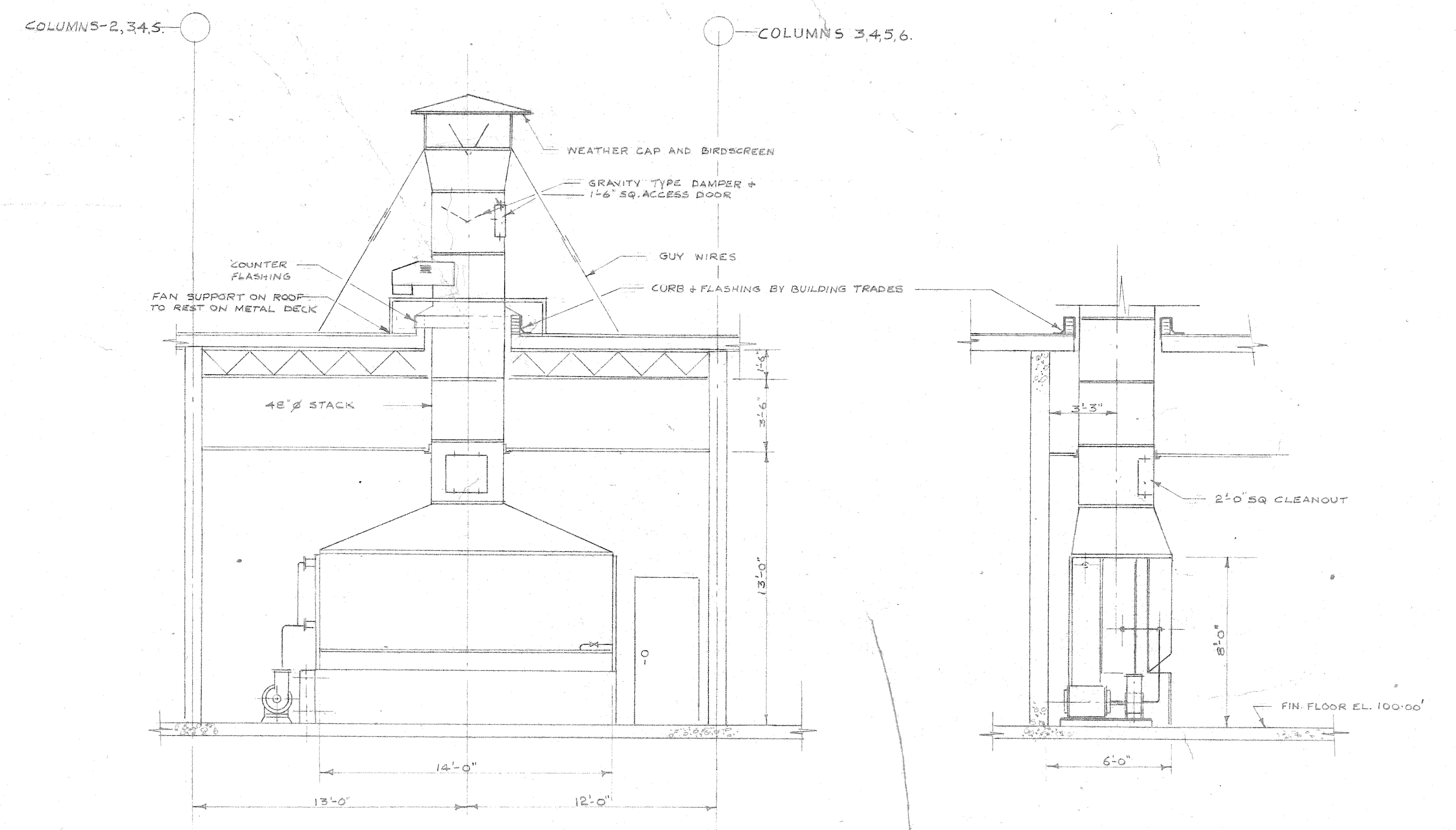
HEATING & VENTILATING - DETAILS

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

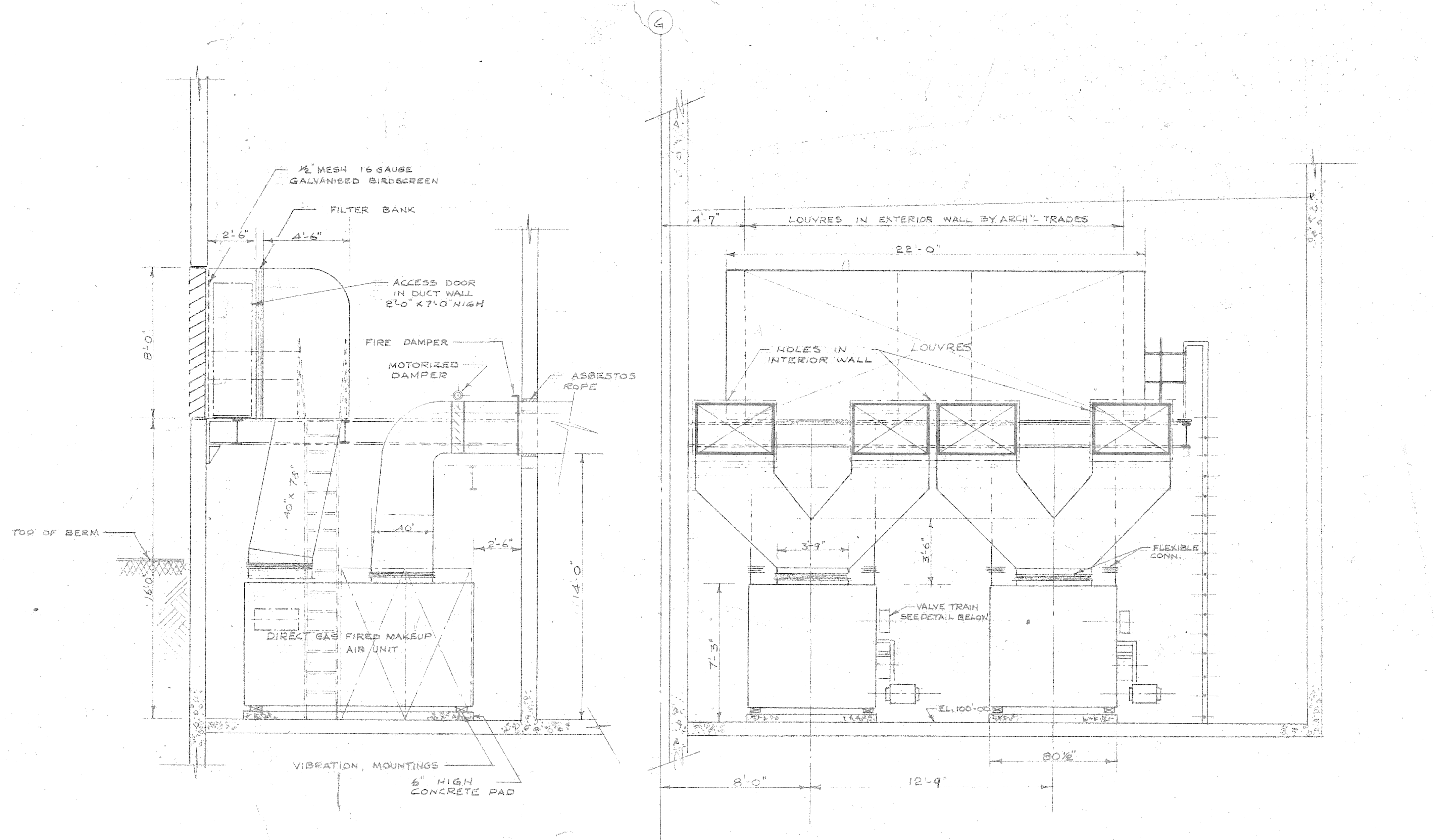
ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY	W G O'Keefe	DATE	AUGUST '67
CHECKED	J.T.T.	SCALE	AS SHOWN
FILE No.		DRAWING No.	2185 - 605 MECHANICAL
SHEET No.			



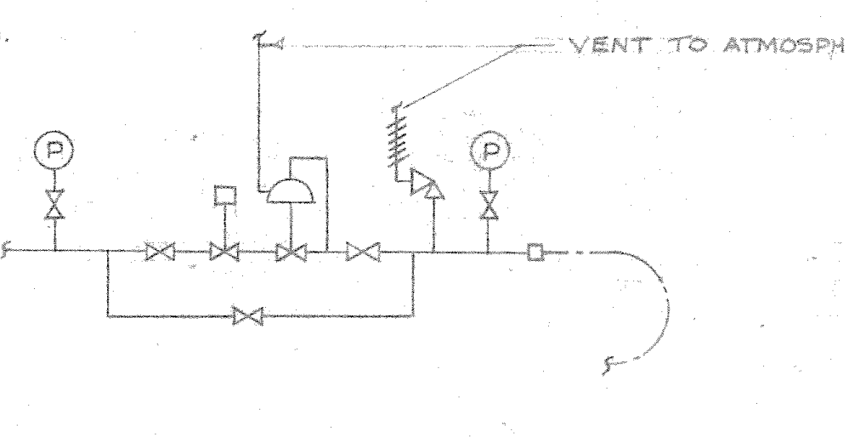
WATER WASH PAINT SPRAY BOOTH ARRANGEMENT
OVERHAUL & REPAIR BUILDING
SCALE 1/4" = 1'-0"



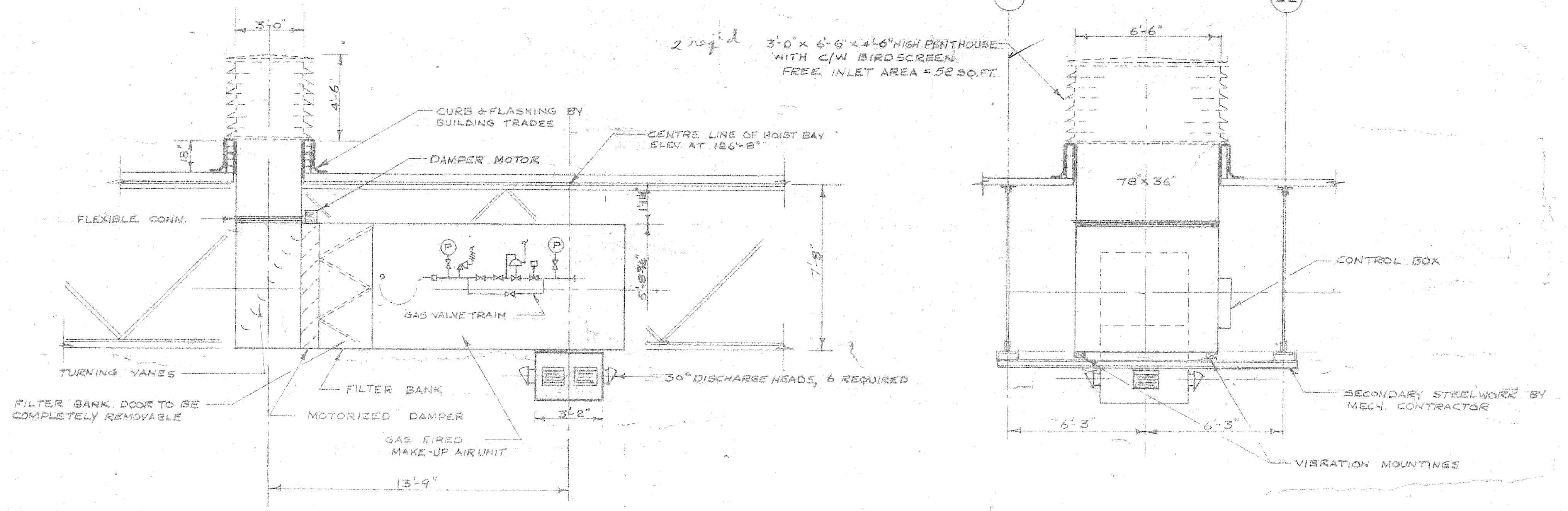
ELEVATION

ELEVATION

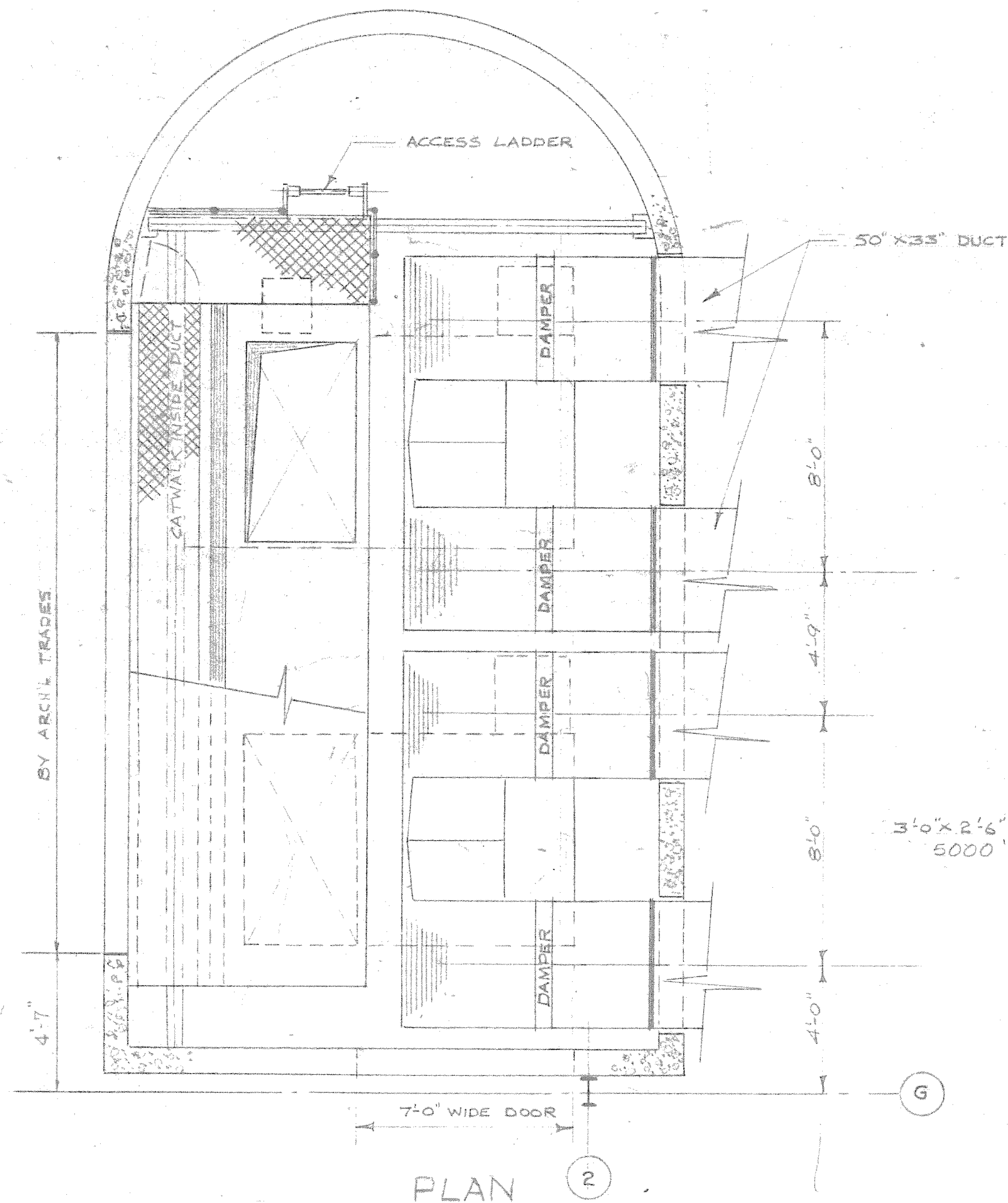
NOTE: MAIN STEEL BY STRUCTURAL TRADES; PLATFORM & LADDER BY ARCHITECTURAL TRADES.



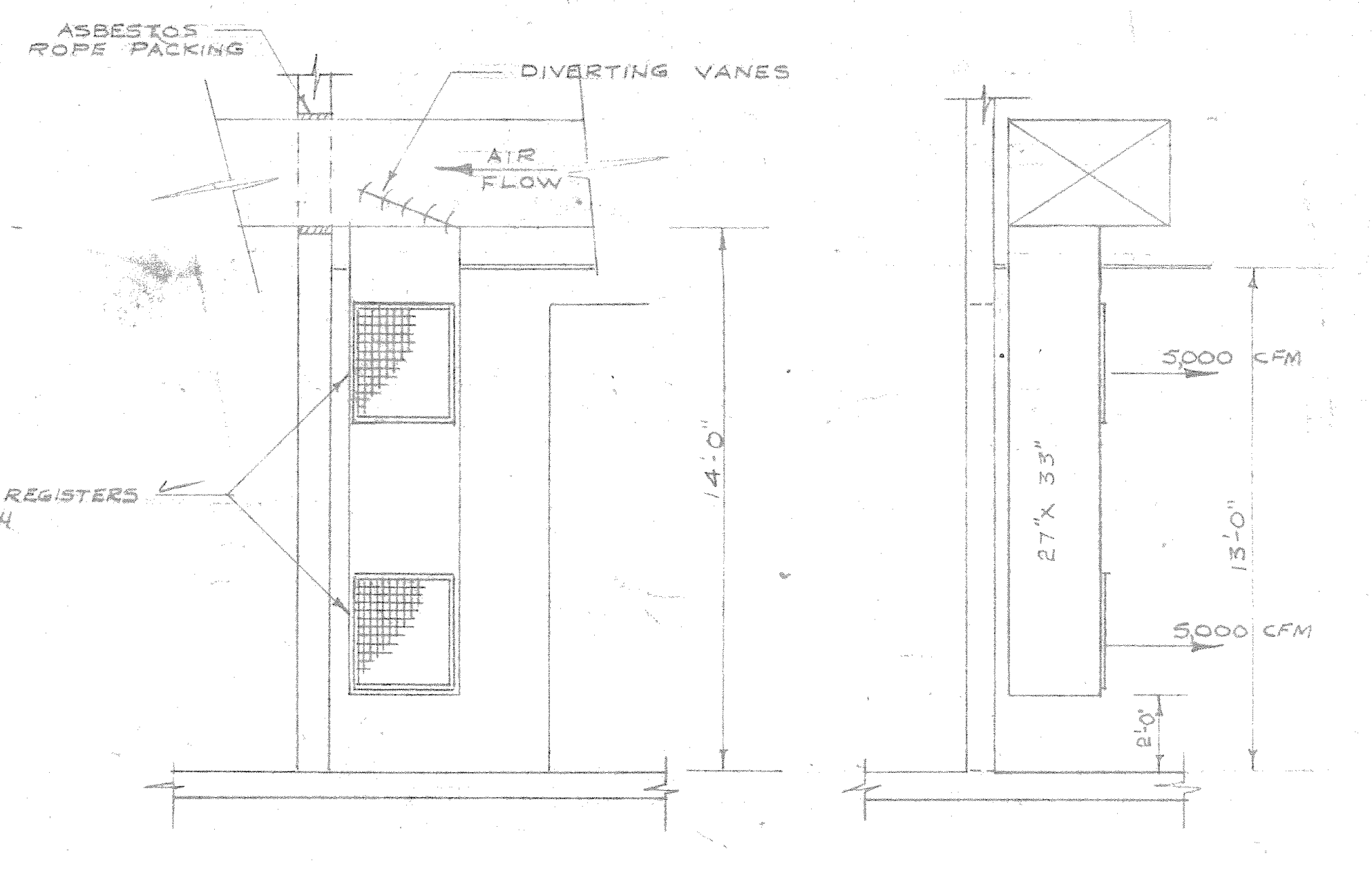
TYPICAL GAS VALVE TRAIN
NOT TO SCALE



LAYOUT OF MAKE-UP AIR UNIT
IN HOIST BAY
OVERHAUL & REPAIR BUILDING
SCALE 1/4" = 1'-0"

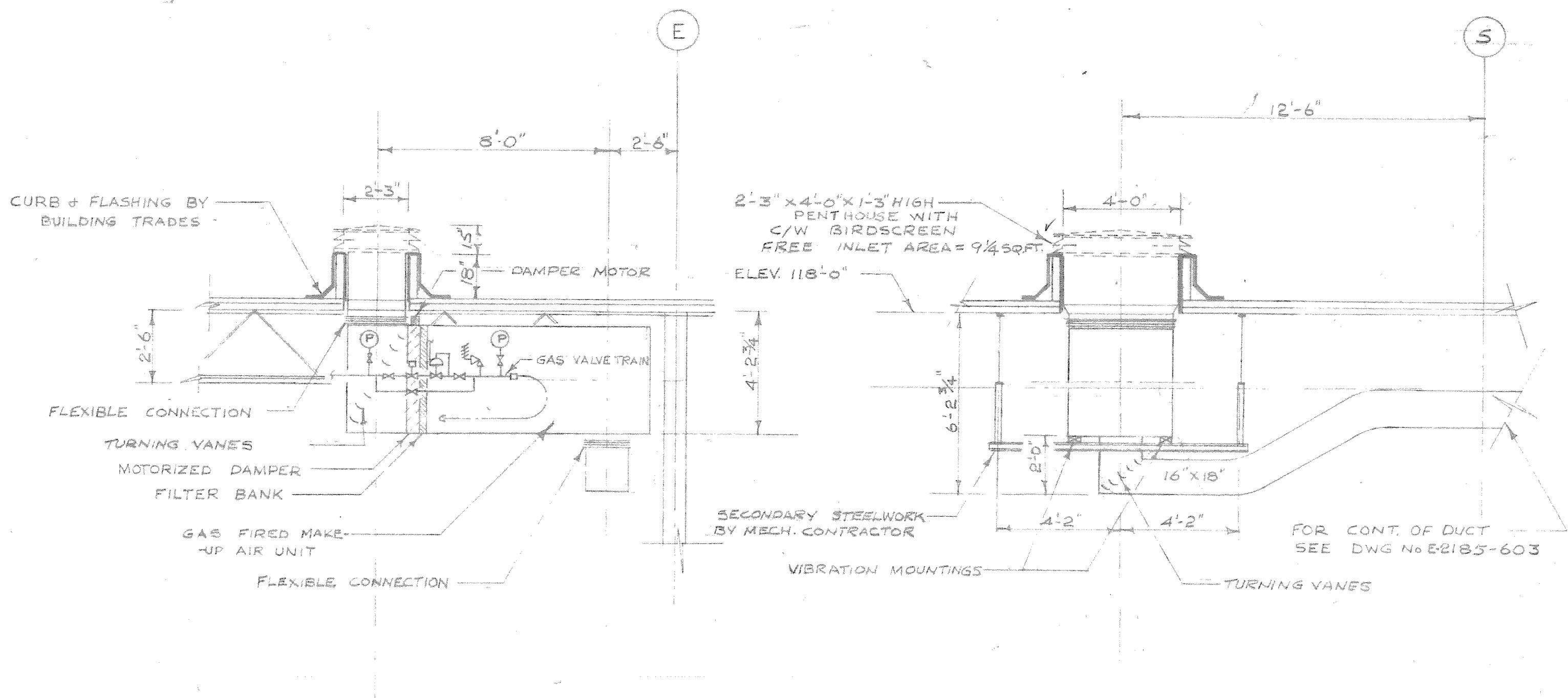


PLAN

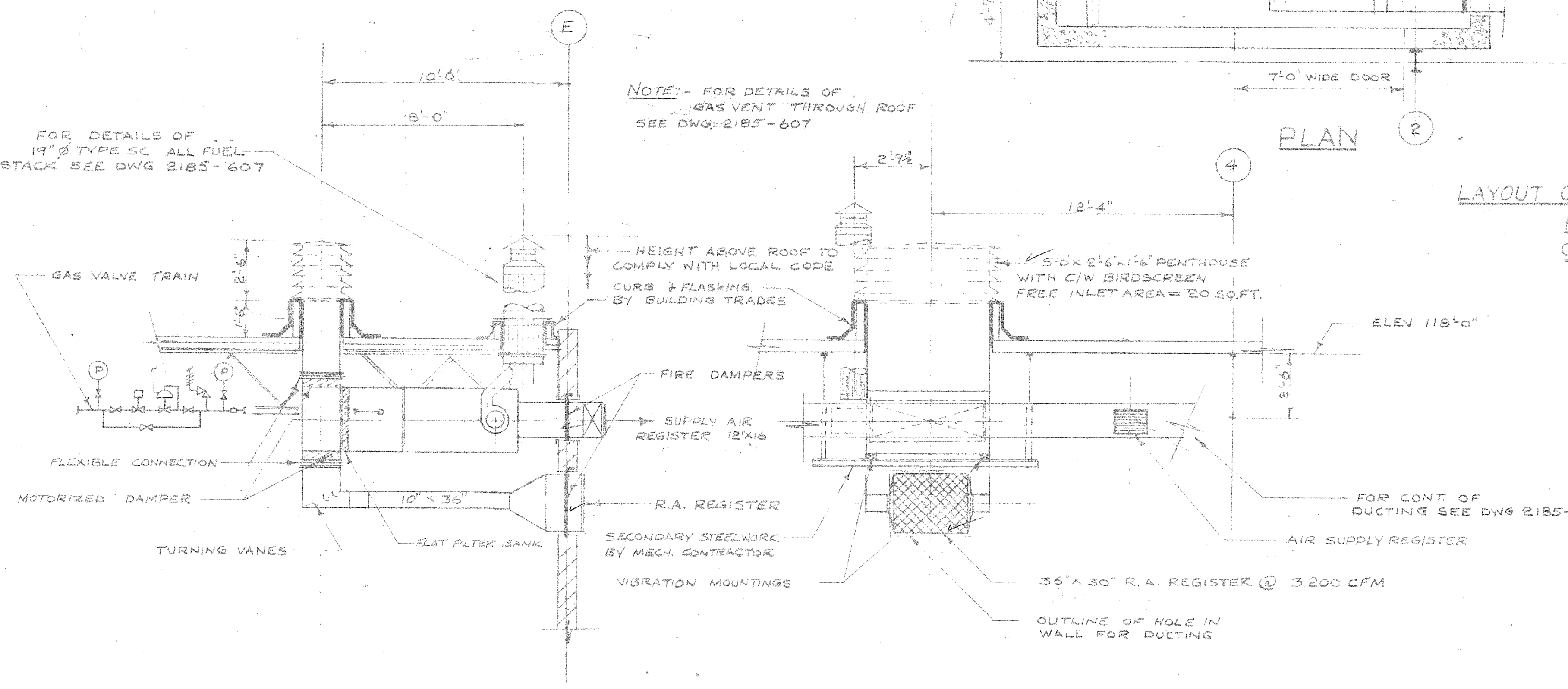


TYPICAL AIR DISCHARGE IN PAINT SPRAY BOOTH
SCALE 1/8" = 1'-0"

LAYOUT OF MAKE-UP AIR UNITS & DUCTING
FOR PAINT SPRAY BOOTHS
OVERHAUL & REPAIR BUILDING
SCALE 1/8" = 1'-0"



LAYOUT OF MAKE-UP AIR UNIT AND DUCTING
FOR POLE PAINTING AREA
OVERHAUL & REPAIR BUILDING
SCALE 1/4" = 1'-0"



LAYOUT OF HEATING & VENTILATING & DUCTWORK
OF SIGN SHOP
OVERHAUL & REPAIR BUILDING
SCALE 1/4" = 1'-0"

NOTE:- NO WELDING OR DRILLING TO BUILDING STEEL WILL BE PERMITTED

2185 - 606

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
19/1/68	2	0	FOR TENDER	
20/10/67	1	0	FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

HEATING & VENTILATING - DETAILS

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
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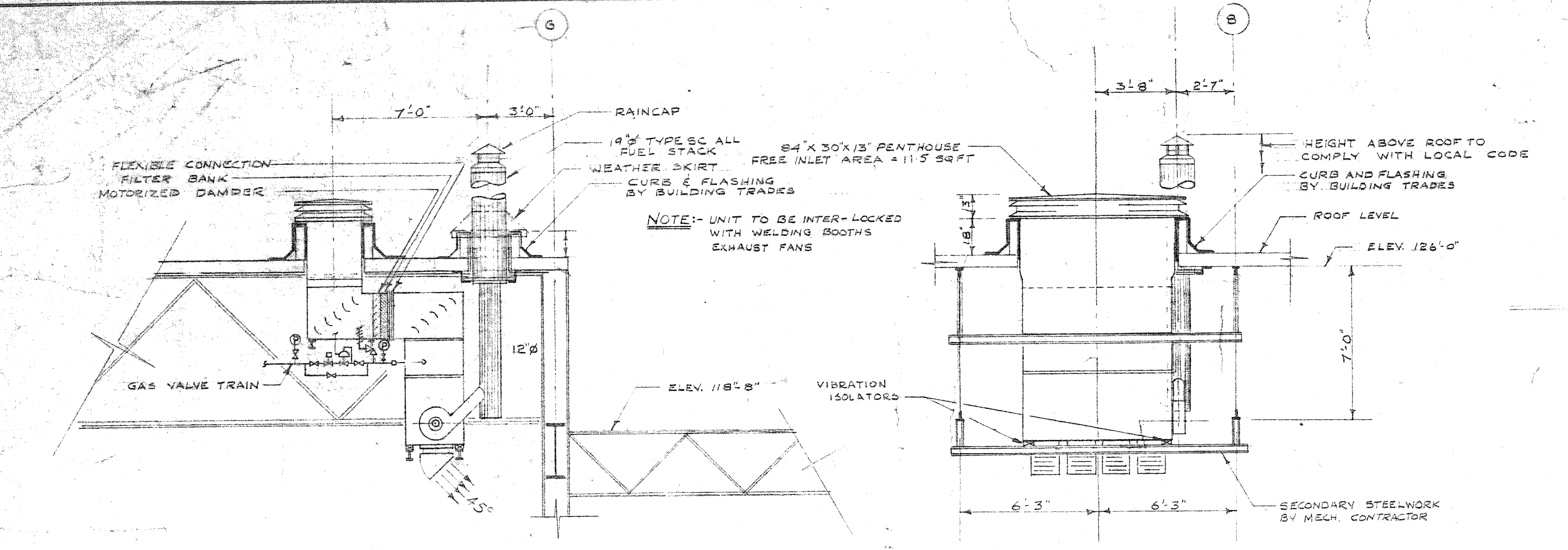
10 DONALD STREET, WINNIPEG, MANITOBA

J. T. F. THORPE

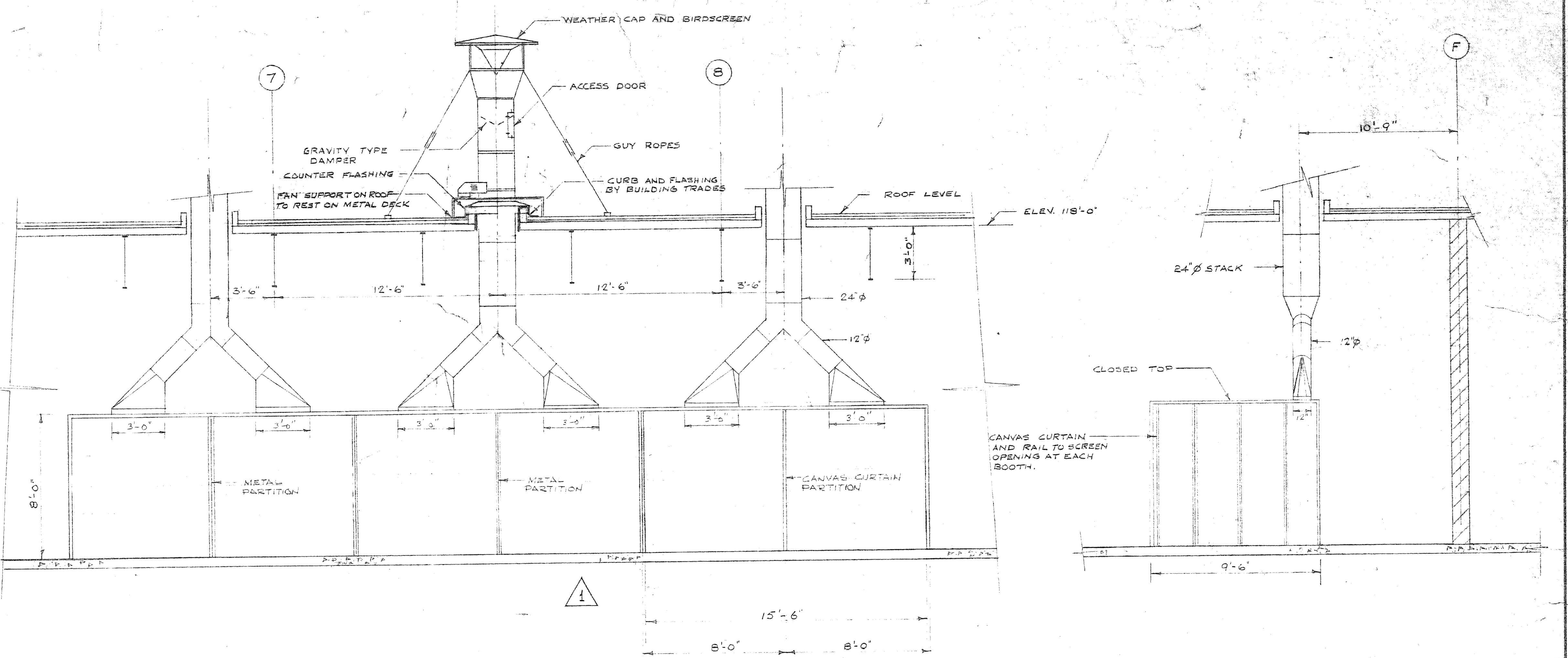
LICENSED TO PRACTICE
IN THE
PROVINCE OF MANITOBA
My Licence Expires: 10 Jan. 1968

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY
CHECKED J.T.T.
FILE No.
SHEET No.
DATE AUGUST '67
SCALE AS SHOWN
DRAWING No. 2185-606
MECHANICAL



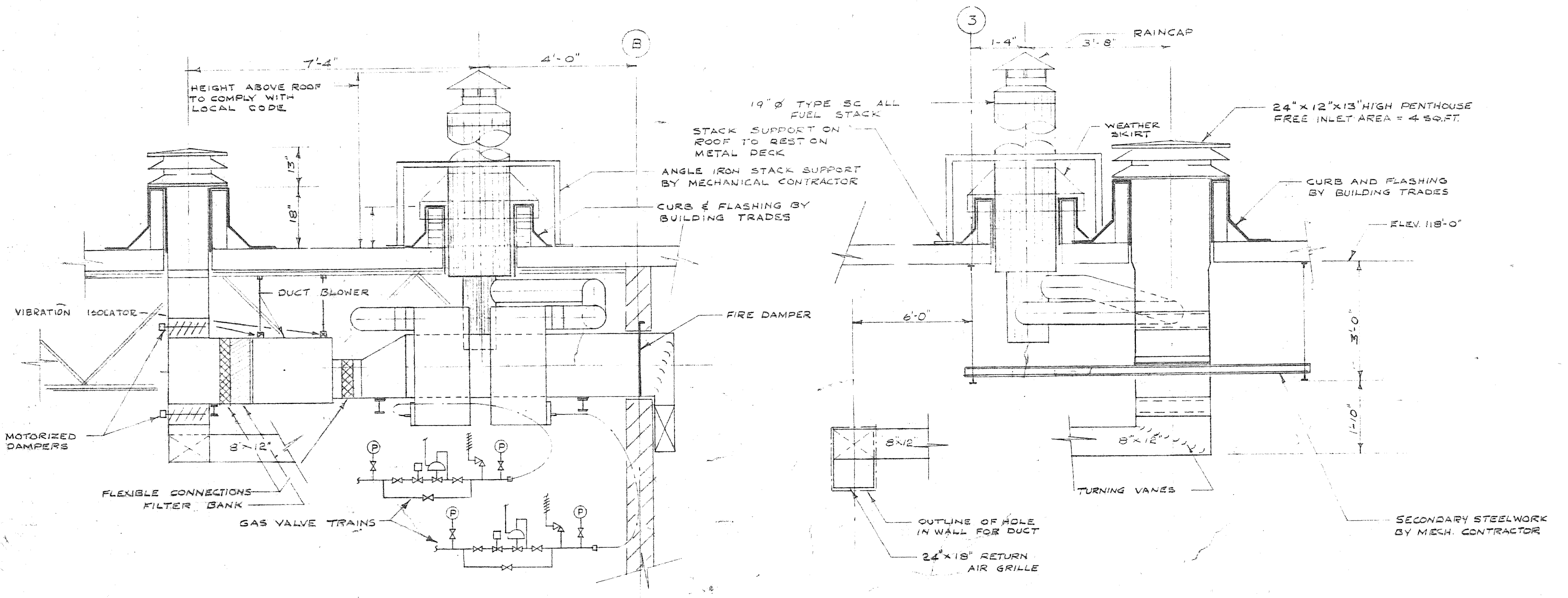
LAYOUT OF MAKE-UP AIR UNIT FOR WELDING BOOTHS
OVERHAUL & REPAIR BUILDING
SCALE 1/4" = 1'-0"



FRONT ELEVATION

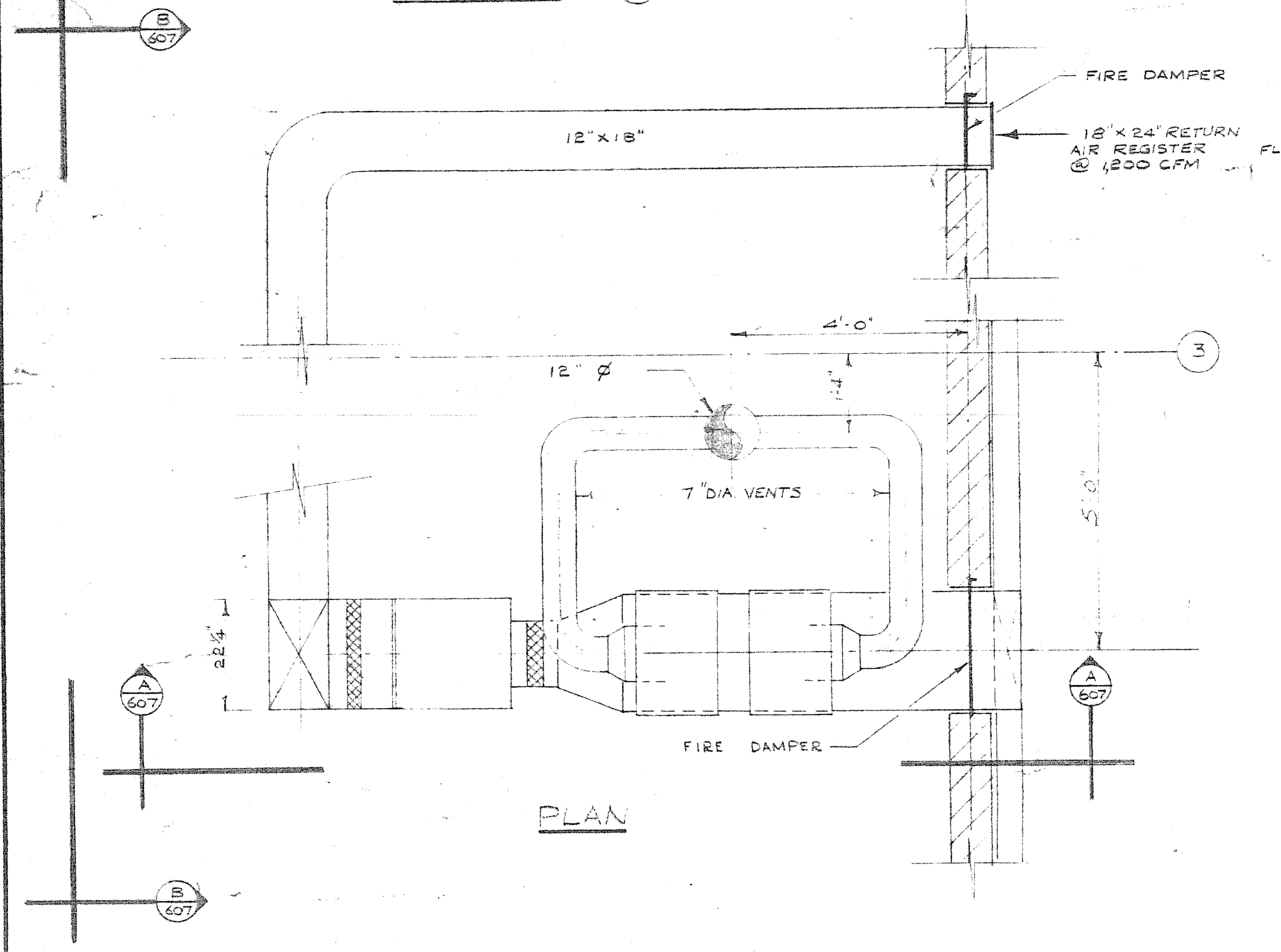
END ELEVATION

WELDING BOOTHS VENTILATION ARRANGEMENT
OVERHAUL & REPAIR BUILDING
SCALE 1/4" = 1'-0"



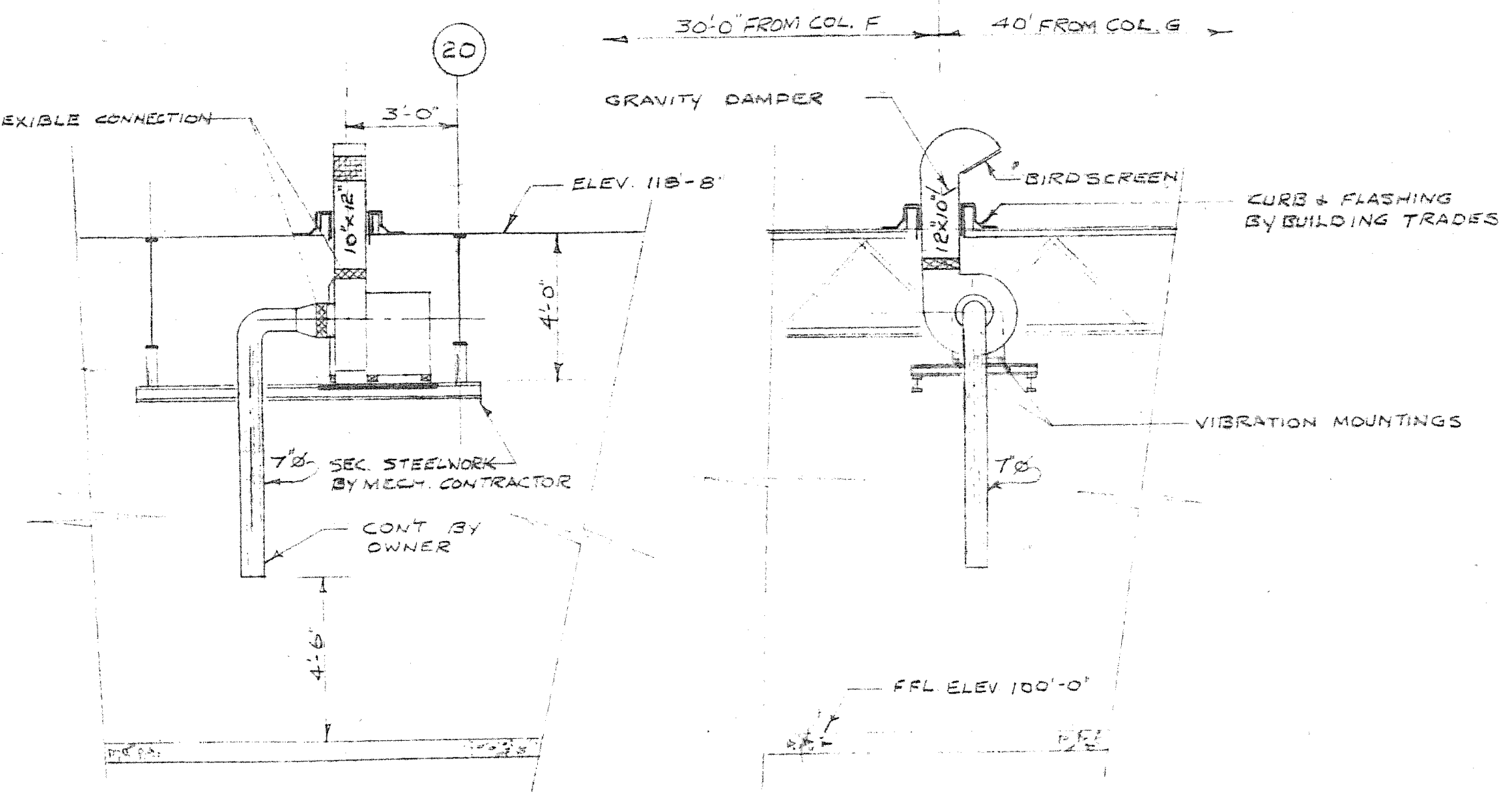
SECTION A/607

SECTION B/607

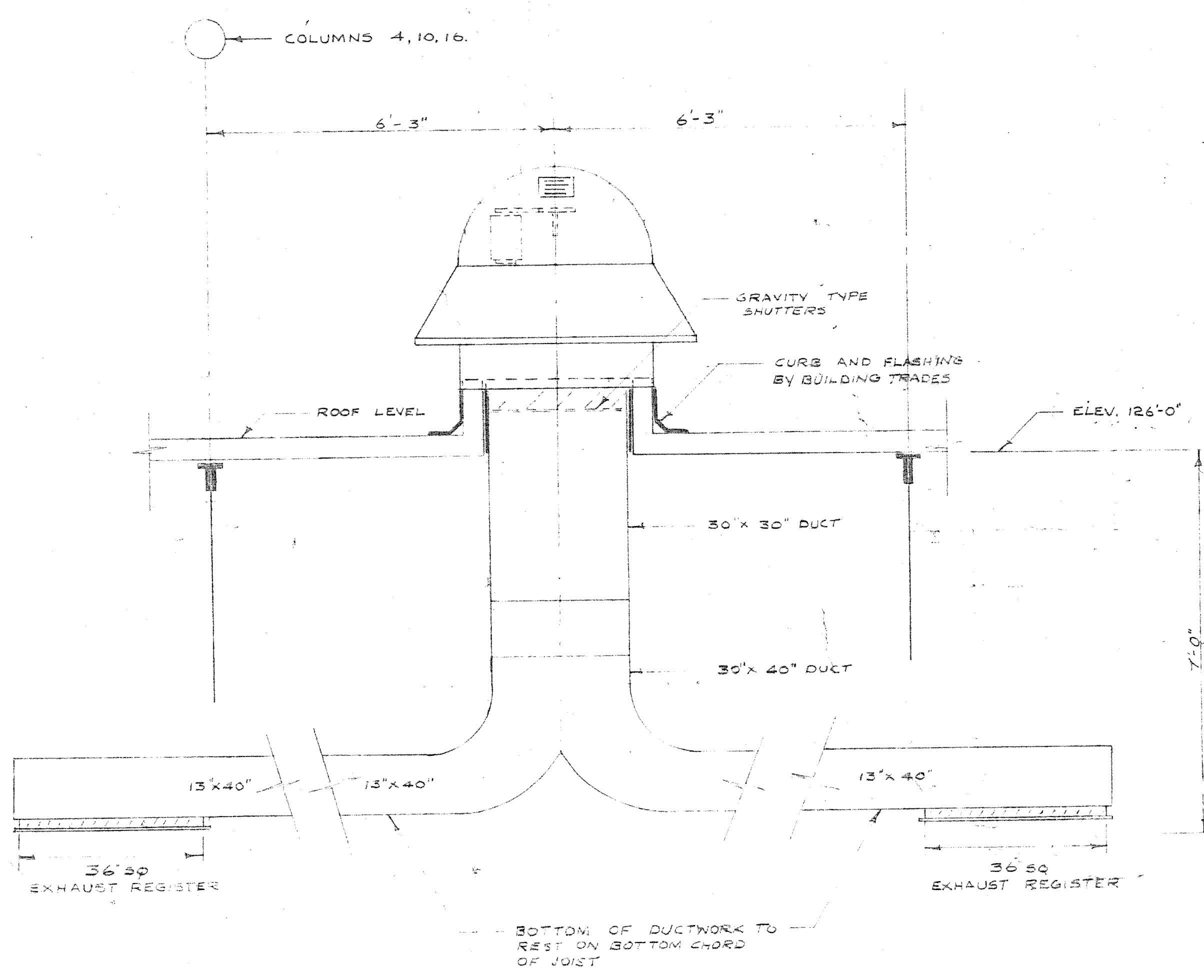


PLAN

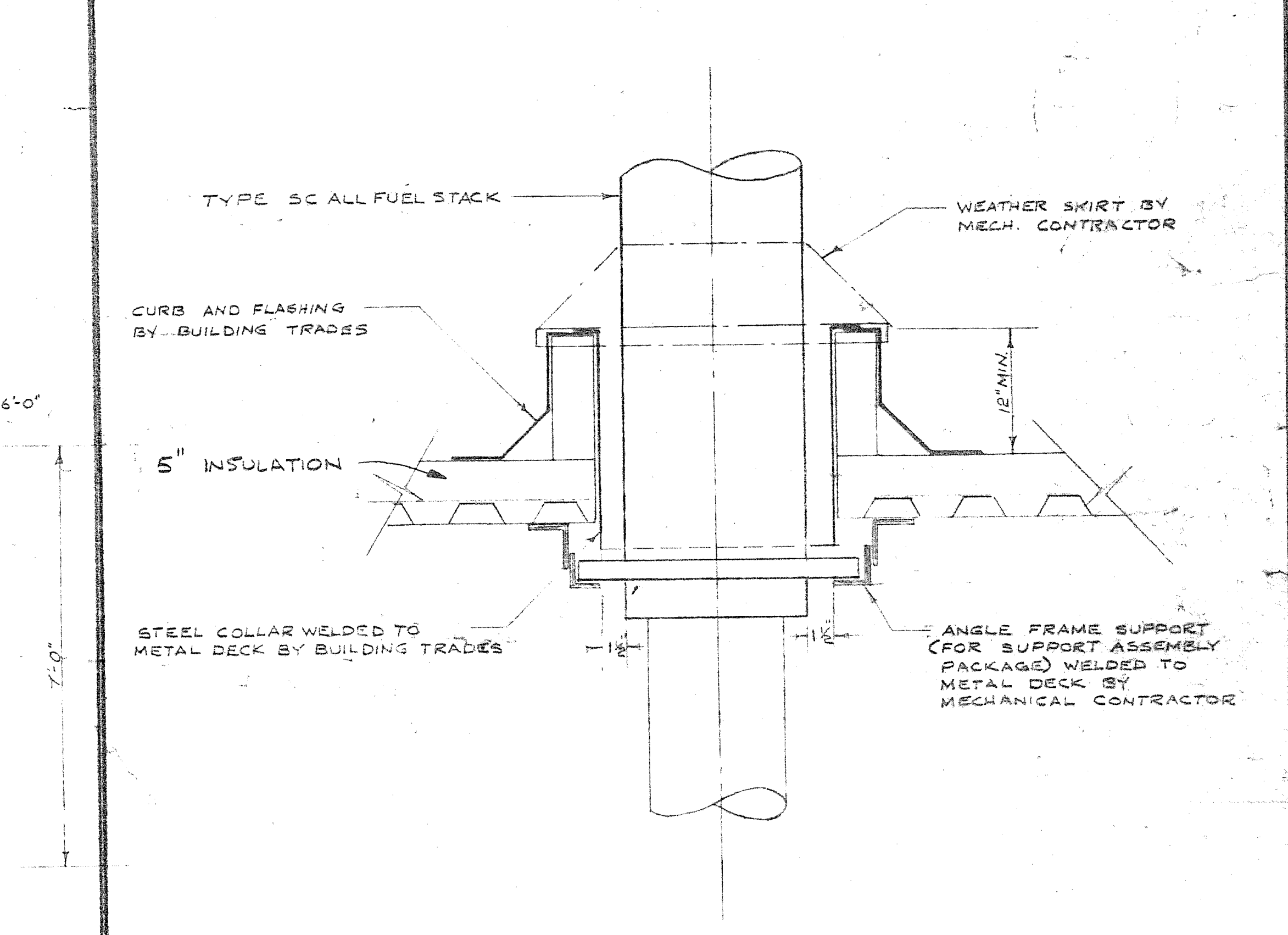
LAYOUT OF MAKE-UP AIR UNIT FOR PAINT SHOP (WAYS AND SERVICES BLD'G
SCALE 1/2" = 1'-0"



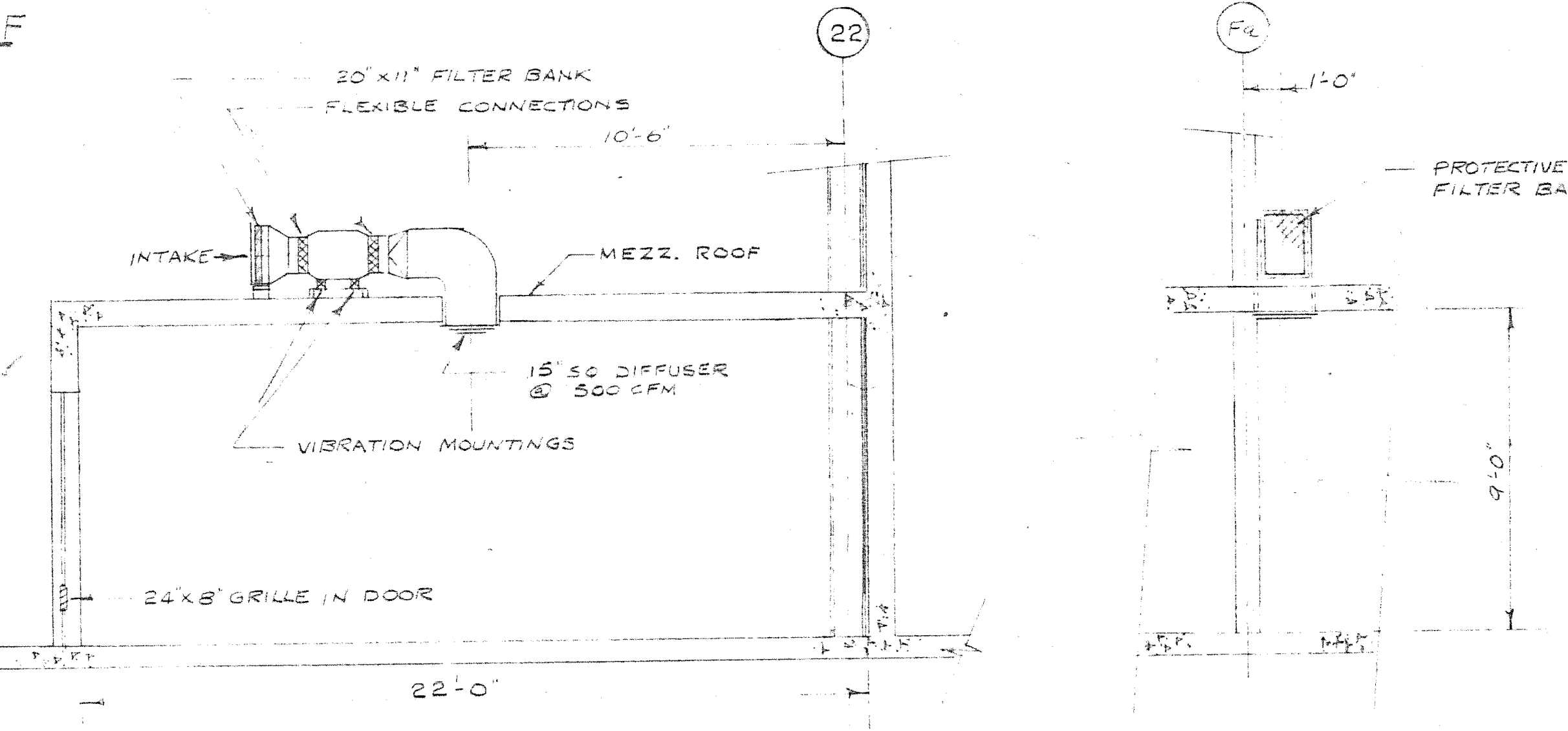
LAYOUT OF DUST EXT. SYSTEM FOR BUFFER GRINDER
OVERHAUL & REPAIR BUILDING
SCALE 1/4" = 1'-0"



LAYOUT OF ROOF VENTILATORS AND DUCTING OF NORTH SIDE OF HIGH BAY
OVERHAUL & REPAIR BUILDING
SCALE 1/2" = 1'-0"

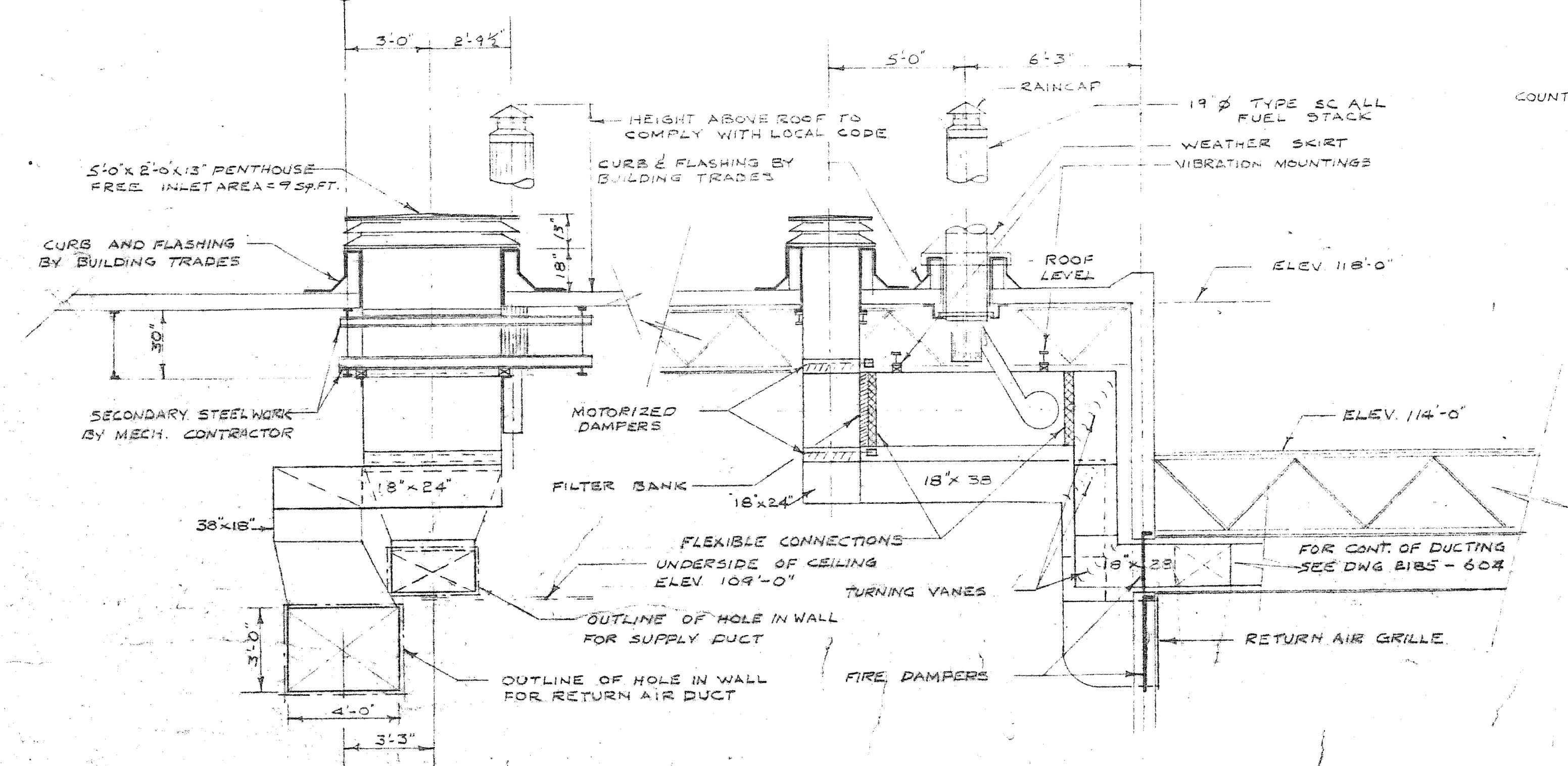


TYPICAL DETAIL OF GAS VENT THROUGH ROOF
NOT TO SCALE
GARAGE ADDITION

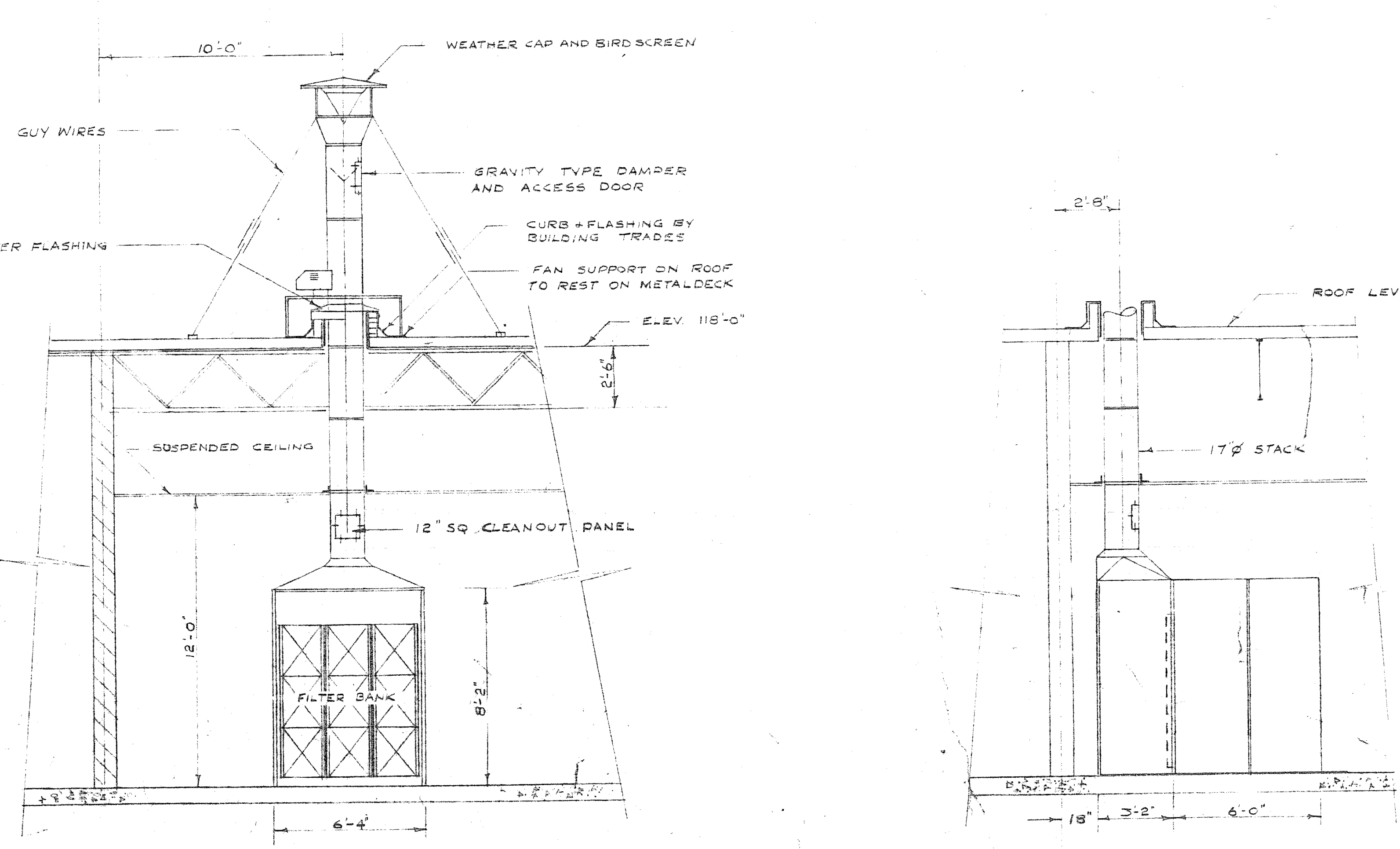


2185-607

LAYOUT OF VENTILATION FOR INJECTOR ROOM
OVERHAUL & REPAIR BUILDING
SCALE 1/4" = 1'-0"



LAYOUT OF MAKE-UP AIR UNIT FOR LUNCH ROOM
WAYS & SERVICES BUILDING
SCALE 1/4" = 1'-0"



ELEVATION

END ELEVATION

LAYOUT OF POLE PAINTING SPRAY BOOTH
OVERHAUL & REPAIR BUILDING
SCALE 1/4" = 1'-0"

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9.5.77	6	2	GARAGE ADDITION - FOR TENDER	
24/11/69	5		AS BUILT	R. MCC
1/4/69	4	1	WELDING BOOTH REVISED.	W.O'K
29/3/68	3	0	FOR CONSTRUCTION	
19/1/68	2	0	FOR TENDER	
20/10/67	1	0	FOR APPROVAL	

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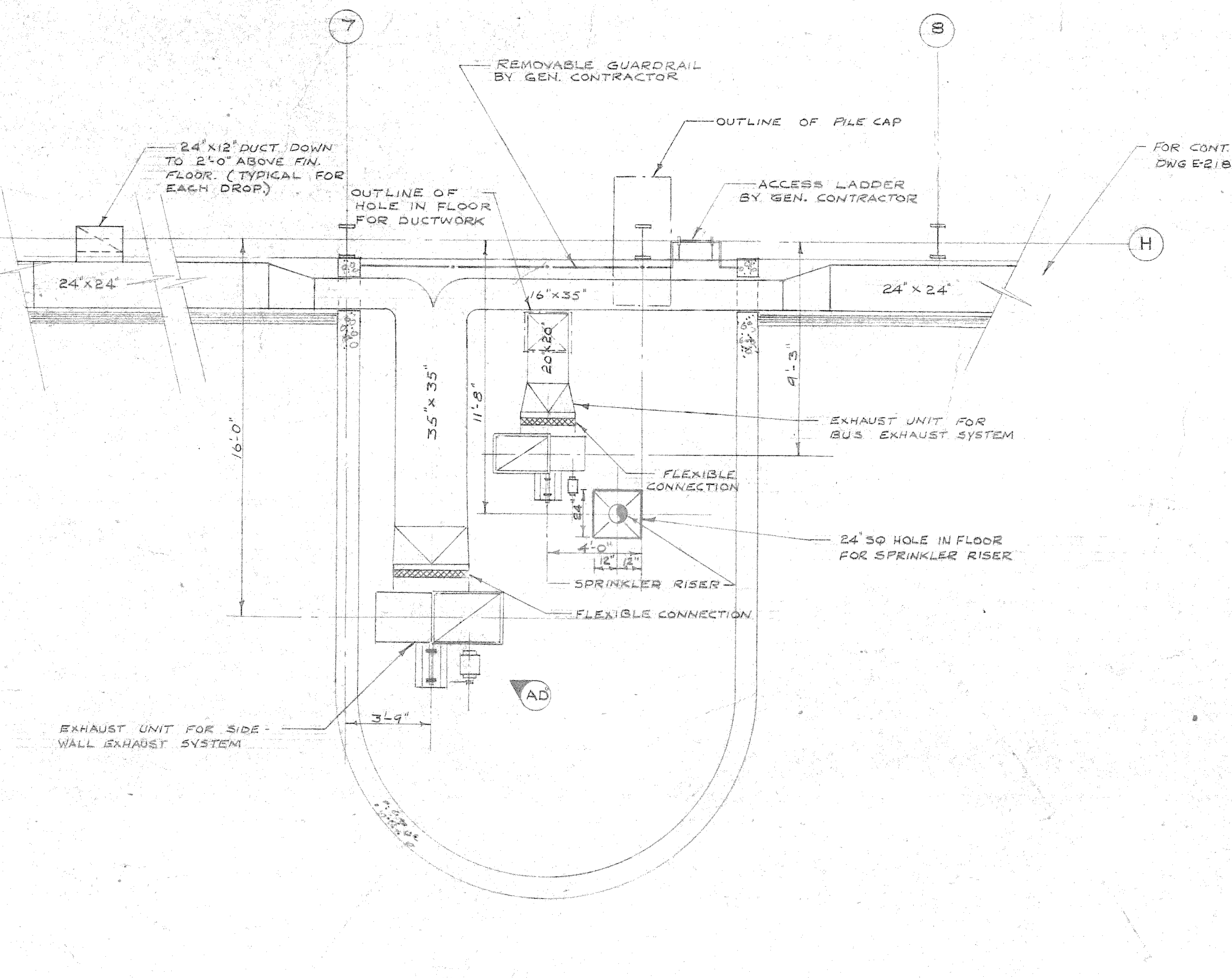
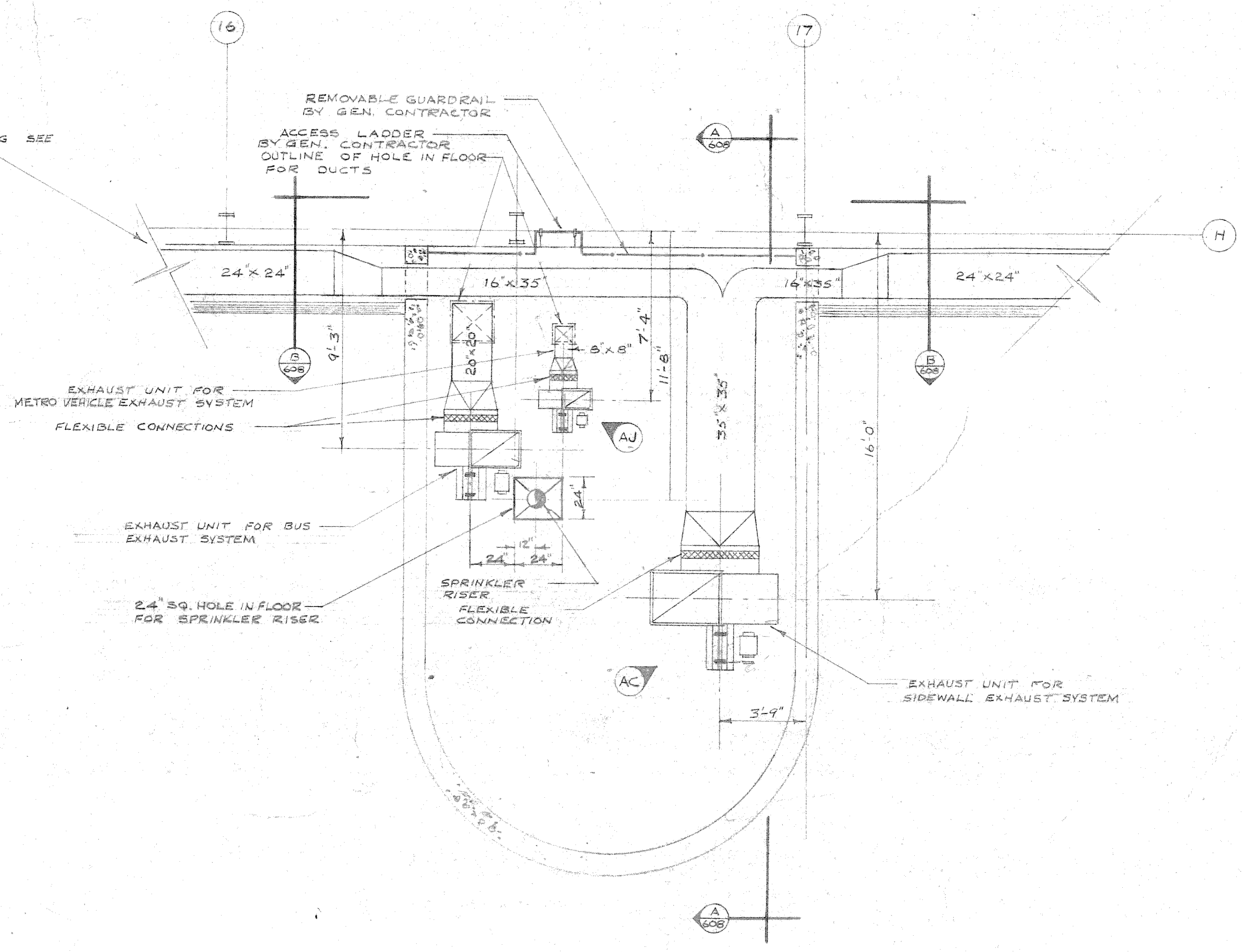
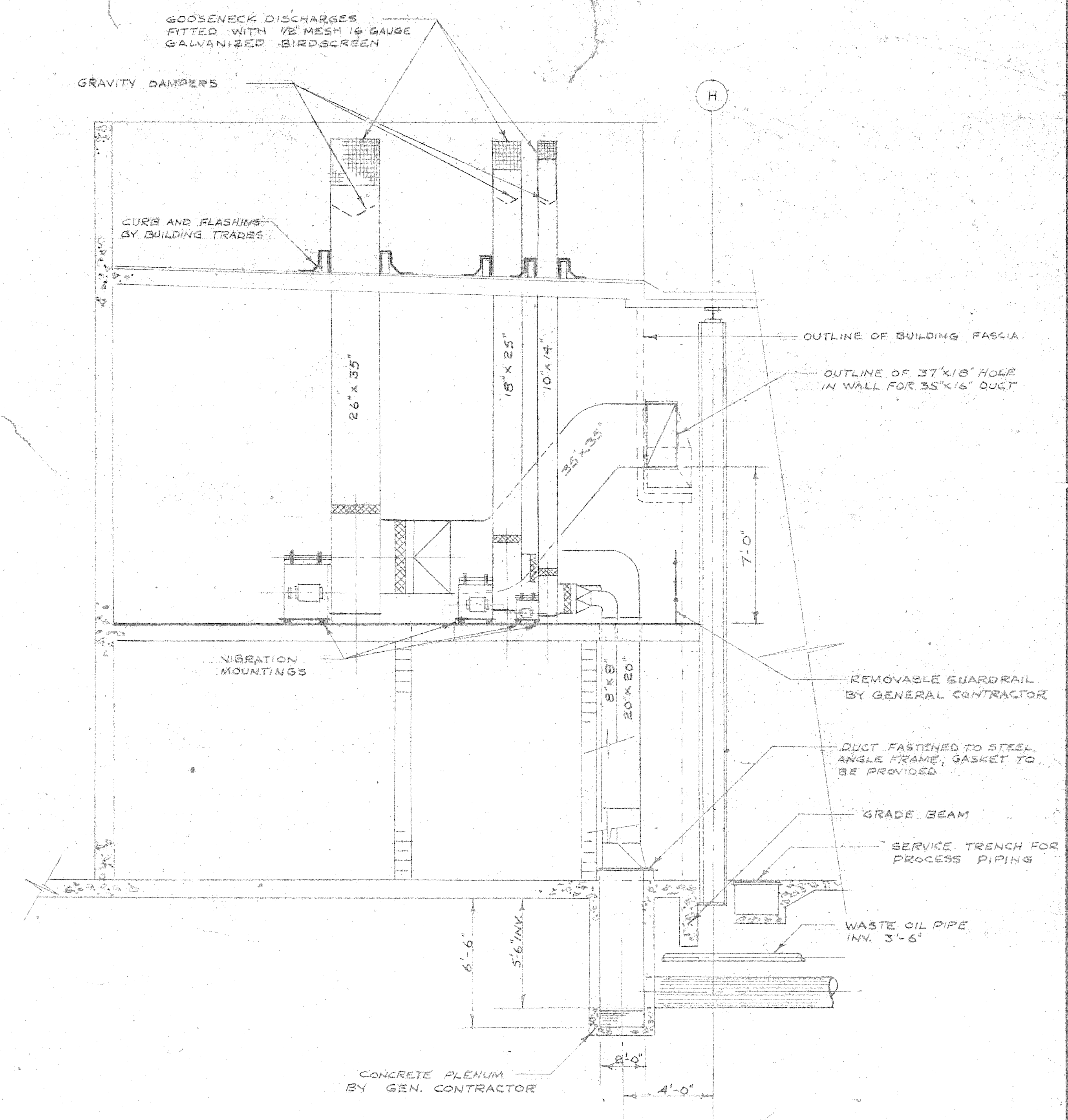


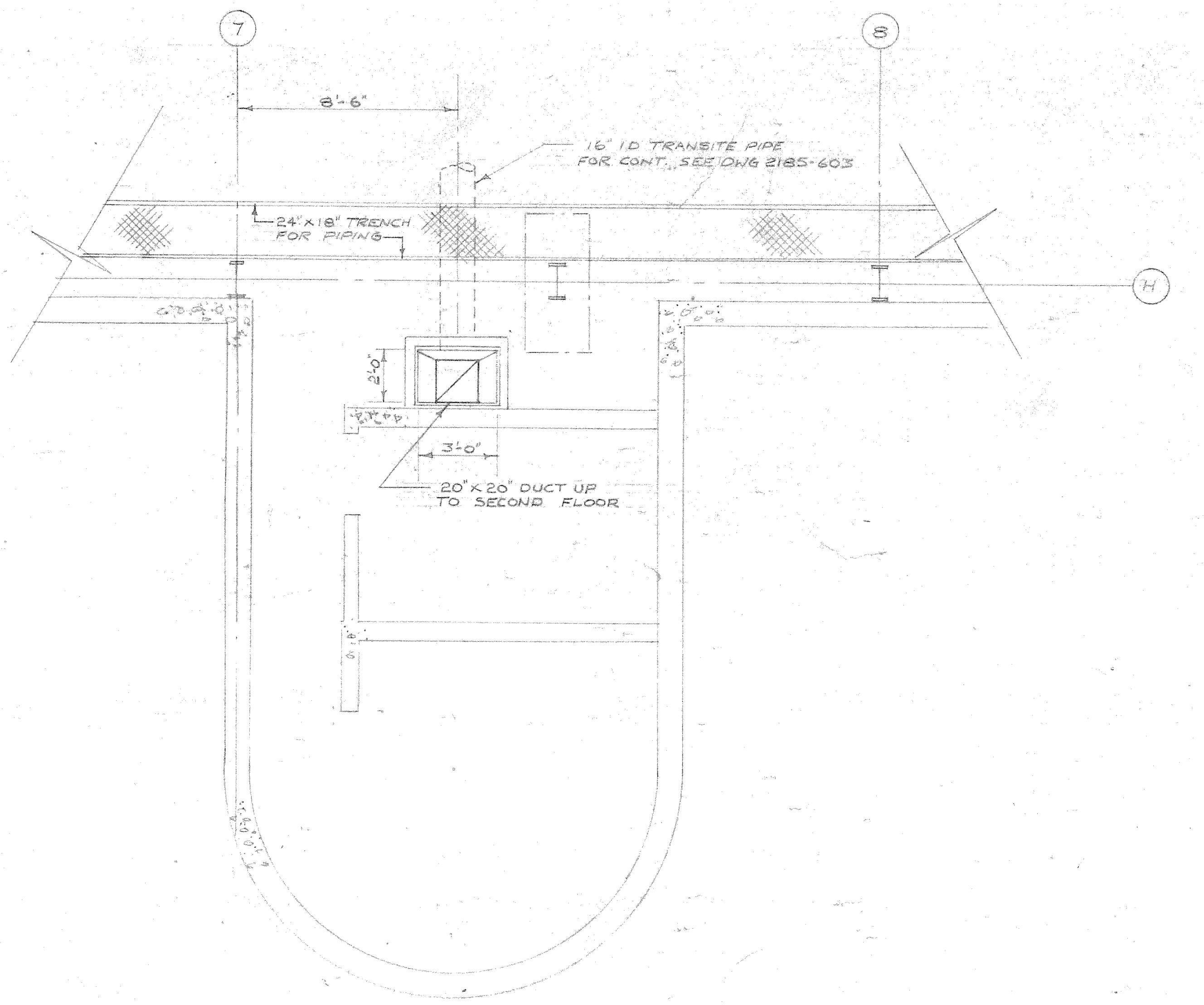
SECOND FLOOR PLAN OF WEST SERVICE PROJECTION
OVERHAUL & REPAIR BUILDING
SCALE 1/4" = 1'-0"



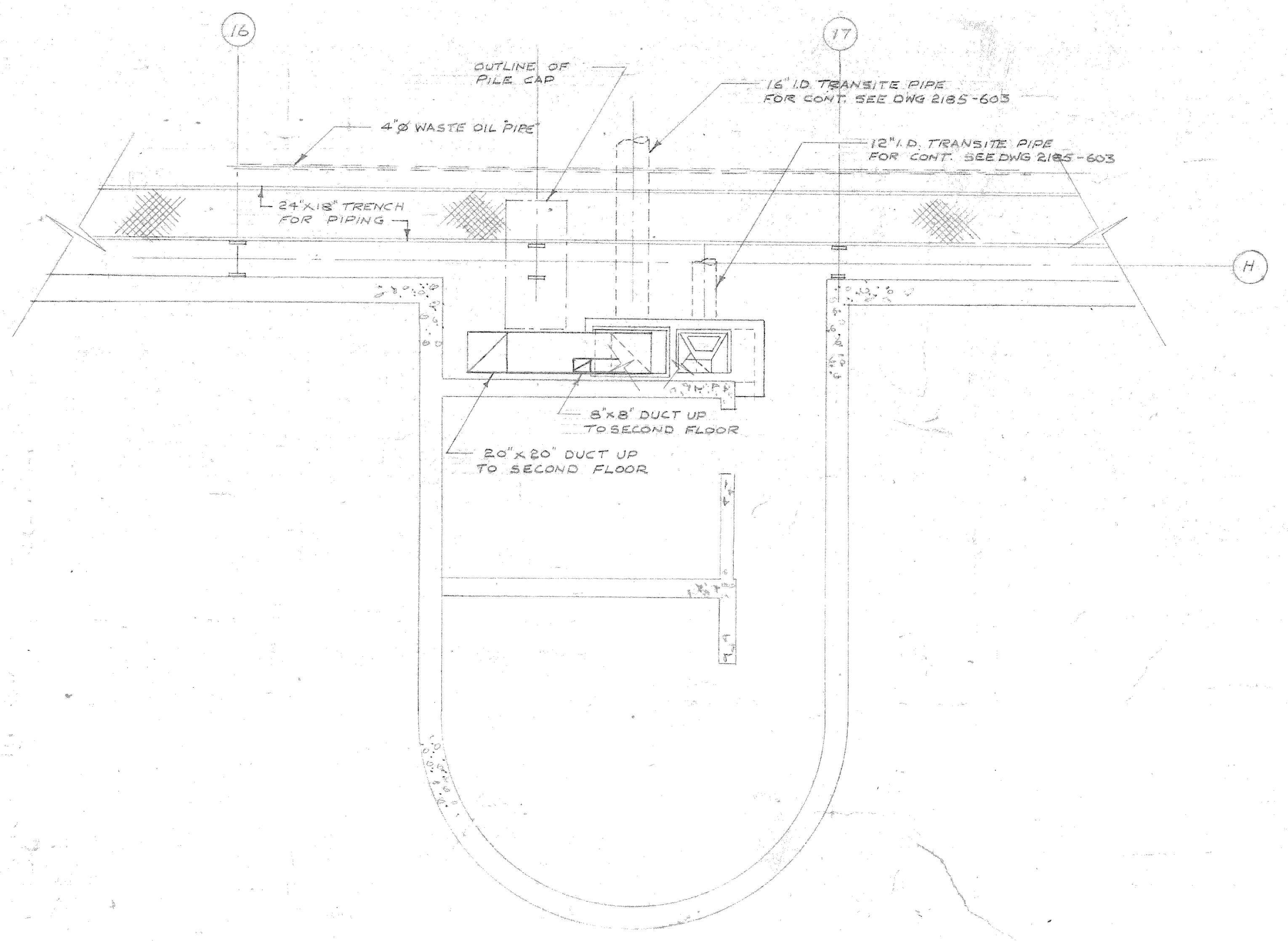
SECOND FLOOR PLAN OF EAST SERVICE PROJECTION
OVERHAUL & REPAIR BUILDING
SCALE 1/4" = 1'-0"



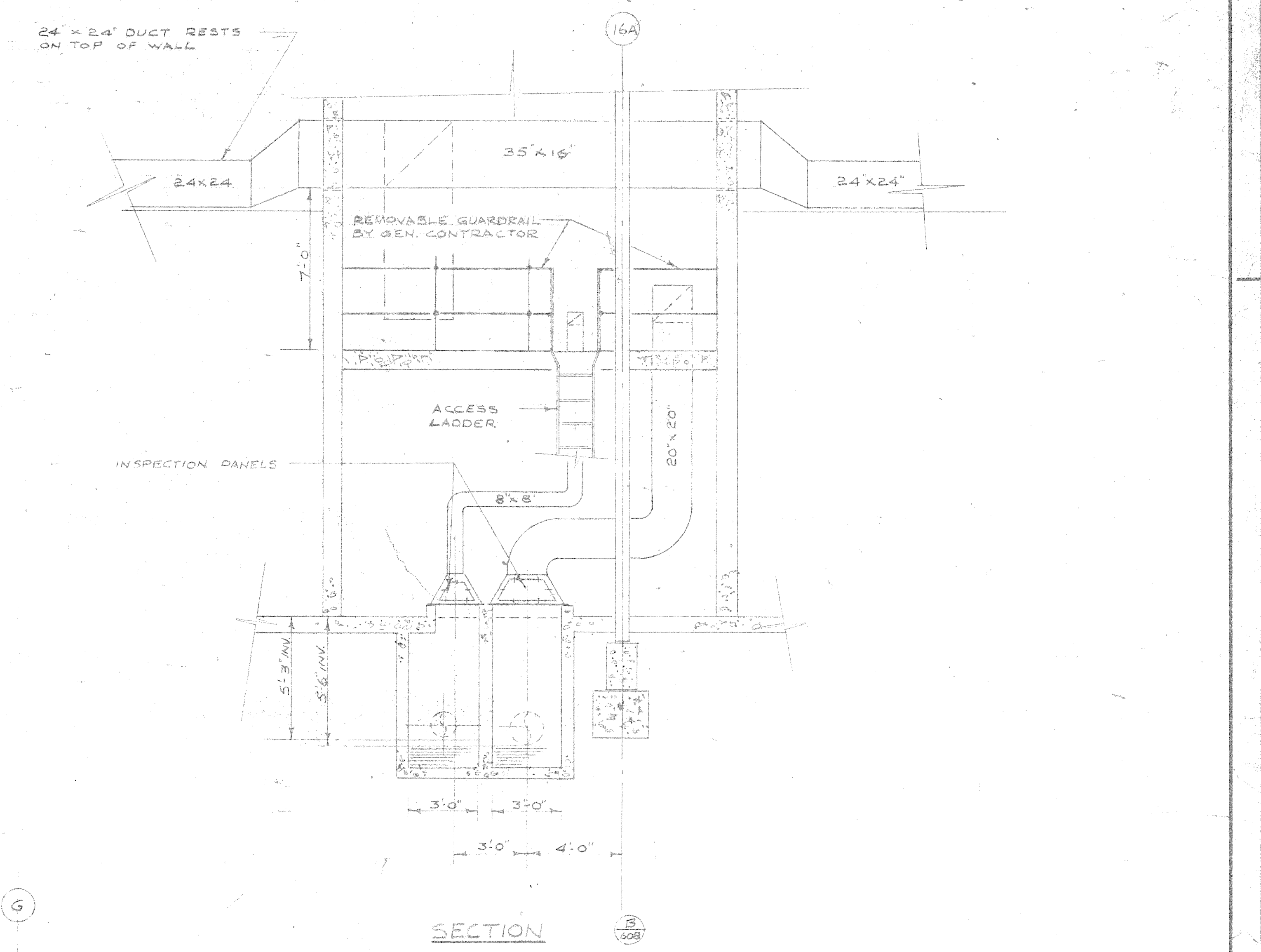
SECTION A/608
SCALE 1/4" = 1'-0"



FIRST FLOOR PLAN OF WEST SERVICE PROJECTION
OVERHAUL & REPAIR BUILDING
SCALE 1/4" = 1'-0"



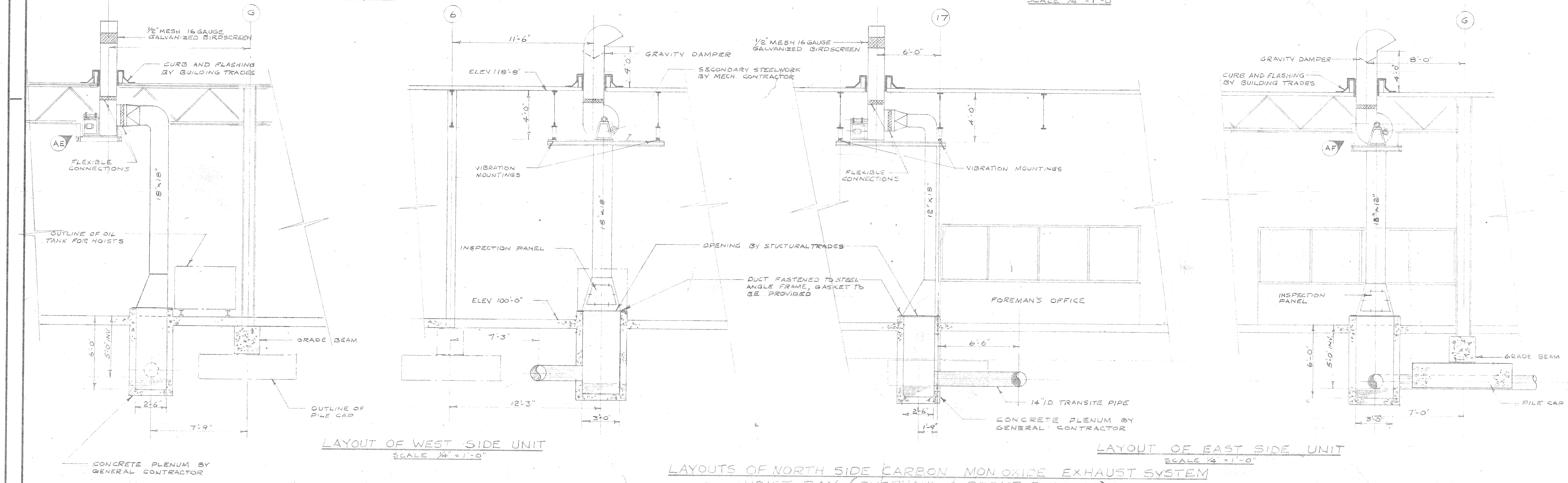
FIRST FLOOR PLAN OF EAST SERVICE PROJECTION
OVERHAUL & REPAIR BUILDING
SCALE 1/4" = 1'-0"



SECTION B/608
SCALE 1/4" = 1'-0"

NOTE —
ALL EXHAUST VENTS ARE FITTED WITH BIRDSCREEN AND GRAVITY DAMPER
ALL EXHAUST FANS TO BE MOUNTED ON VIBRATION ISOLATORS

2185-608



LAYOUT OF WEST SIDE UNIT
SCALE 1/4" = 1'-0"

LAYOUT OF EAST SIDE UNIT
SCALE 1/4" = 1'-0"

LAYOUTS OF NORTH SIDE CARBON MONOXIDE EXHAUST SYSTEM
HOIST BAY (OVERHAUL & REPAIR BUILDING)

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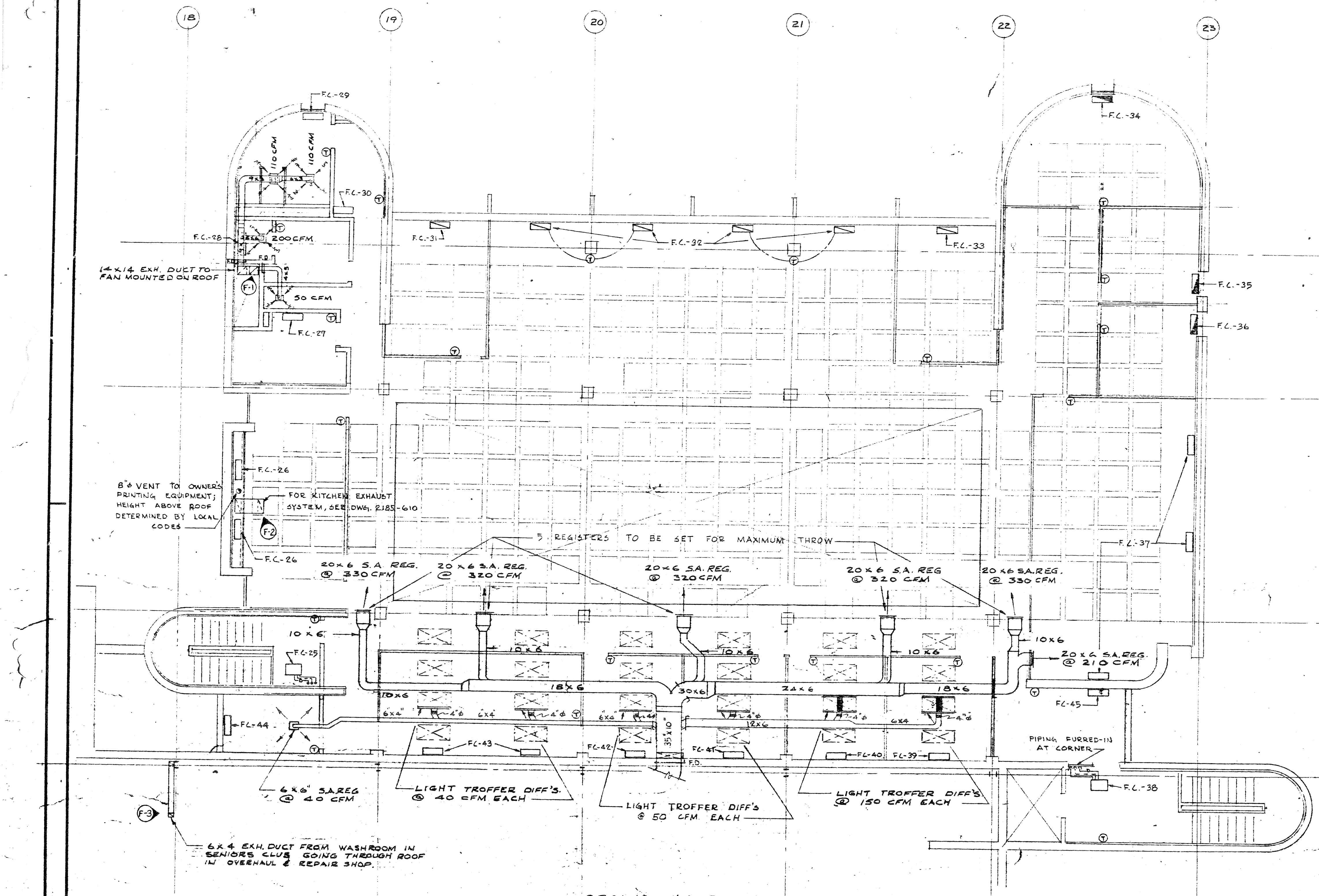
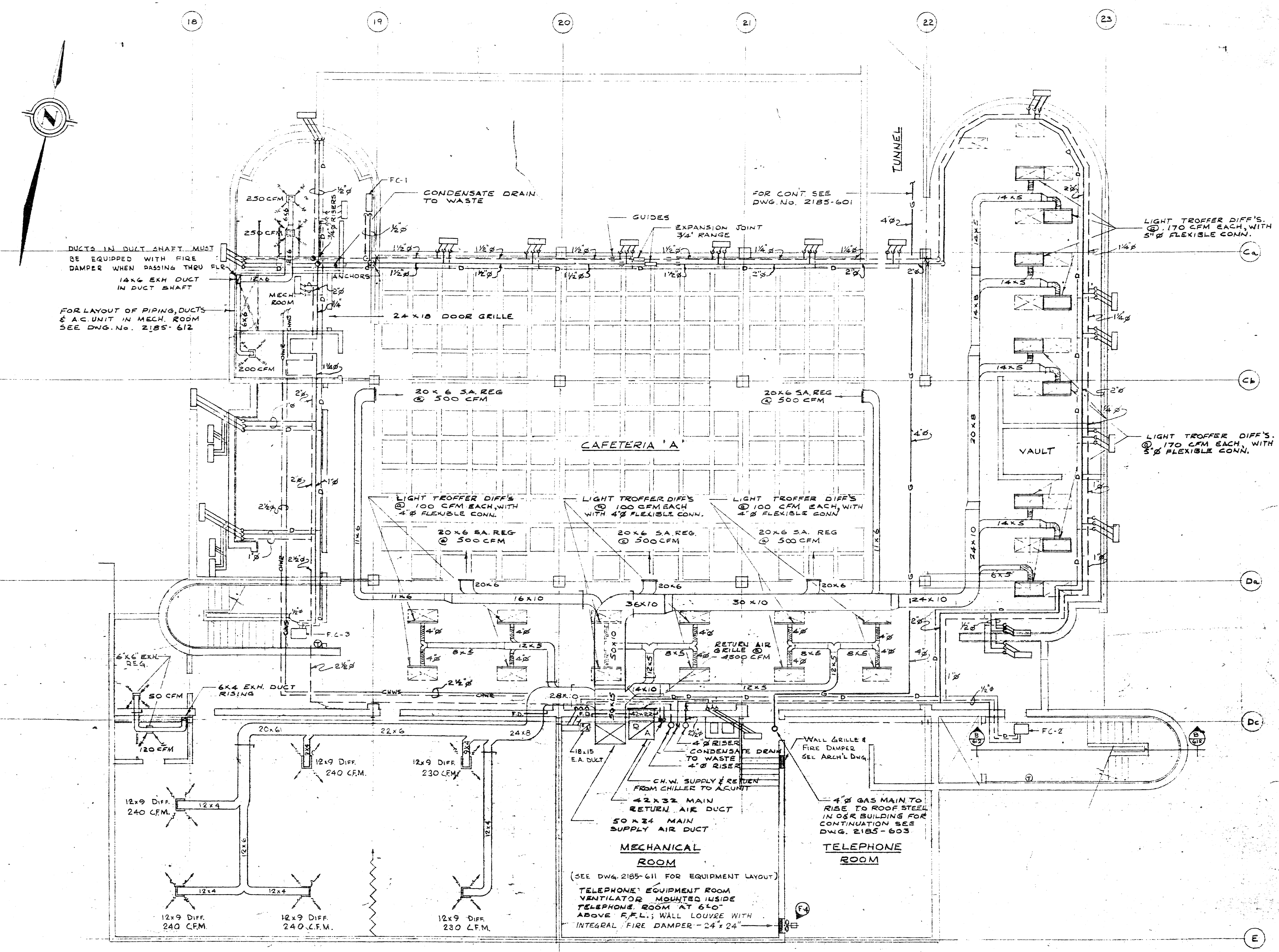
MECHANICAL

N.W.C.L. TRANSTEX 15 400-8-66



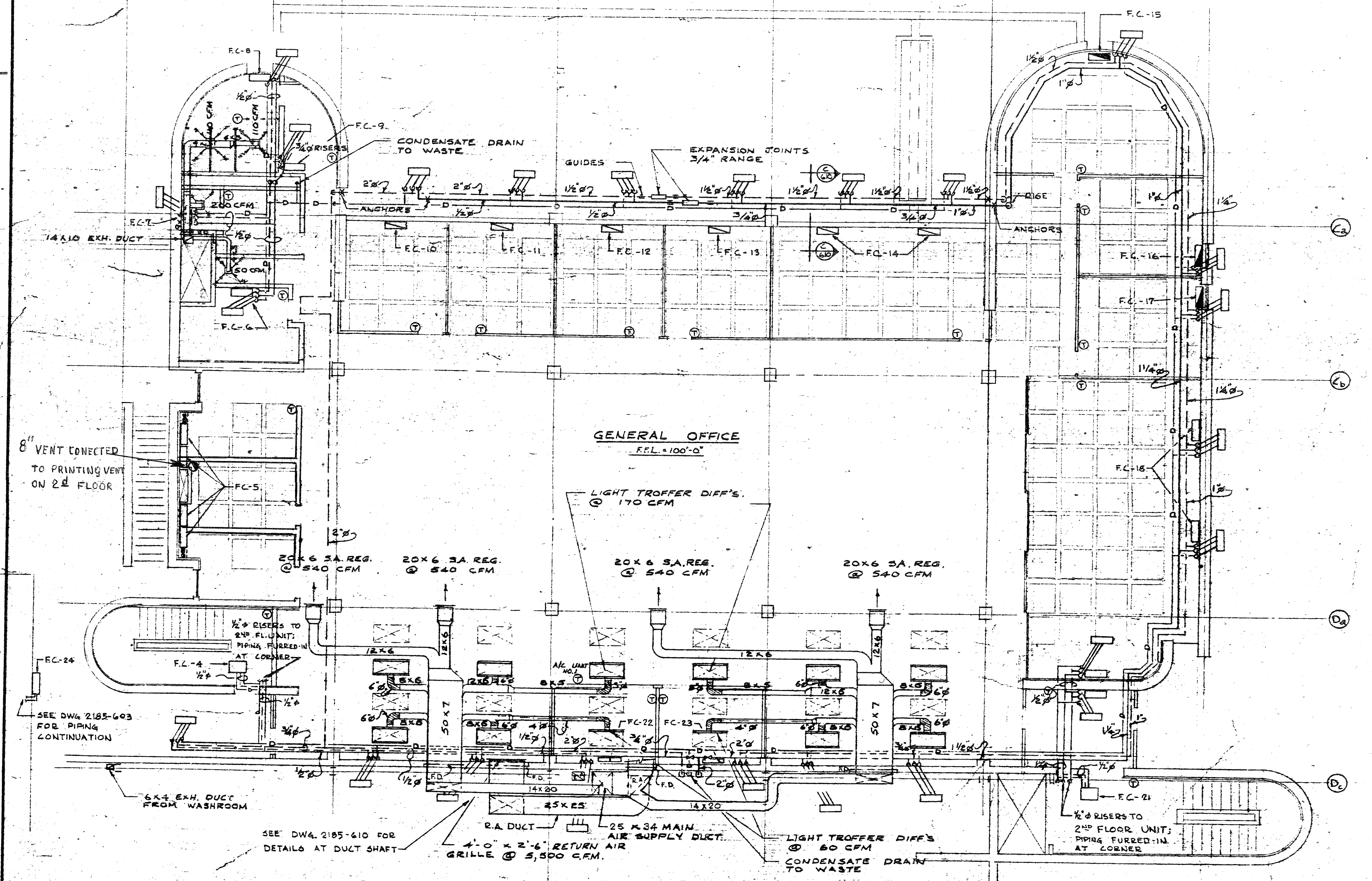
SECOND FLOOR PLAN

SCALE 1/8" = 1'-0"



BASEMENT PLAN

SCALE 1/8" = 1'-0"

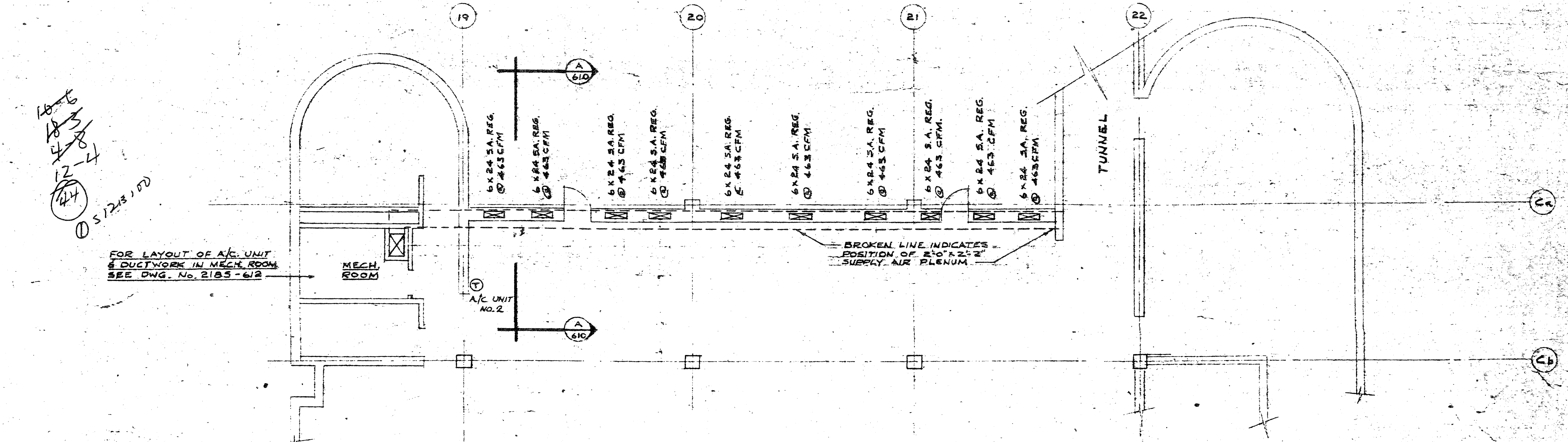


NOTE:- ALL OTHER LIGHT TROFFER DIFF'S INDICATED ON 1st FLOOR ARE AT 220 CFM

FIRST FLOOR PLAN

SCALE 1/8" = 1'-0"

FAN SCHEDULE							
FAN	MODEL	CFM	HP	RPM	" S.P.	SQ. CURB	REMARKS
F-1	18-C-SR	1580	1/3	900	1/2	19 1/2"	WASHROOM EXHAUST
F-2	135-B-ES	1664	3/4	1739	1	—	KITCHEN EXHAUST; SEE DWG 2185-610
F-3	84-UCD	185	1/25	1500	1/2	11"	SENIORS' CLUB W/R EXHAUST
F-4	TELEPHONE RM. VENT'R NO. 2	1270	1/4	1150	1/4	—	C.B.&F. BLOW-THRU TYPE
F-5	SIZE 930	10,000	2	969	5/8"	—	VANEAXIAL; SEE DWG 2185-611 FOR LOCATION



LAYOUT OF SUPPLY AIR DISTRIBUTION
FROM AIR-CONDITIONING UNIT Nº 2

SCALE: 1/8" = 1'-0"

FAN COIL SCHEDULE									
SYMBOL	ROOM	MODEL	No. REQ'D	HTG. USGPM	COOL'G. USGPM	FAN SPEED	HP	REMARKS	
F.C.-1	A-B06	F.C.6V-FS-F	1	0.7 EACH	1.2 EACH	LOW	1/30		FREE STANDING
F.C.-2	A-B15	F.C.3H-FI-CP	1	0.7 "	1.8 "	"	"		FURRED IN
F.C.-3	A-B01	F.C.3H-FI-CP	1	0.4 "	1.1 "	"	"		" "
F.C.-4	A-101	F.C.3H-FI-CP	1	0.4 "	1.1 "	"	"		" "
F.C.-5	A-102	F.C.8V-FS-F	4	0.4 "	2.7 "	MEDIUM	1/20	2 FOR HTG. ONLY	FREE STANDING
F.C.-6	A-103	FC3V-FS-F	1	0.1 "	0.5 "	LOW	1/30		" "
F.C.-7	A-106	FC3V-FS-F	1	0.1 "	0.4 "	"	"		" "
F.C.-8	A-107	FC3V-FS-F	1	0.5 "	1.4 "	"	"		" "
F.C.-9	A-108	FC3V-FS-F	1	0.3 "	0.4 "	"	"		" "
F.C.-10	A-110	FC4V-FI-W	1	0.5 "	1.0 "	"	1/20		FURRED IN
F.C.-11	A-111	"	1	0.5 "	1.0 "	"	"		" "
F.C.-12	A-112	"	1	0.5 "	1.0 "	"	"		" "
FC-13	A-113	"	1	0.5 "	1.0 "	"	"		" "
FC-14	A-114	"	2	0.5 "	1.0 "	"	"		" "
FC-15	A-116	FC6L-FS-P	1	0.7 "	4.0 "	"	1/30		FREE STANDING
FC-16	A-117	FC3L-FS-P	1	0.3 "	2.0 "	"	"		" "
FC-17	A-118	FC3L-FS-P	1	0.3 "	2.0 "	"	"		" "
FC-18	A-119	FC4V-FS-F	2	0.2 "	1.3 "	"	1/20		" "
FC-19	A-119	FC3V-FS-F	1	0.1 "	0.9 "	"	1/30		" "
FC-20	A-120	FC8V-FS-F	1	1.0 "	1.8 "	"	1/20		" "
FC-21	A-121	FC3H-FI-CP	1	0.7 "	1.8 "	"	1/30		FURRED IN
FC-22	A-123	FC4V-FS-F	1	0.3 "	1.3 "	"	1/40		FREE STANDING
FC-23	A-124	FC4V-FS-F	1	0.3 "	1.3 "	"	"		" "
FC-24	R-114	SIZE 100	1	4.0 "	—	"	1/8	H.W. FORCED FLO	" "
FC-25	A-201	FC3H-FI-CP	1	0.4 "	1.1 "	"	1/30		FURRED IN
FC-26	A-203	FC8V-FS-F	2	0.6	1.7 "	"	1/20		FREE STANDING
FC-27	A-205	FC3V-FS-F	1	0.3 "	1.0 "	"	1/30		" "
FC-28	A-207	FC3V-FS-F	1	0.2 "	0.4 "	"			" "
FC-29	A-209	FC4V-FS-F	1	0.6 "	1.4 "	"	1/20		" "
FC-30	A-210	FC3V-FS-F	1	0.4 "	0.8 "	"	1/30		" "
FC-31	A-212	FC6V-FI-W	1	0.6 "	1.0 "	"	"		FURRED IN
FC-32	A-213	FC6V-FI-W	4	0.6 "	1.2 "	"	"		" "
FC-33	A-214	FC6V-FI-W	1	0.6	1.0 "	"	"		" "
FC-34	A-216	FC8L-FS-P	1	1.2 "	4.6 "	"	1/20		FREE STANDING
FC-35	A-217	FC3L-FS-P	1	0.5 "	2.0 "	"	1/30		" "
FC-36	A-218	FC3L-FS-P	1	0.5 "	2.0 "	"	"		" "
FC-37	A-219	FC6V-FS-F	3	0.6 "	2.0 "	"	"		" "
FC-38	A-222	FC3H-FI-CP	1	0.7 "	1.8 "	"	"		FURRED IN
FC-39	A-223	FC6V-FS-F	1	0.3 "	2.3 "	"	"		FREE STANDING
FC-40	A-224	FC6V-FS-F	1	0.3 "	2.3 "	"	"		" "
FC-41	A-225	FC4V-FS-F	1	0.3 "	1.6 "	"	1/20		" "
FC-42	A-227	FC4V-FS-F	1	0.3 "	1.3 "	"	"		" "
FC-43	A-228	FC4V-FS-F	2	0.3 "	1.0 "	"	"		" "
FC-44	A-229	FC6V-FS-F	1	0.4 "	1.2 "	"	1/30		" "
F.C.-45	A-221	FC6V-FS-F	1	0.9 "	2.5 "	"	"		" "

2185 - 609

NOTE:- ALL CONDENSATE DRAIN PIPING TO BE 1"Ø PLASTIC PIPE.

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METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

ADMINISTRATION BUILDING
HEATING, VENTILATING & AIR CONDITIONING — PLAN

J. T. F. THORPE

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

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PROVINCE OF MANITOBA
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DEPUTY DIRECTOR OF STREETS AND TRANSIT

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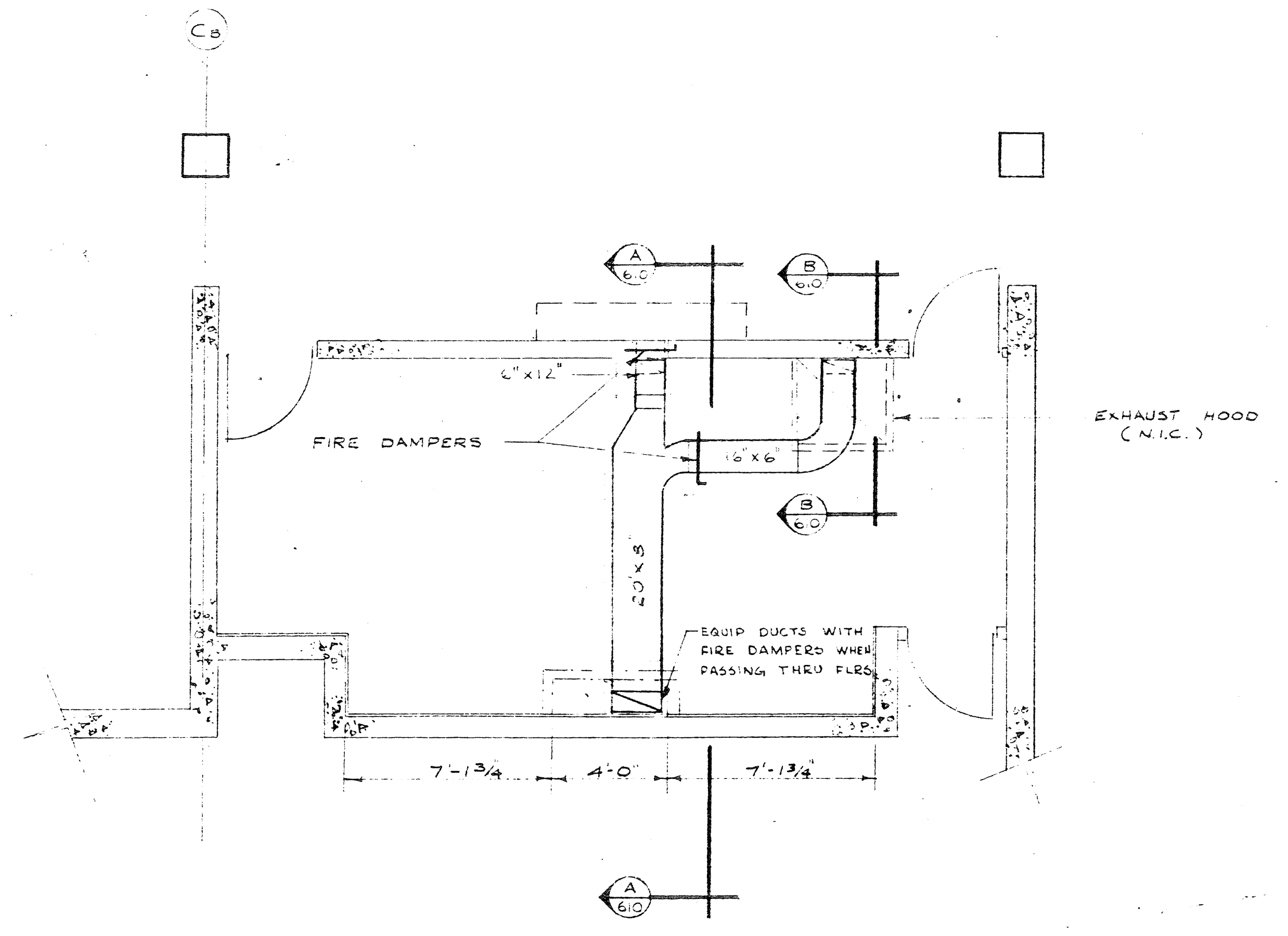
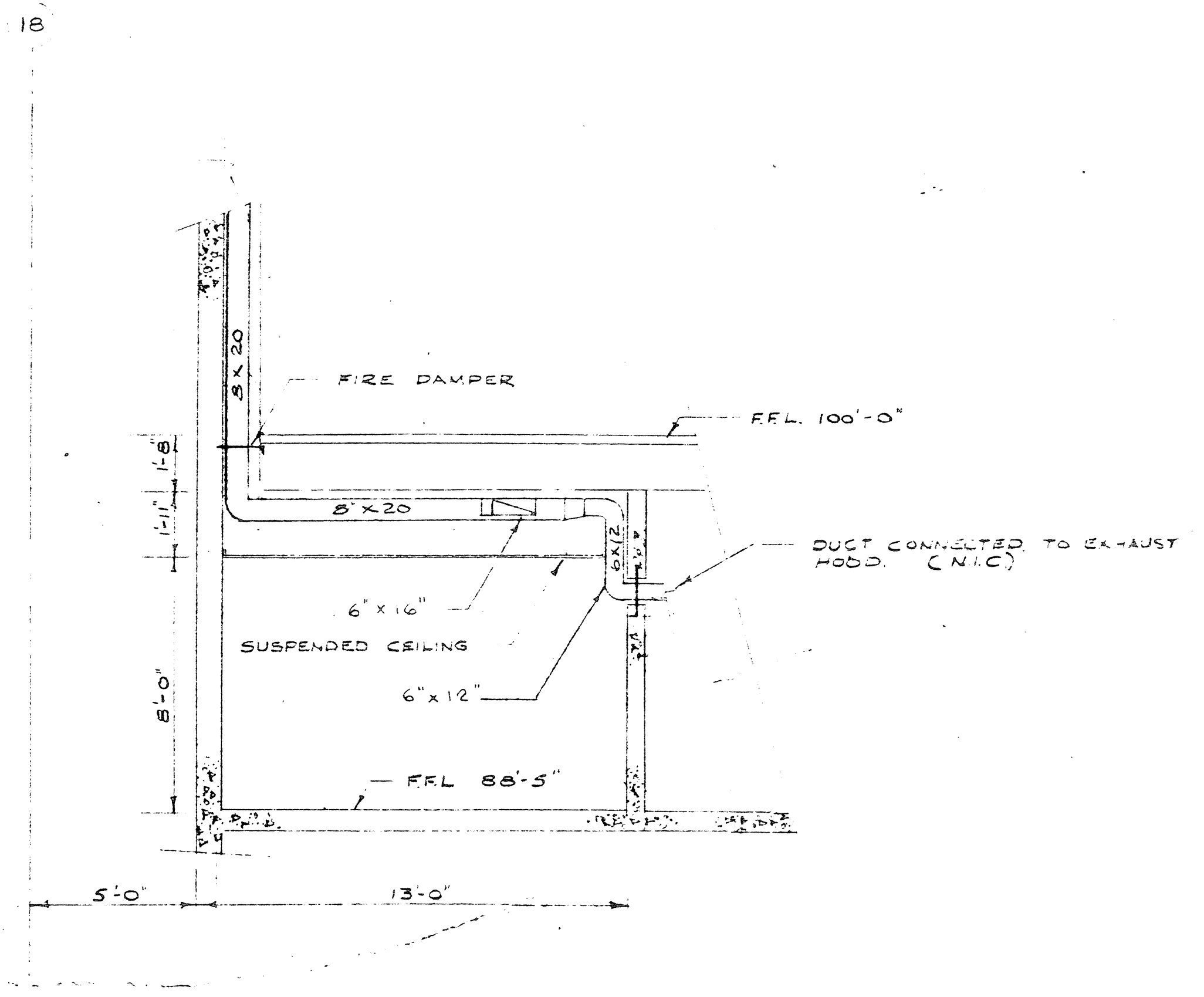
SHEET No.
DATE AUGUST '67
SCALE AS SHOWN
DRAWING No. 2185 - 609
MECHANICAL



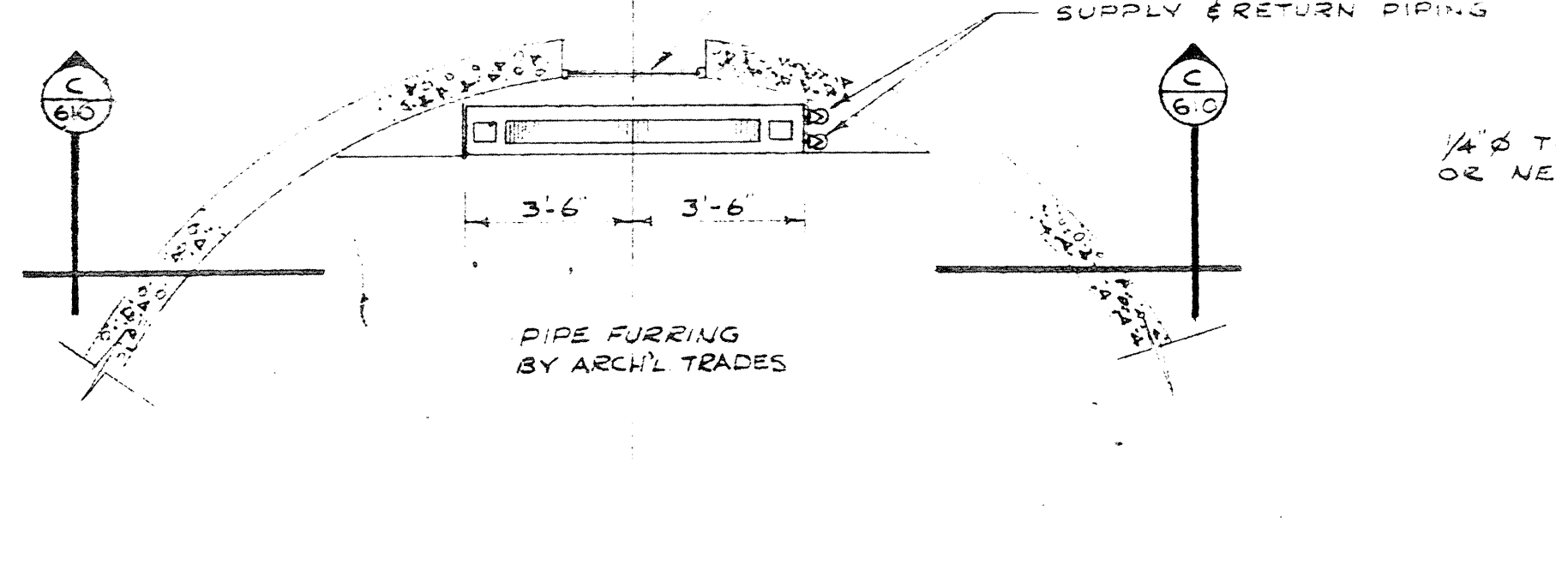
PLAN OF KITCHEN IN OFFICE BUILDING

SCALE = 1/4" = 1'-0"



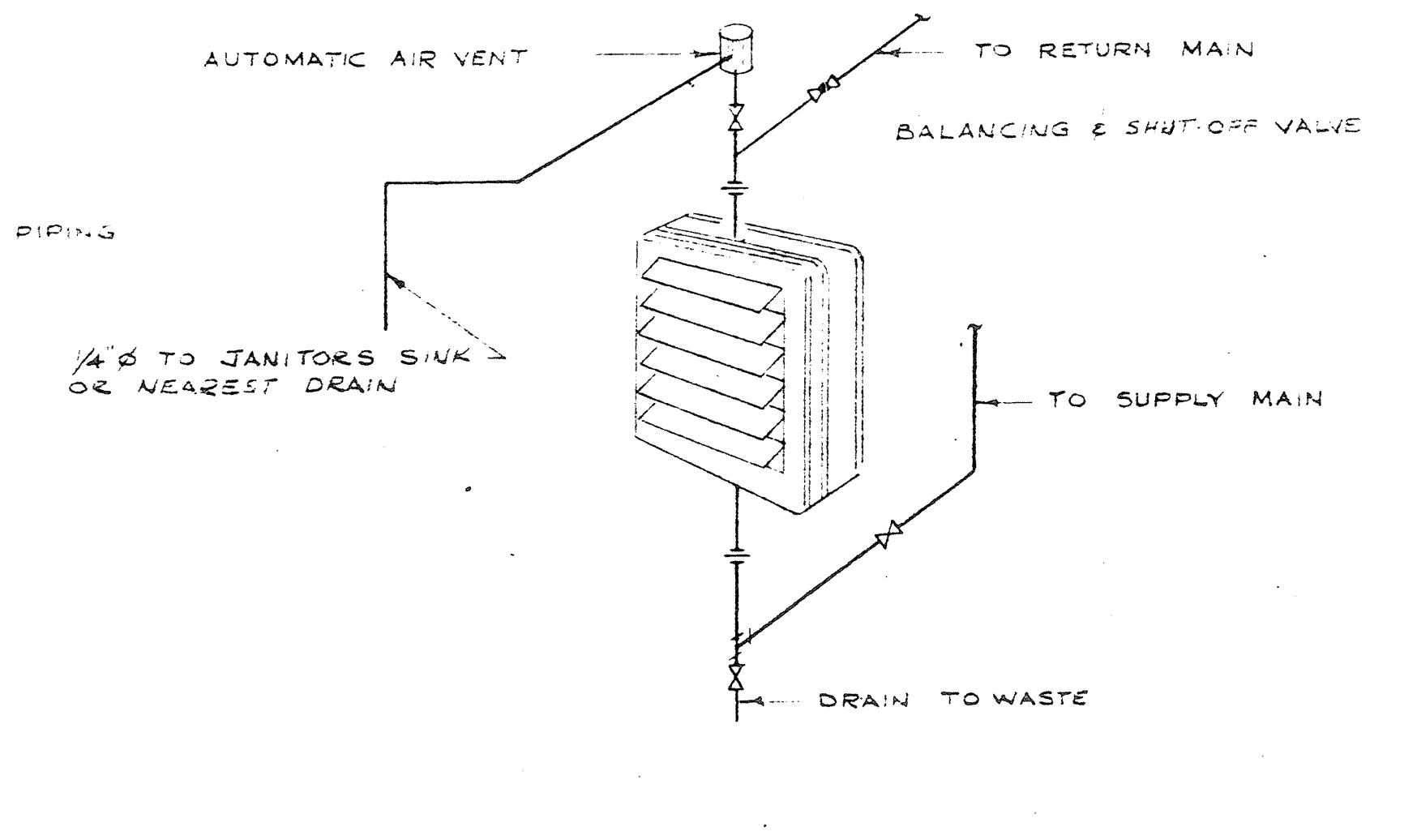
SECTION A/610

SCALE 1/4" = 1'-0"



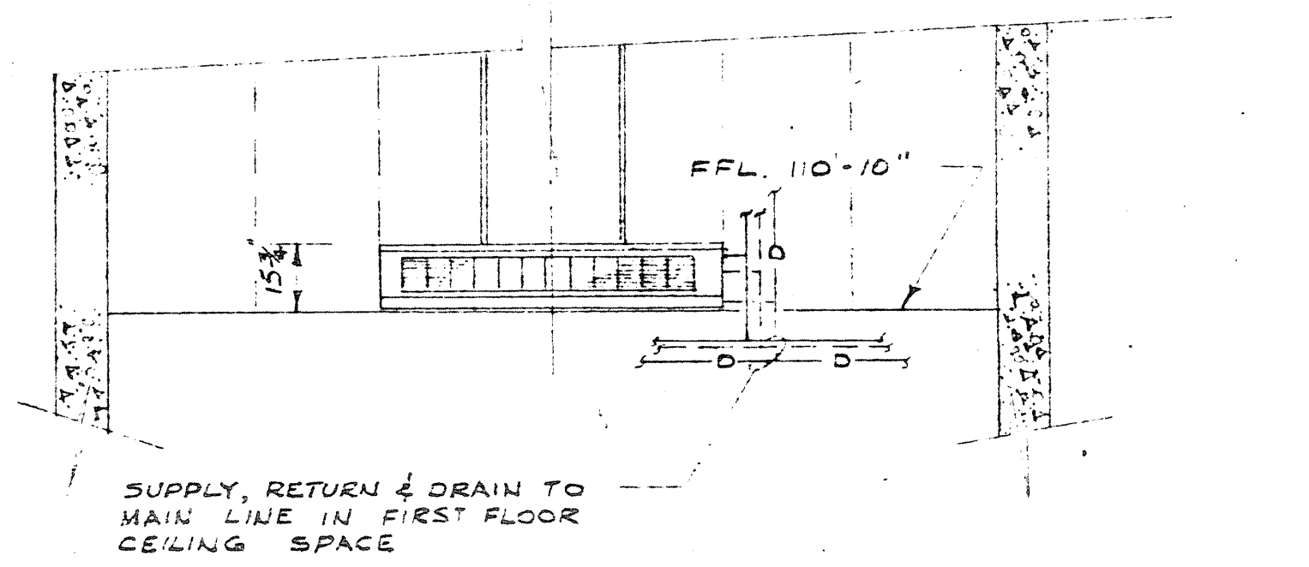
LAYOUT OF HOT WATER HEATER IN ROOM A-116 & 216

SCALE 1/4 = 1-0"



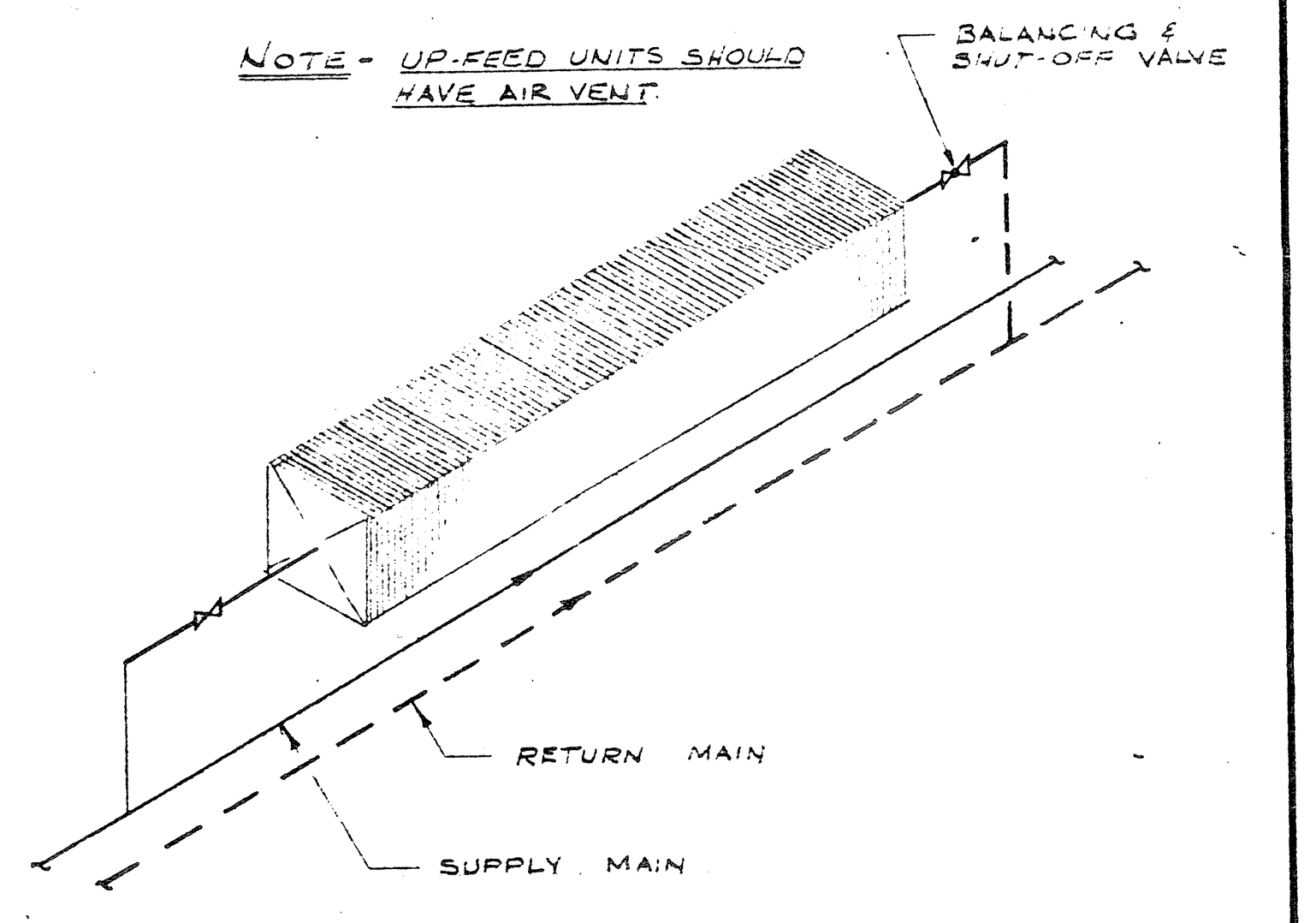
TYPICAL PIPING OF HOT WATER UNIT HEATER

NOT TO SCALE



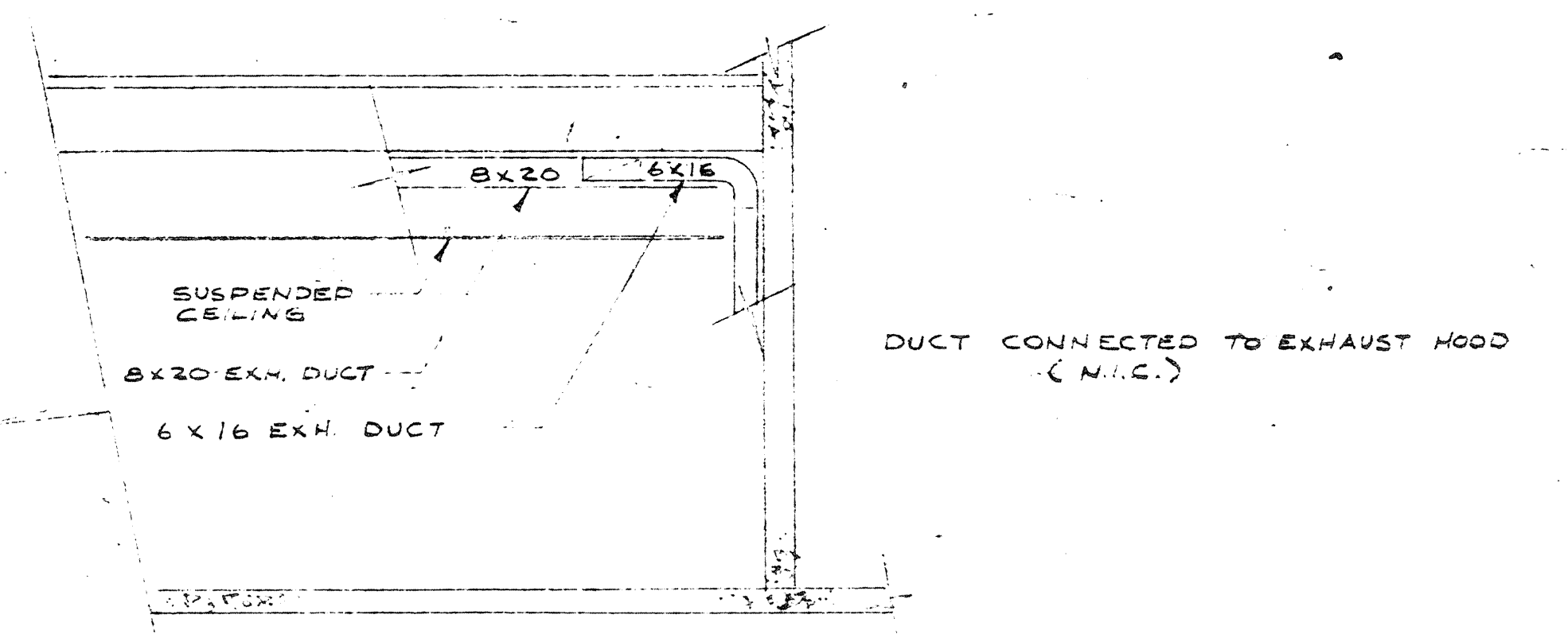
SECTION C/610

SCALE 1/4" = 1'-0"



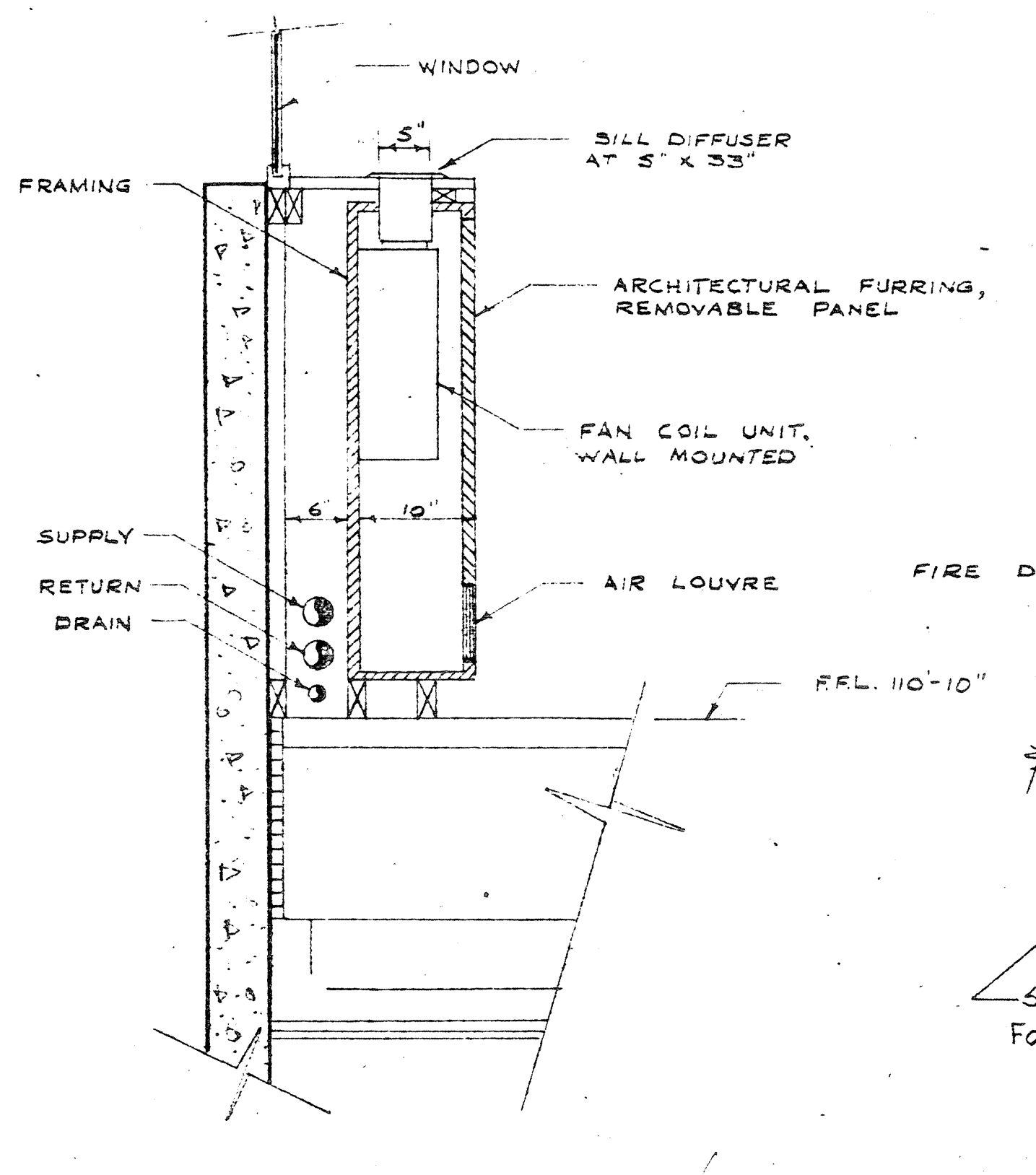
TYPICAL PIPING OF HOT WATER CONVECTOR

NOT TO SCALE



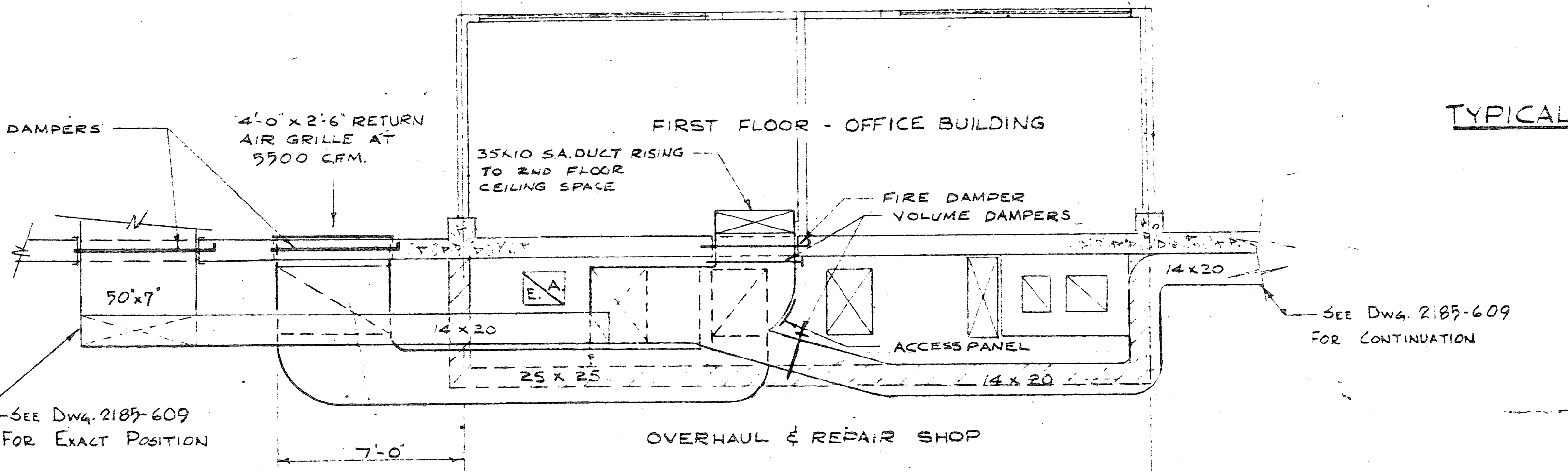
SECTION B/610

SCALE 1/4" = 1'-0"



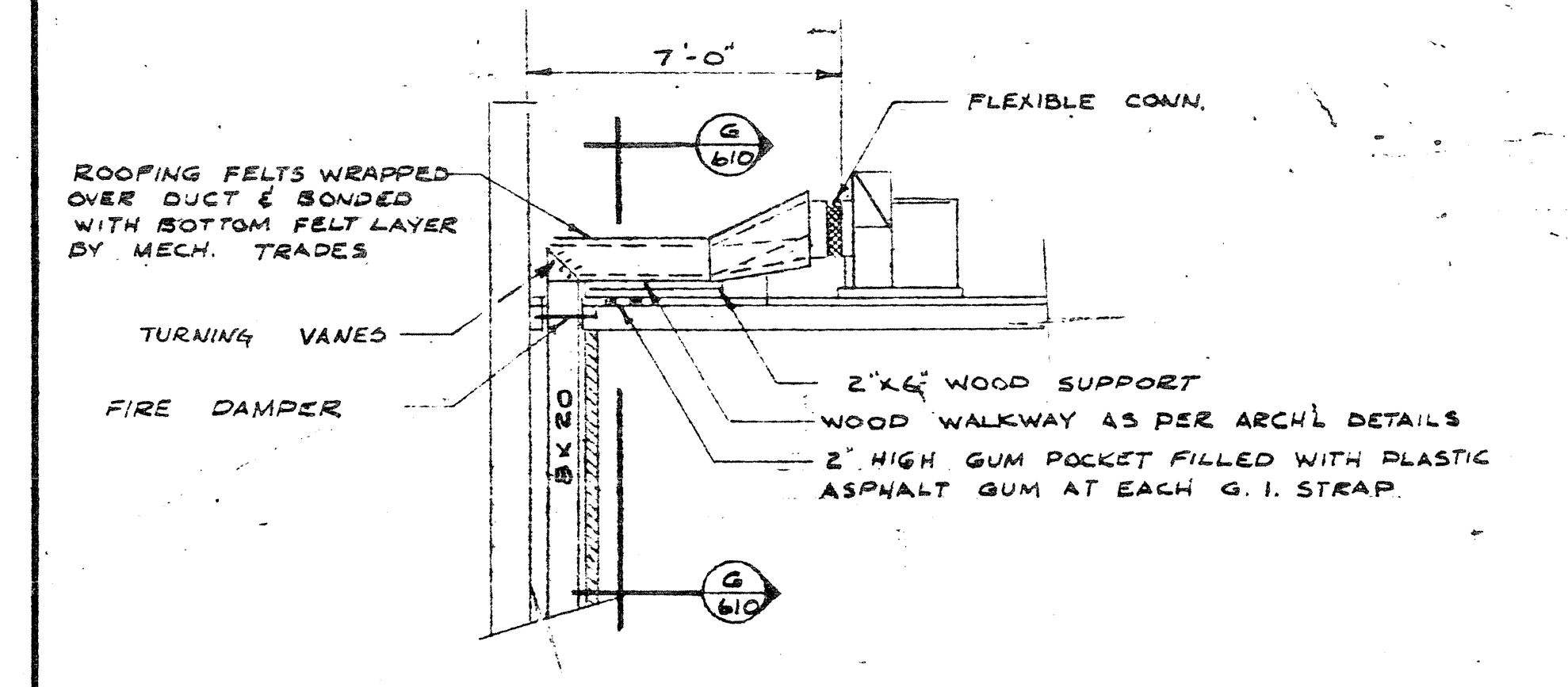
2ND FLOOR

SCALE 3/4" = 1'-0"



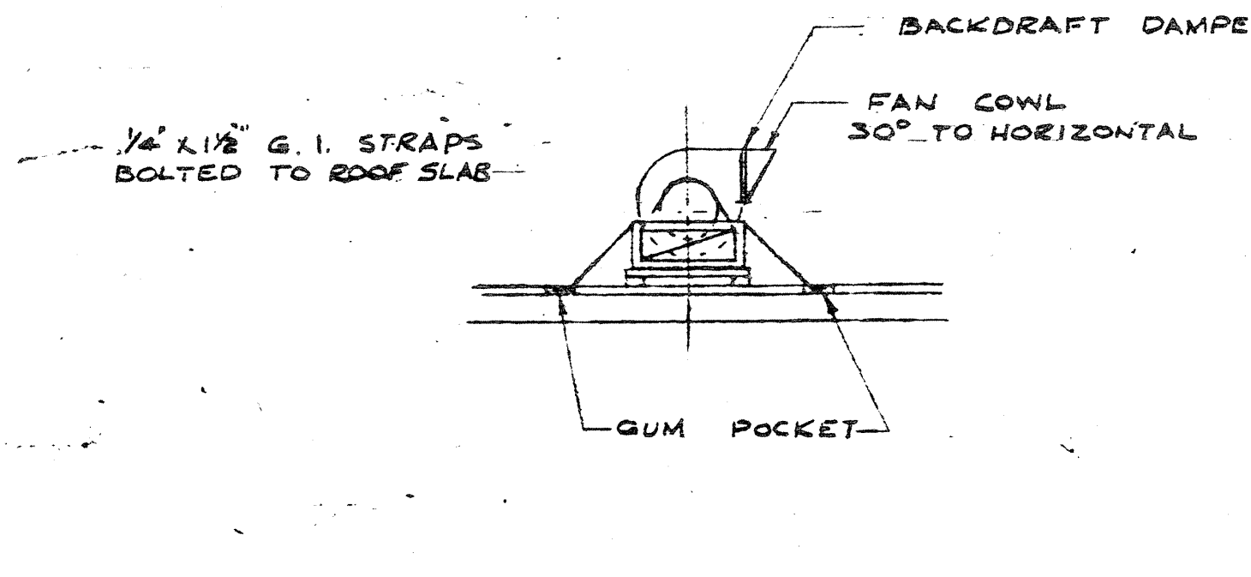
PLAN

SCALE 1/4" = 1'-0"



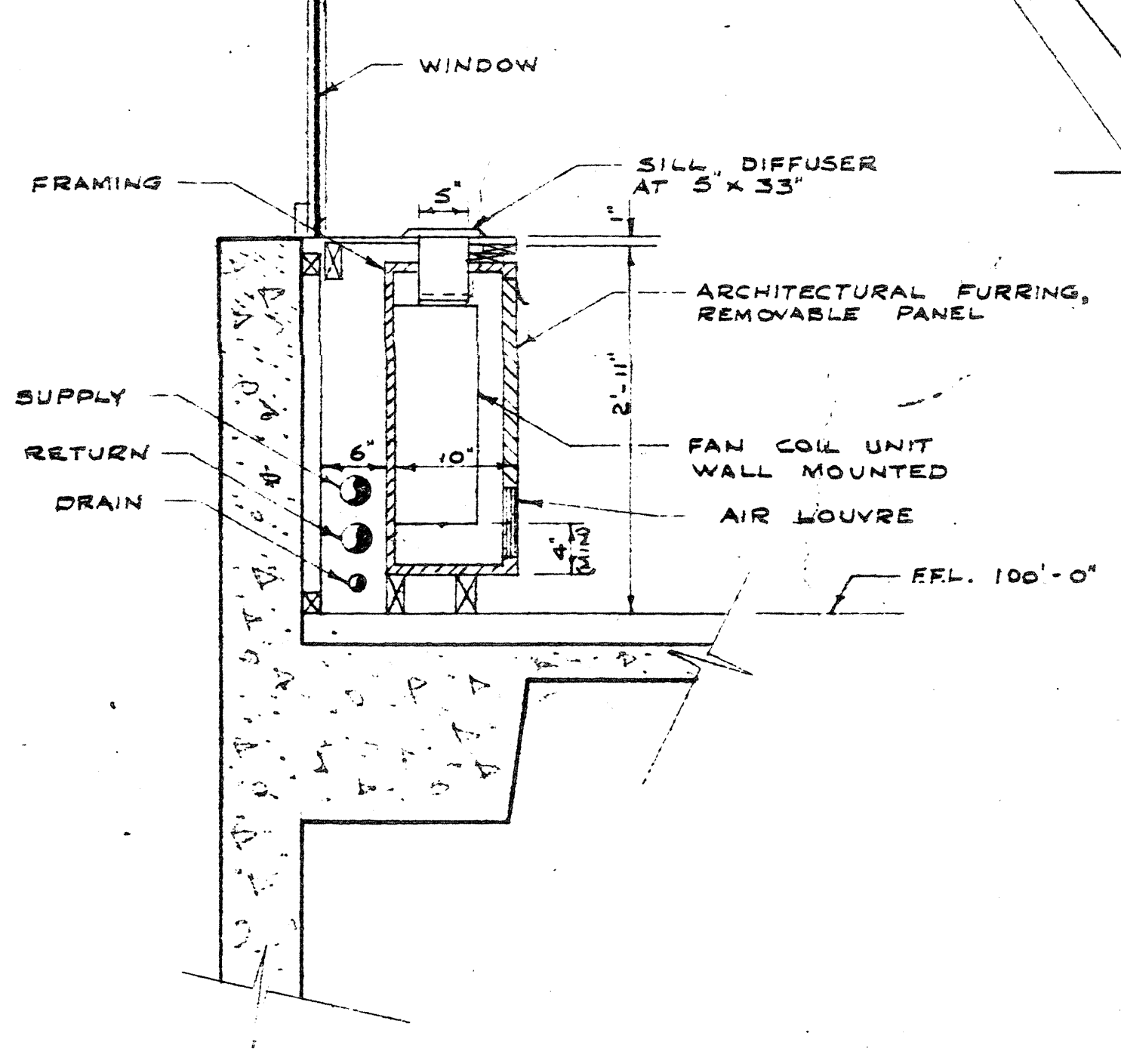
ELEVATION OF KITCHEN EXHAUST FAN ON ROOF

SCALE 1/4" = 1'-0"



SECTION

SCALE 1/4" = 1'-0"



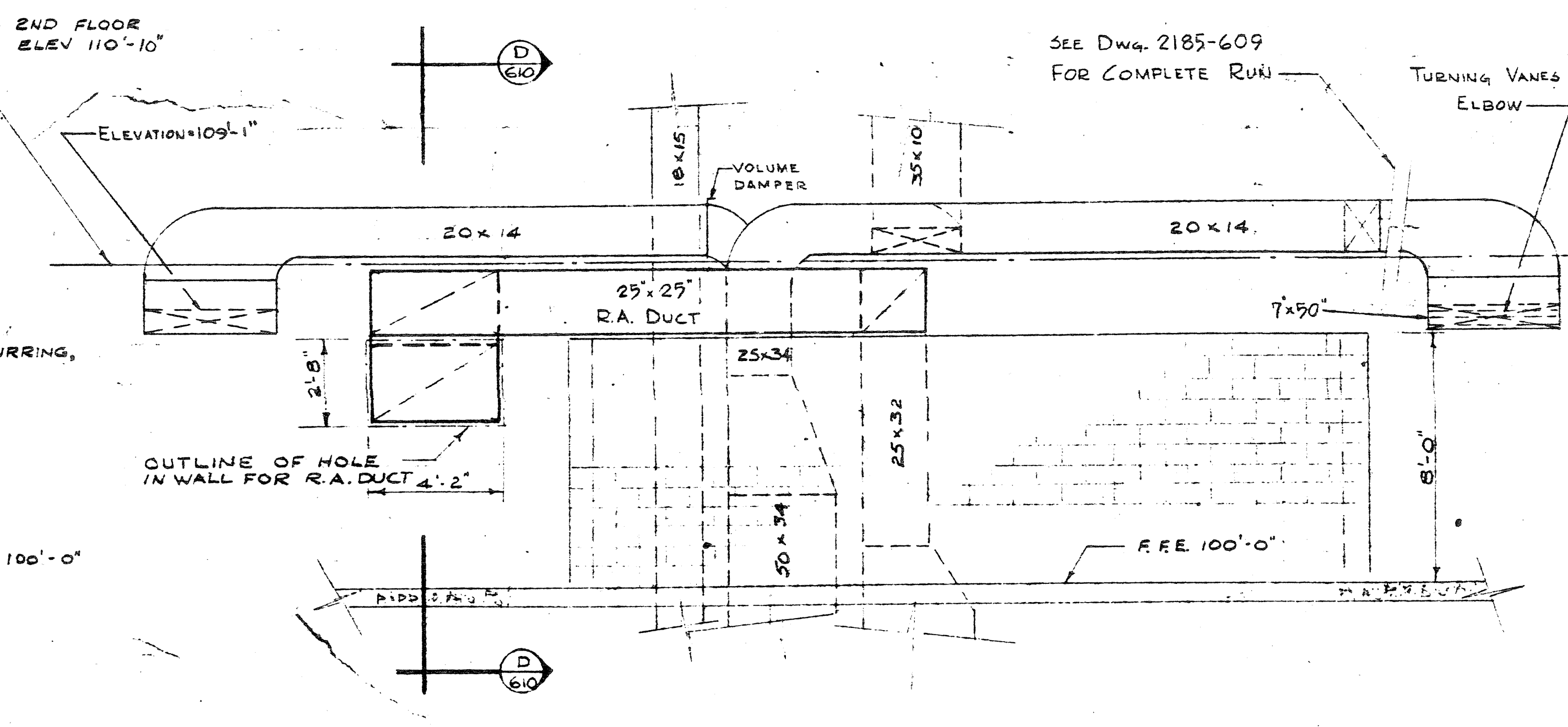
1ST FLOOR

SCALE 3/4" = 1'-0"

SECTION C/609

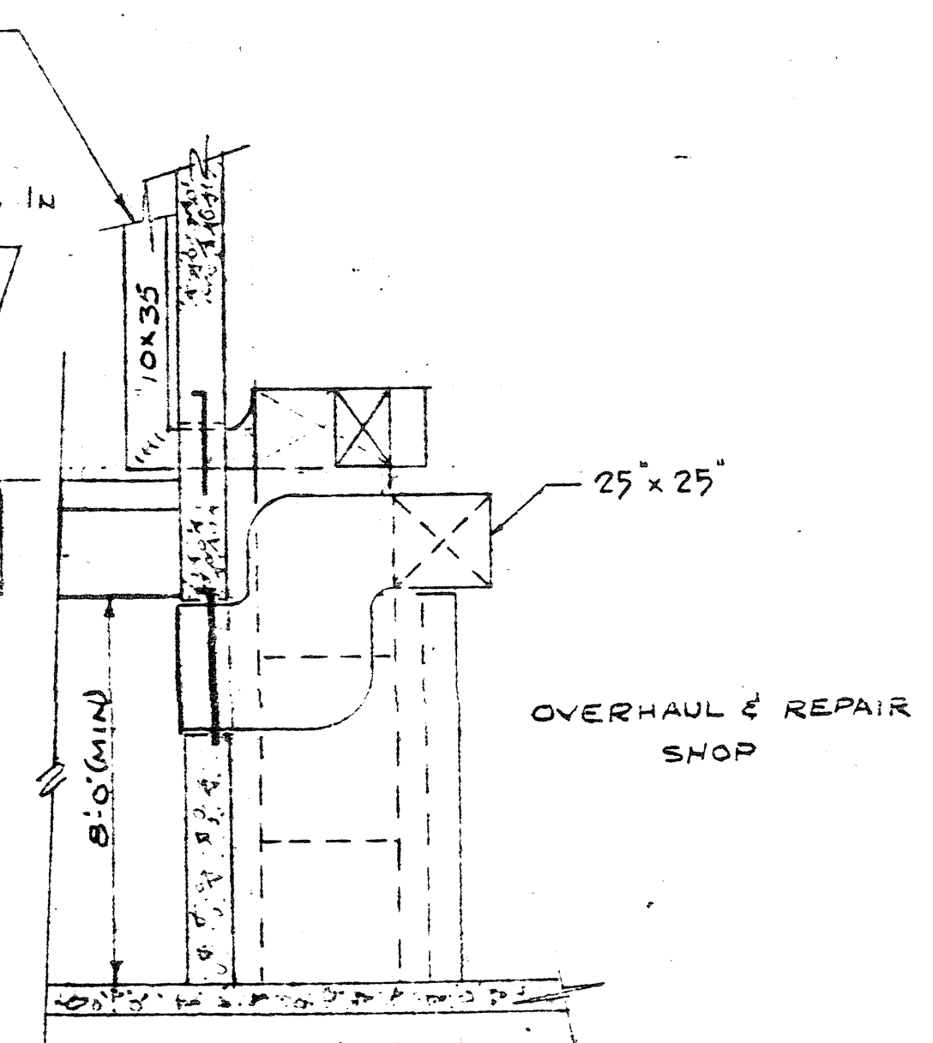
FURRED FAN COIL DETAILS

NORTH WINDOWS OFFICE BUILDING



ELEVATION

SCALE 1/4" = 1'-0"



SECTION D/610

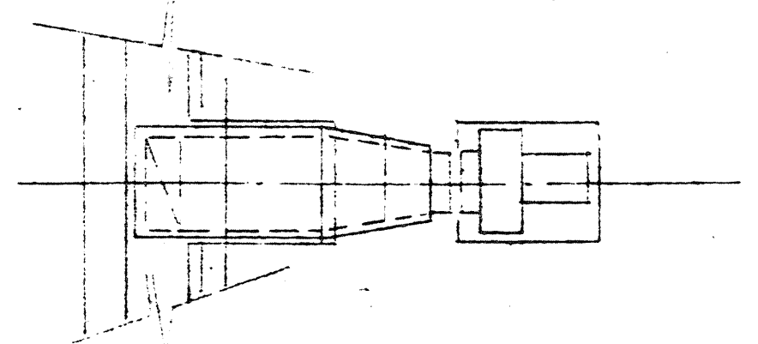
SCALE 1/4 = 1'-0"

2185- 610

LAYOUT OF AIR SYSTEMS

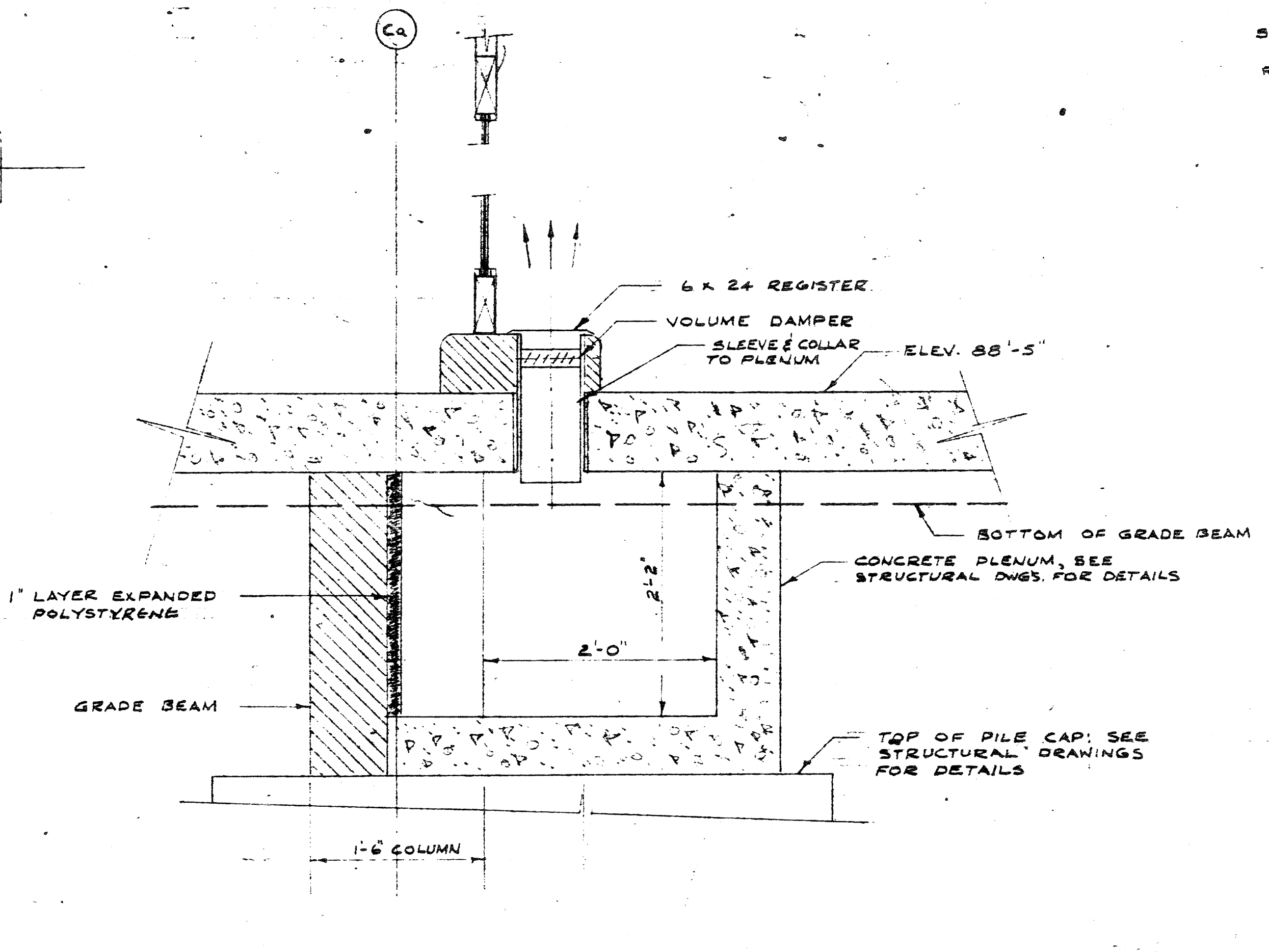
FIRST FLOOR - OFFICE BUILDING

SCALE 1/4" = 1'-0"



PLAN

SCALE 1/4" = 1'-0"



SECTION A/609

SCALE 1" = 1'-0"

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ADMINISTRATION BUILDING

HEATING, VENTILATING & AIR CONDITIONING - DETAILS

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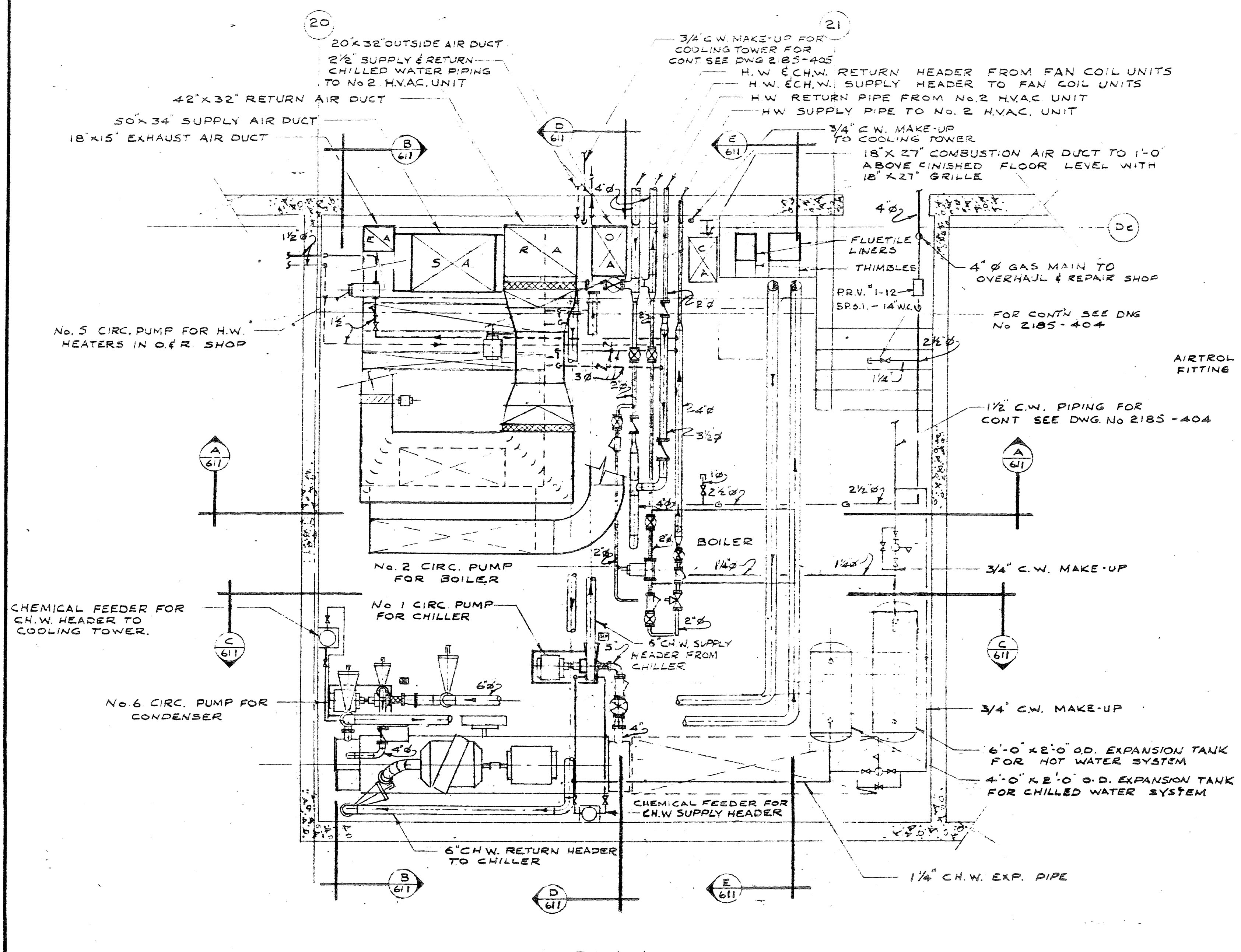
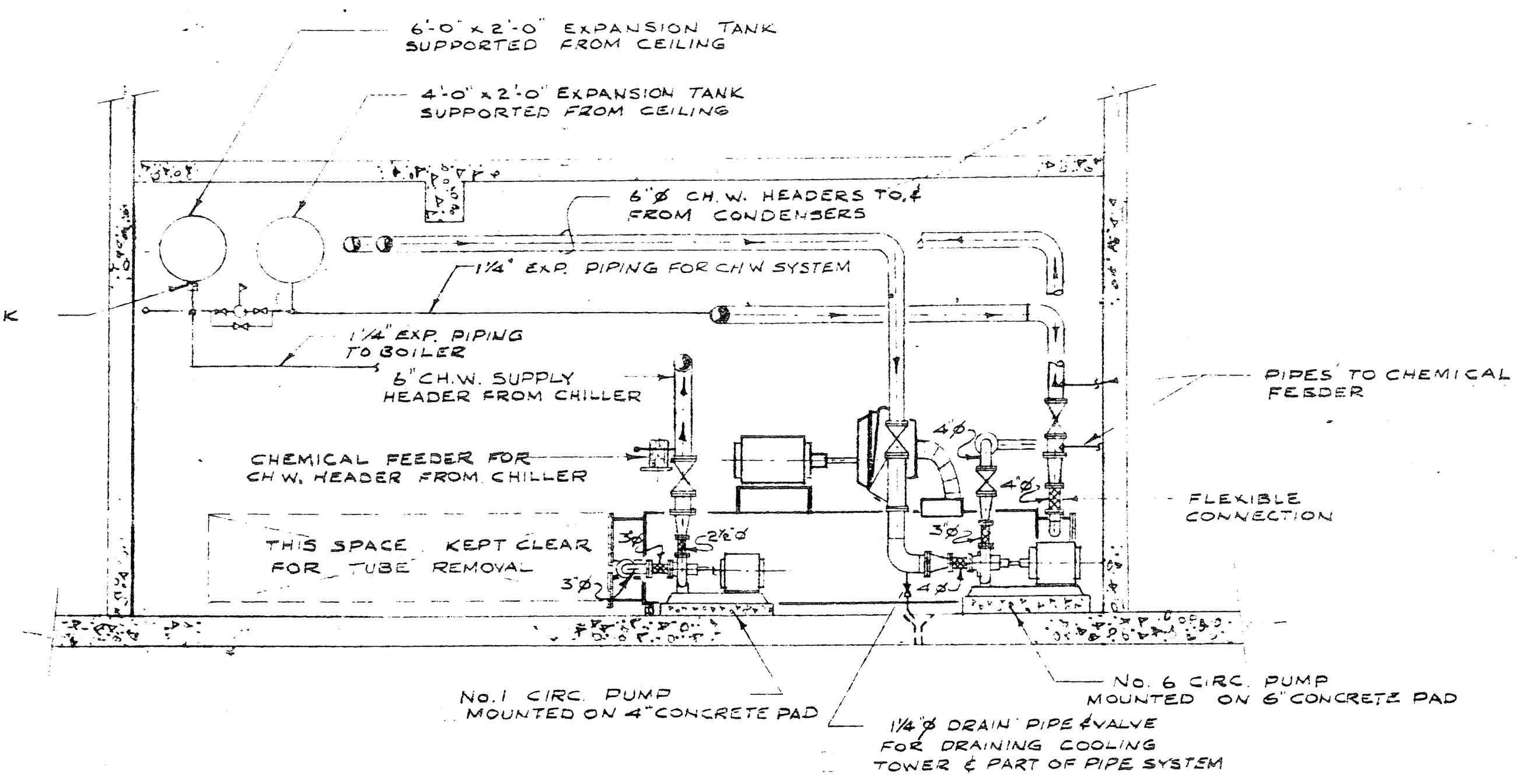
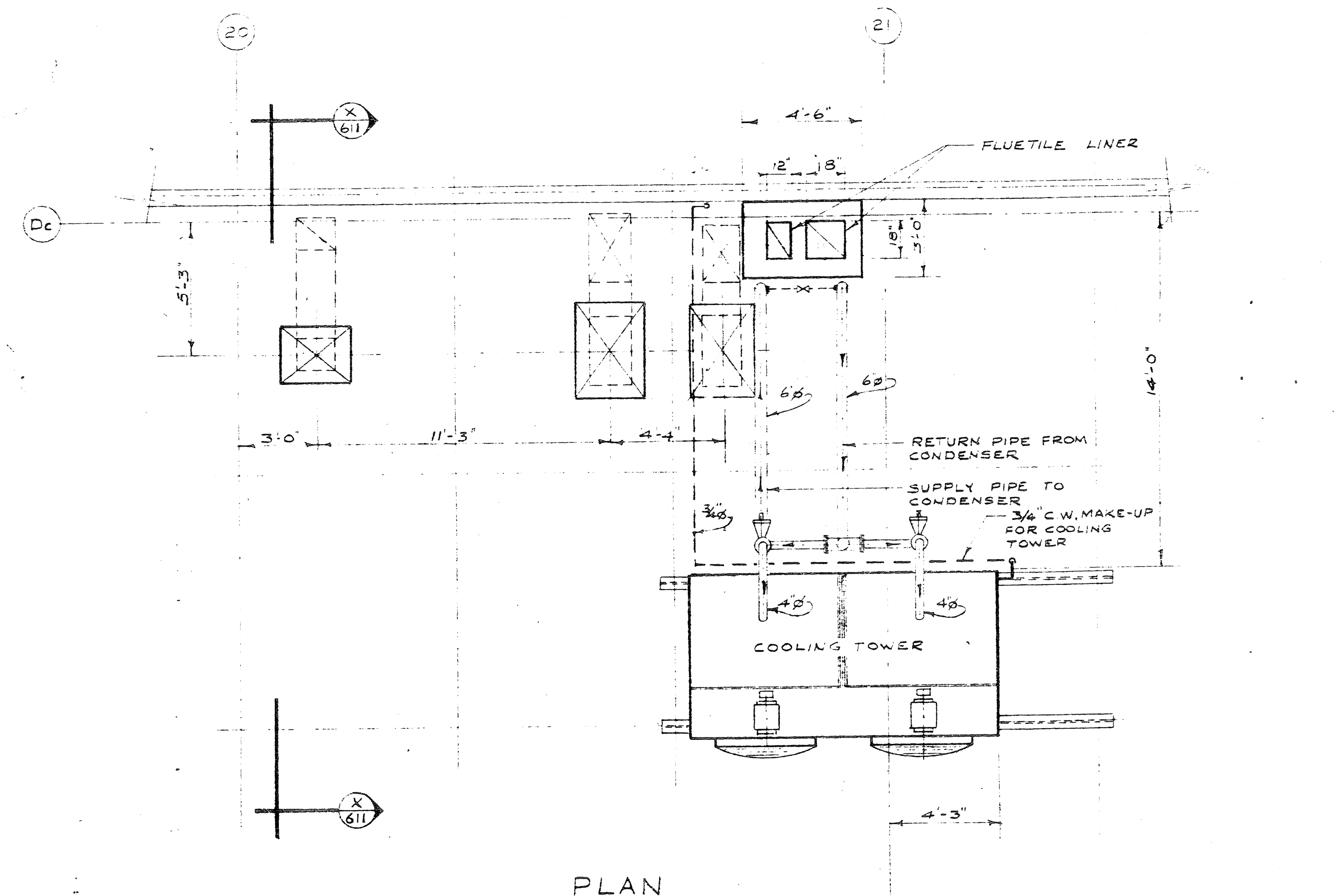


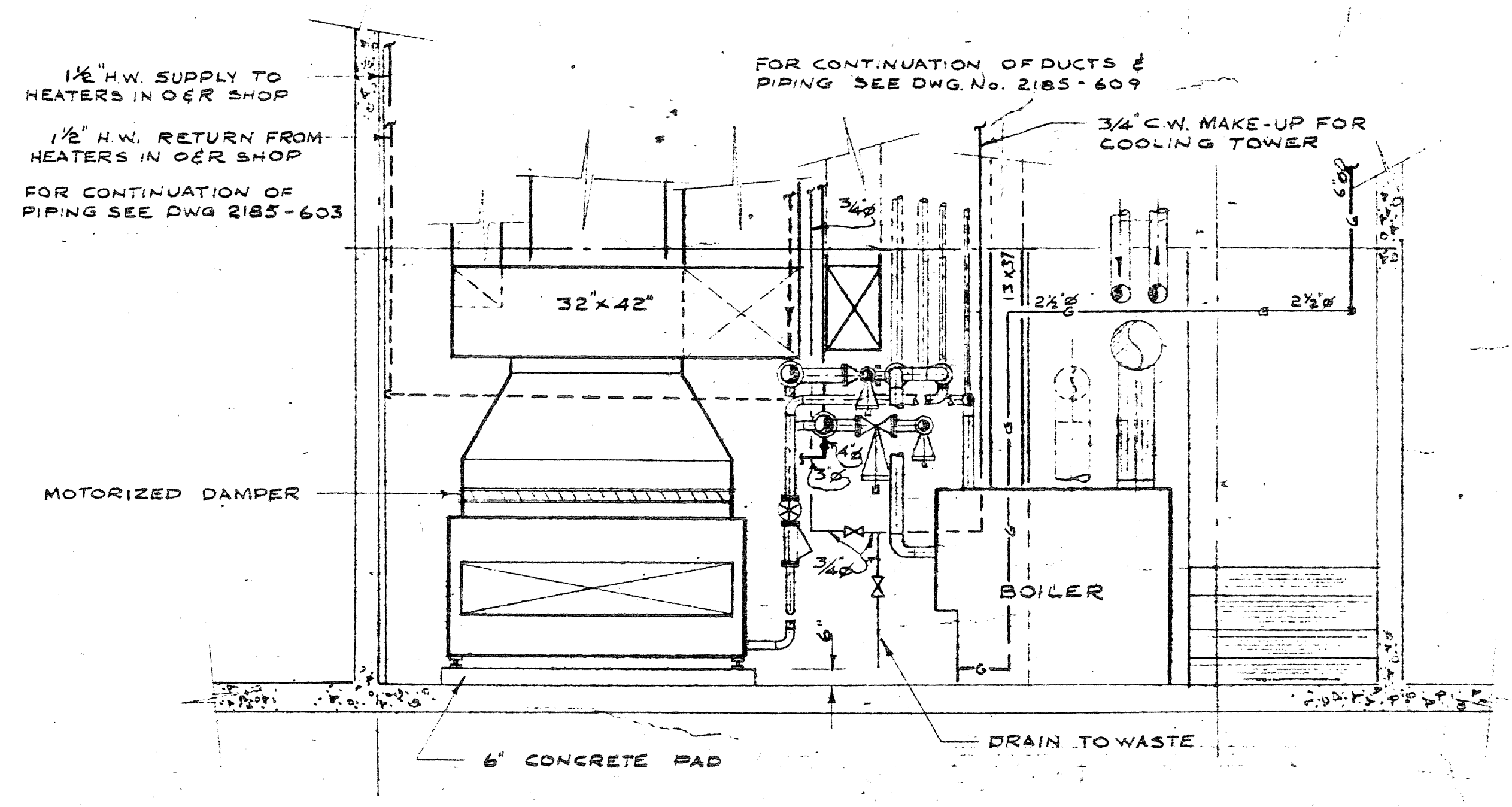
PLAN
SCALE 1/4" = 1'-0"



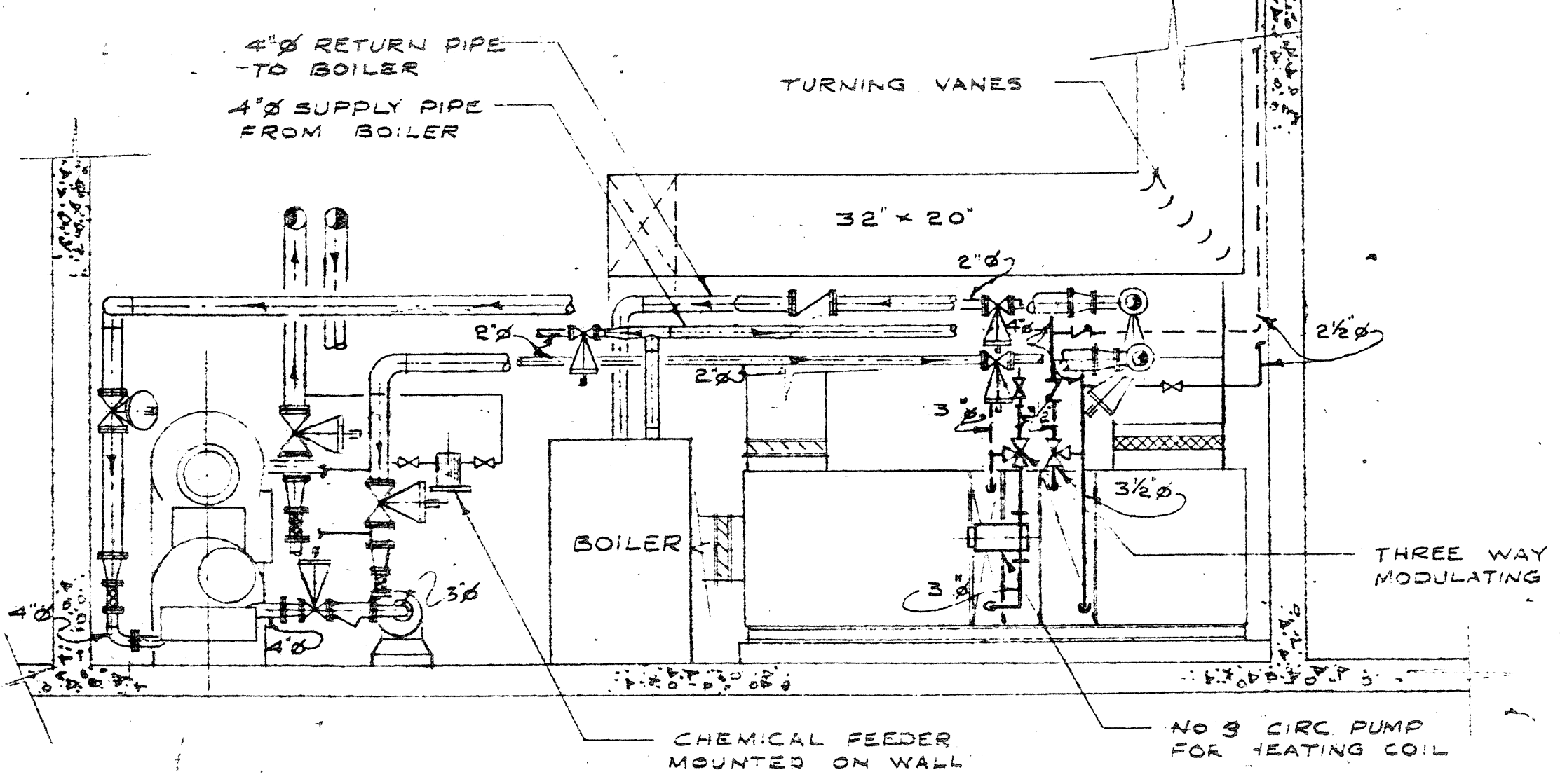
SECTION C/611
SCALE 1/4" = 1'-0"



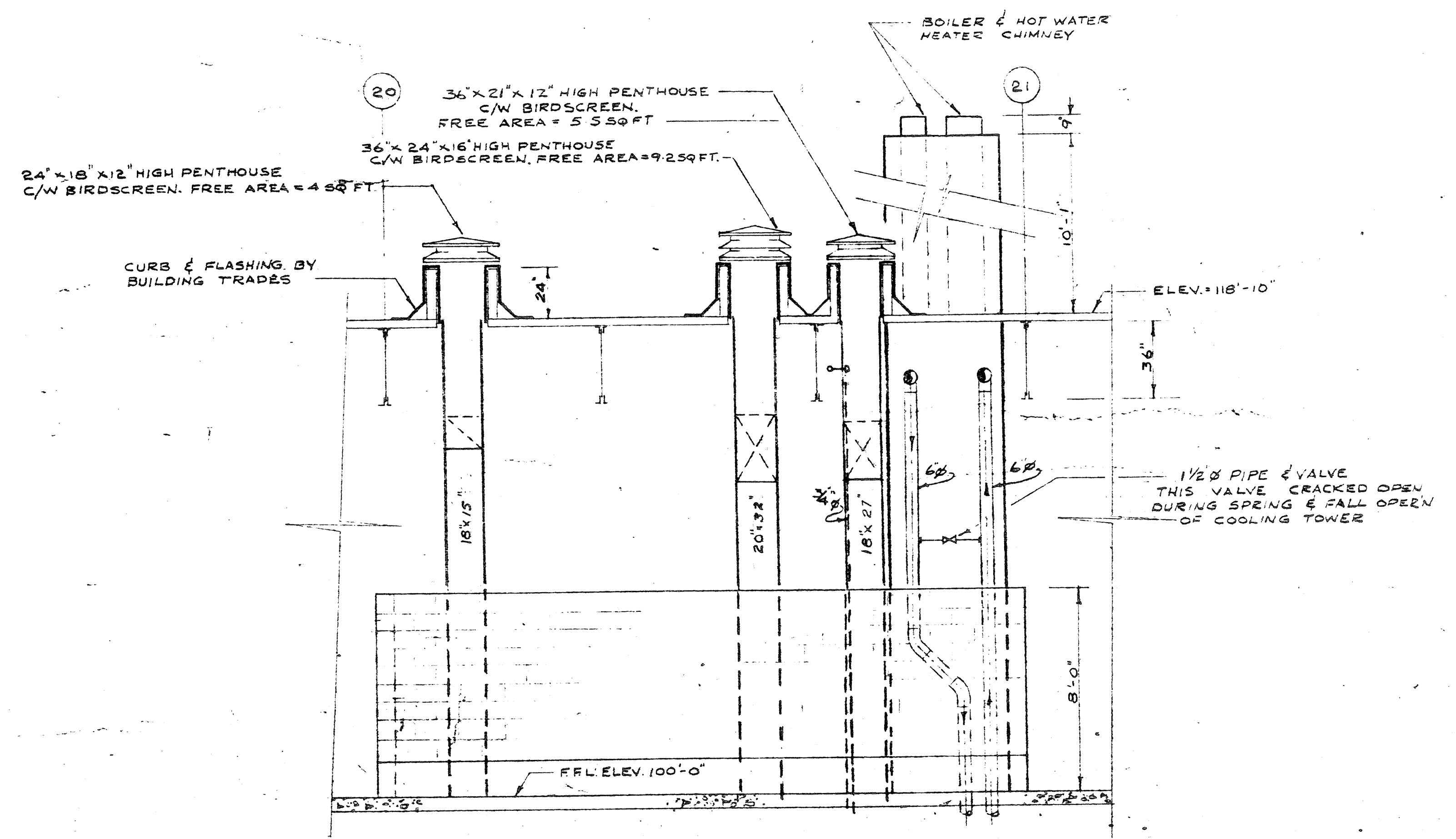
PLAN
SCALE 1/4" = 1'-0"



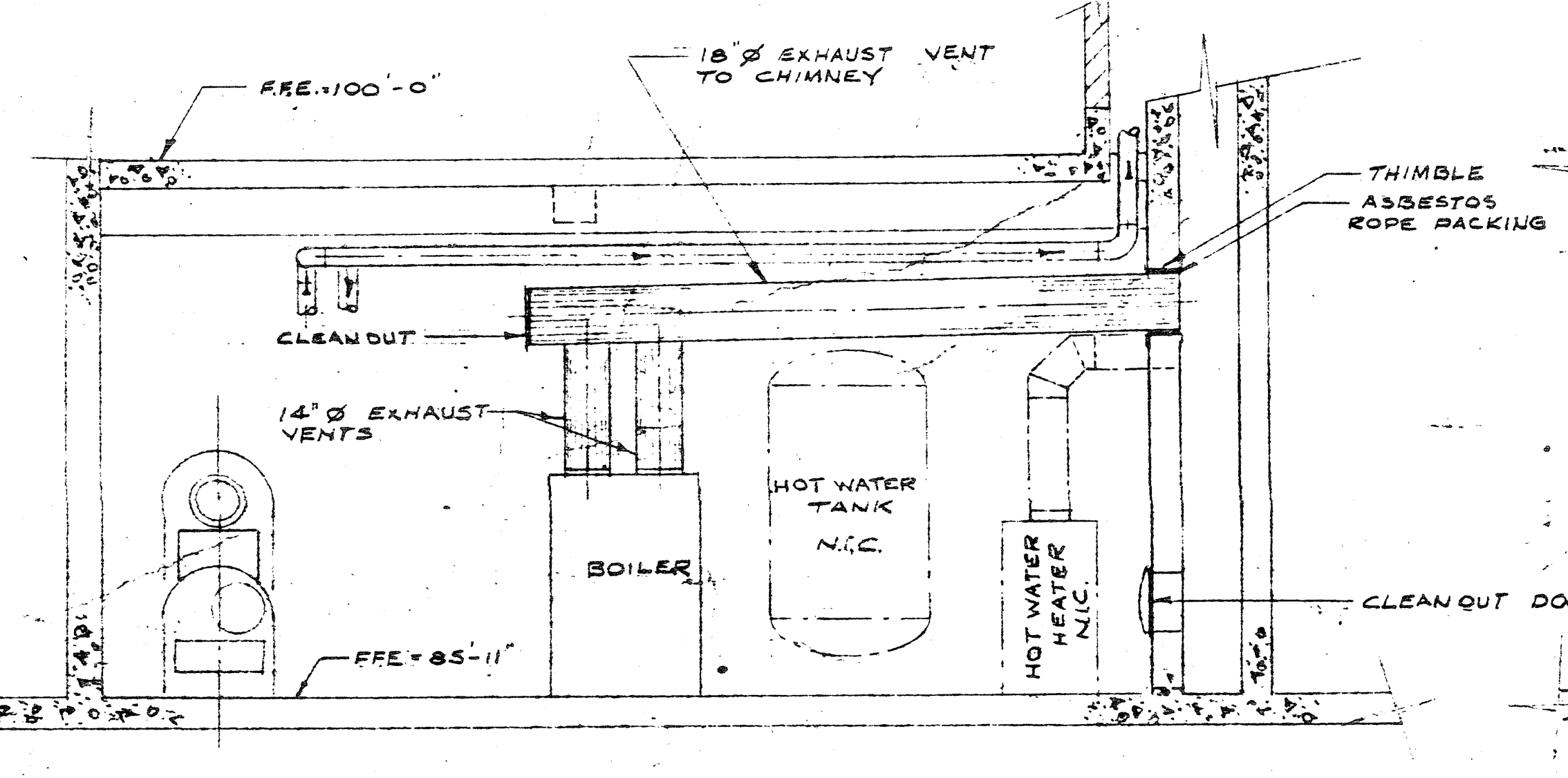
SECTION A/611
SCALE 1/4" = 1'-0"



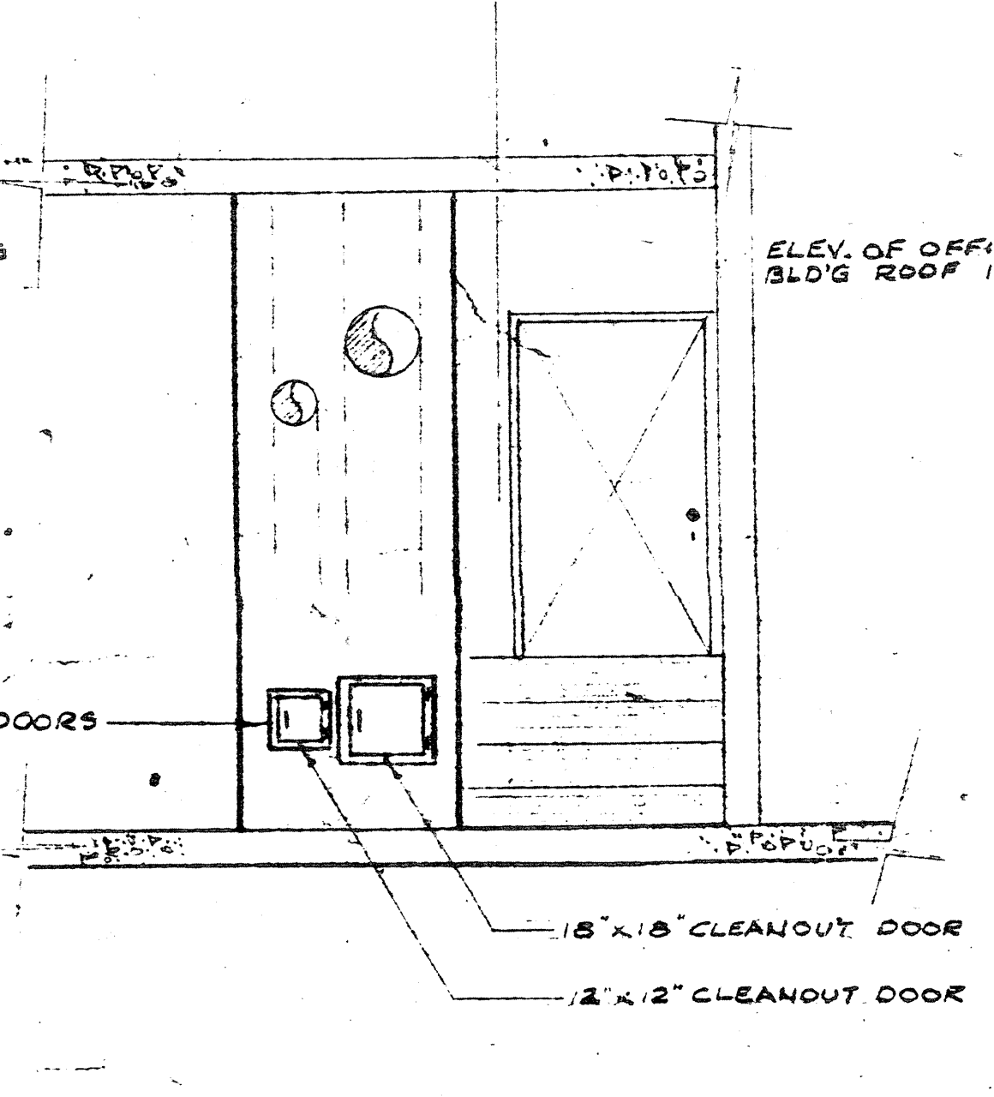
SECTION D/611
SCALE 1/4" = 1'-0"



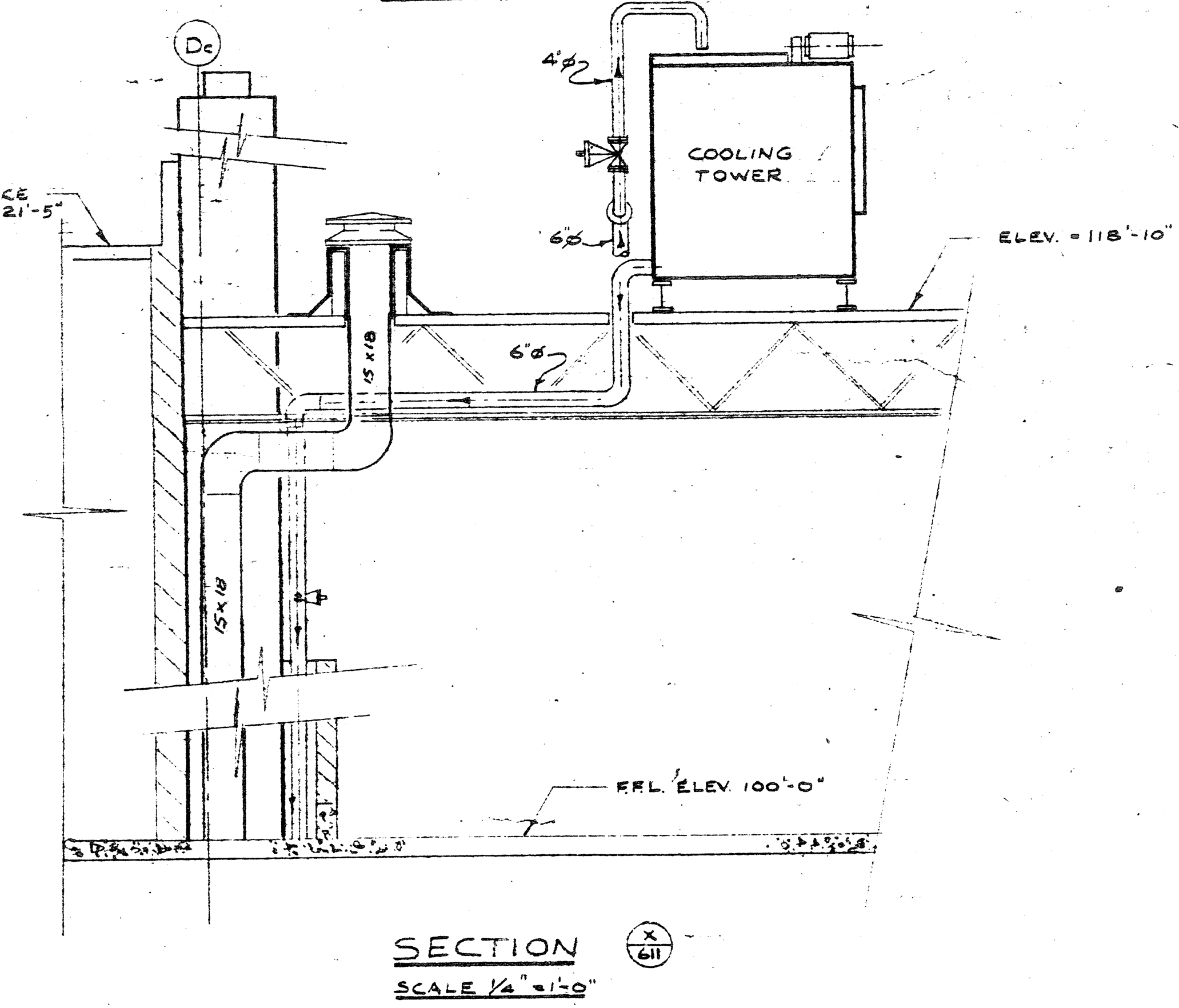
ELEVATION
SCALE 1/4" = 1'-0"



SECTION E/611
SCALE 1/4" = 1'-0"

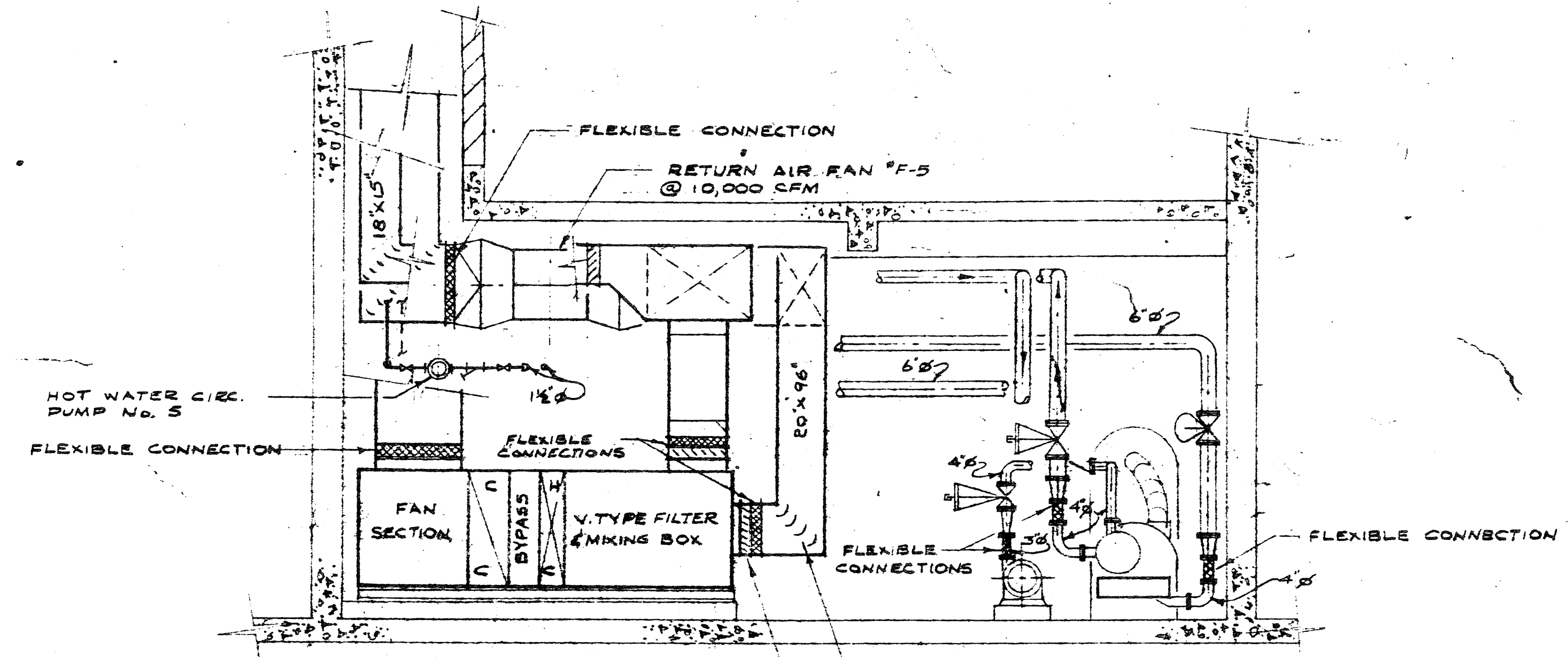


SECTION SHOWING CLEANOUT DOORS FOR EXHAUST CHIMNEY
SCALE 1/4" = 1'-0"



SECTION X/611
SCALE 1/4" = 1'-0"

2185 - 611



SECTION B/611
SCALE 1/4" = 1'-0"

COOLING COIL SCHEDULE

UNIT No	No. REQU'D	COIL TYPE	CFM	TOTAL LOAD BTU/HR	ENTERING AIR		LEAVING AIR		WATER		No ROWS	FINS PER INCH	No. OF CIRCUITS
					D.B.	W.B	D.B.	W.B.	USGPM	ENT'G			
#1	1	DW	13,400	688,000	82.0°F	68.0°F	51.0°F	50.8°F	138	45°F	8	10.	DOUBLE
#2	1	DW	4,628	331,000	19°F	84.8°F	54.6°F	54.6°F	49	45°F	8	10	SINGLE

HEATING COIL SCHEDULE

UNIT No	No REQ'D	COIL TYPE	CFM	TOTAL LOAD BTU/HR	ENT. AIR DB	LEAV. AIR DB	WATER		No ROWS	FINS/INCH	No OF CIRCUITS	REMARKS
							U.S.GPM	ENT'G				
#1	1	RW.	13400	871,000	16°F	78°F	86	200°F	2	8	SINGLE	
#2	1	DW	4,628	331,000	19°F	84.4°F	34	200°F	2	8	SINGLE	

FILTER SCHEDULE

UNIT No	FILTER TYPE	SIZE	No REQ'D	MAX VELOC.	REMARKS
#1	THROW AWAY	20×25 20×20	4 12	520 FPM	318 FPM VEL. THROUGH FILTER MEDIA AREA
#2	THROW AWAY	16×20	6	526 FPM	329 FPM VEL THROUGH FILTER MEDIA AREA

PUMP SCHEDULE

SYMBOL	SERVICE	MODEL No	CAPACITY U.S. GPM.	HEAD	RPM.	H.P.	ELECTRICAL	LOCATION	REMARKS
CP-1	CHILLED WATER (ALL)	SERIES 1510 SIZE 2½B	271	40	1750	7½	550/3/60	BOILER ROOM	SIZED FOR FUTURE EXTENSION
CP-2	HOT WATER FAN COIL	STD. CIRC. SIZE S-	24	14½	1750	¼	115/1/60	BOILER ROOM	
CP-3	HOT WATER A.C. # 1	STD. CIRC. SIZE S-57	89	17	1750	3/4	550/3/60	BOILER ROOM	
CP-4	HOT WATER A.C. # 2	STD. CIRC. SIZE S-55	34	18½	1750	½	550/3/60	AT UNIT	
CP-5	HOT WATER OVERHAUL & REPAIR	STD. CIRC SIZE S-35	13	9	1750	1/6	115/1/60	BOILER ROOM	
CP-6	CONDENSER WATER	SERIES 1510 SIZE 3B	430	43	1750	7½	550/3/60	BOILER ROOM	

AIR SUPPLY - FAN & DRIVE SCHEDULE

UNIT No	No REQ'D	MODEL & SIZE	TYPE	CFM	MAX. VELOC.	TOTAL S.P.	FAN H.P.	REMARKS
#1	1	A-25	HORIZONTAL	13,400	1795 FPM	2½"	10	FAN TO BE TOP DISCHARGE; DRIVE ASSEMBLY MOUNTED ON TOP OF UNIT
#2	1	A-7½	VERTICAL	4,628	1850 FPM	2"	3	DRIVE ASSEMBLY MOUNTED; ON BACK SIDE OF FAN DISCHARGE.

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TRANSIT STORAGE AND SHOP FACILITIES

ADMINISTRATION BUILDING
MECHANICAL EQUIPMENT – LAYOUT, DETAILS & SCHEDULES

CONSULTING PROFESSIONAL ENGINEERS
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10 DONALD STREET, WINNIPEG, MANITOBA

MECHANICAL
J. F. THORPE

LICENSED TO PRACTICE
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PROVINCE OF MANITOBA
My licence Expires: 10 Jan. 1963

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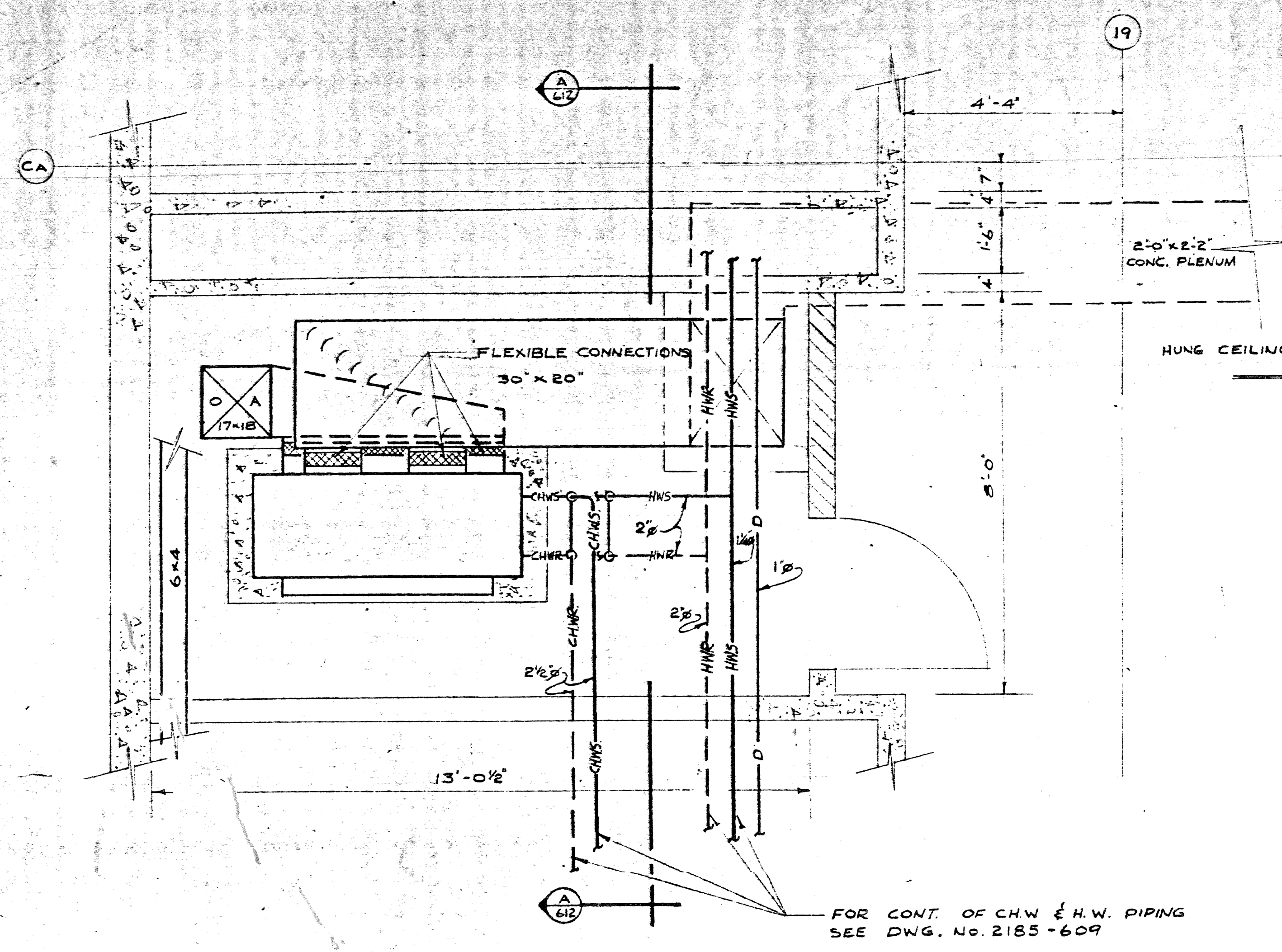
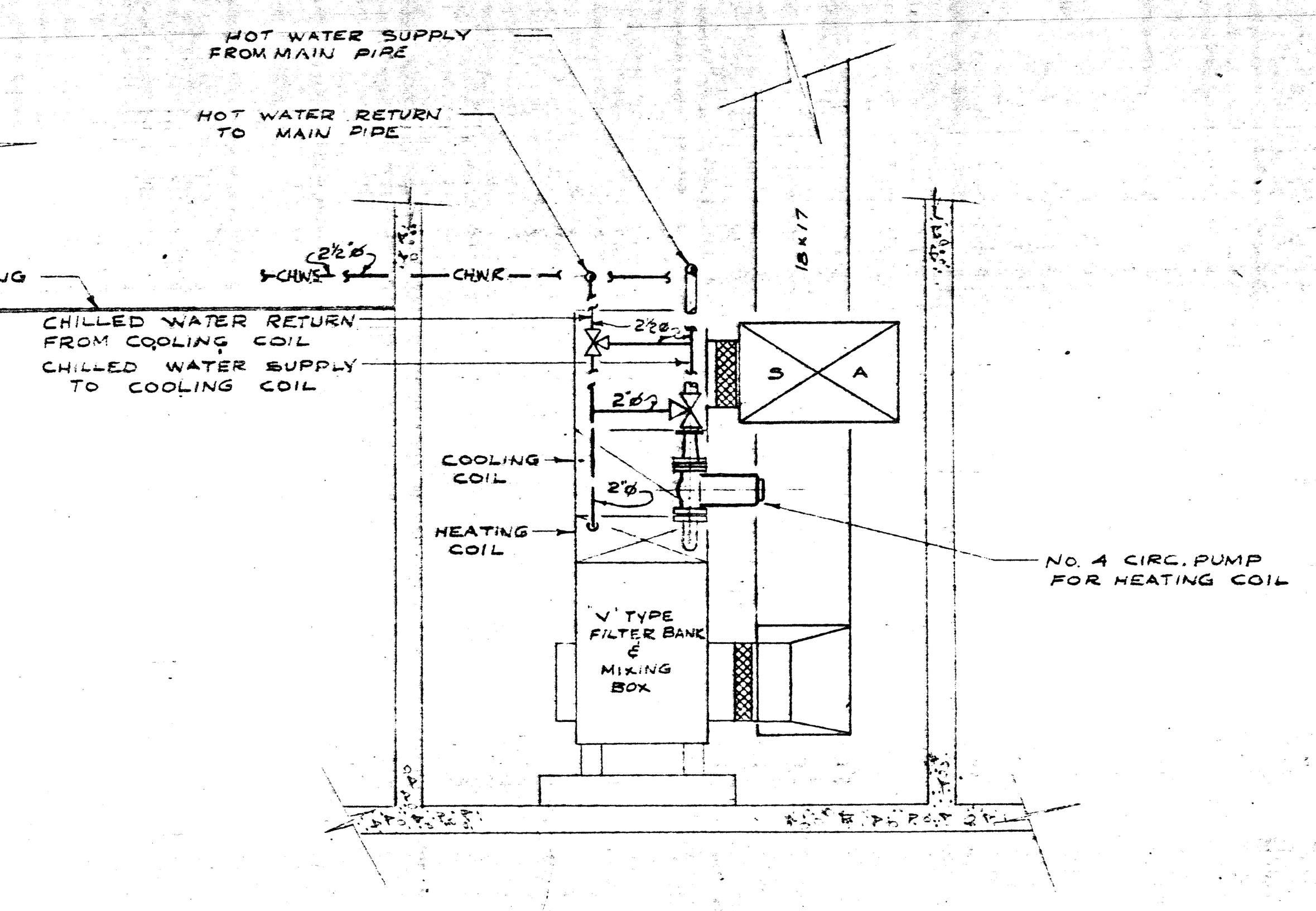


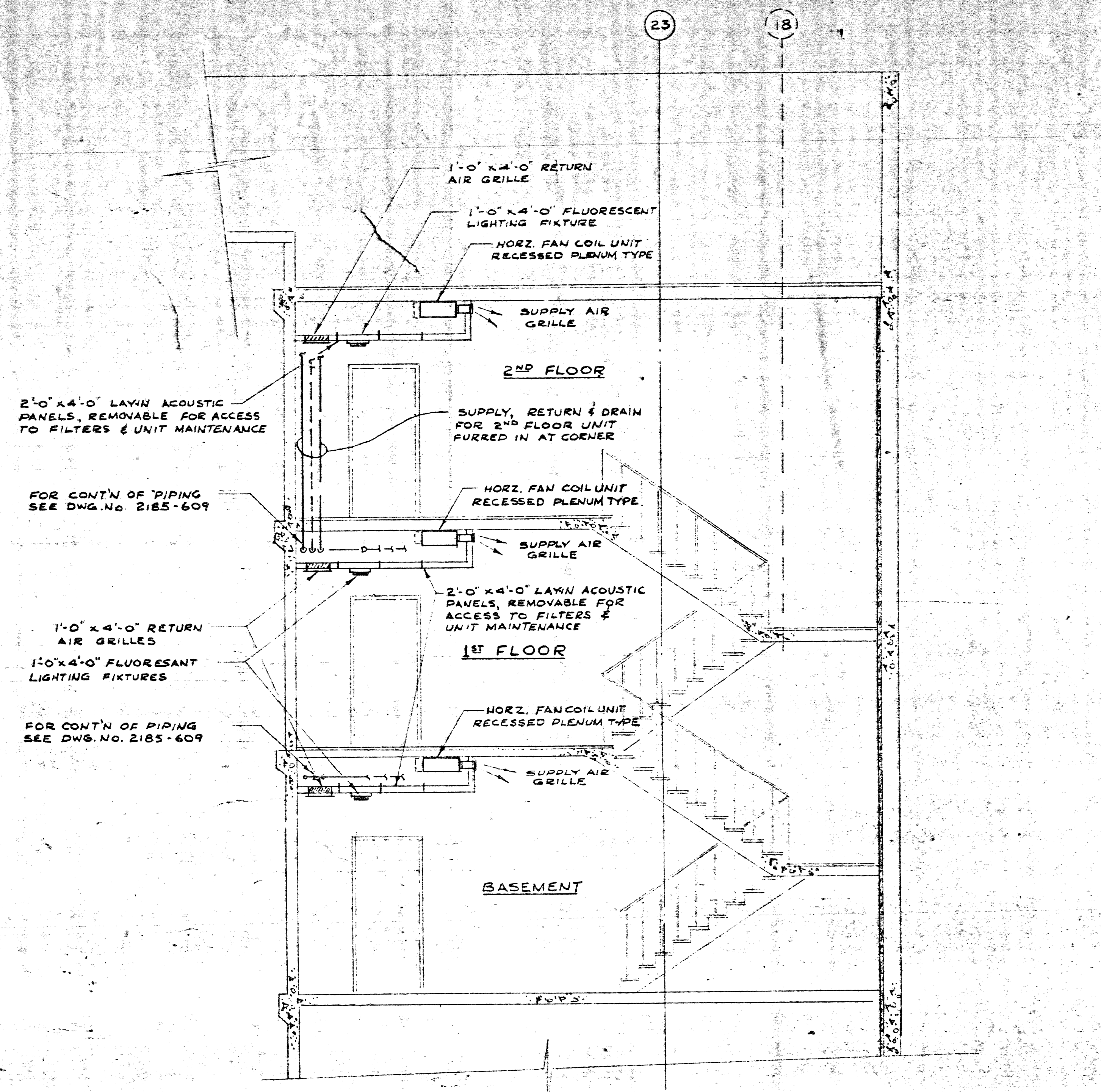
PLAN

SCALE ½" = 1'-0"



SECTION (A/612)

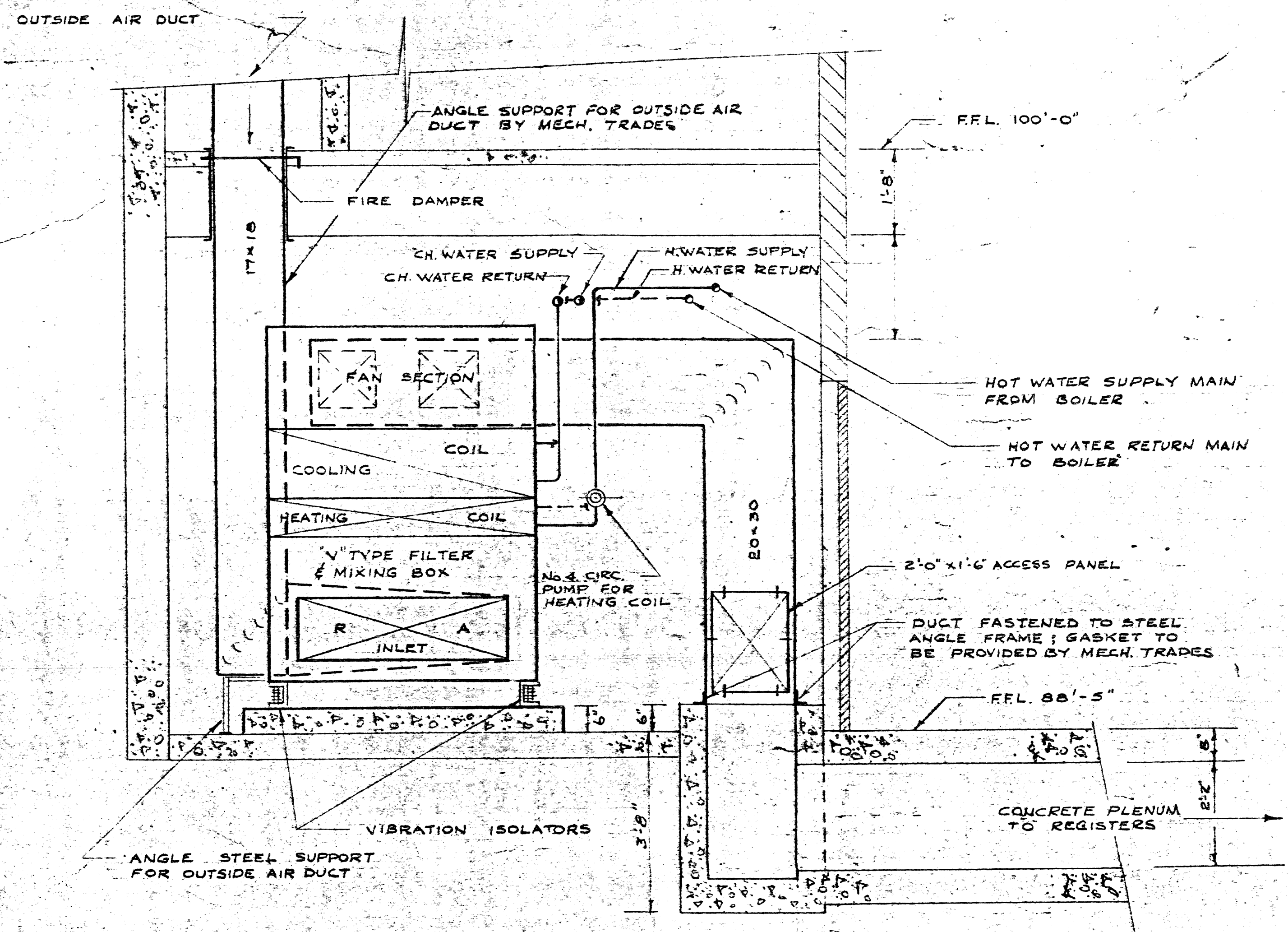
SCALE ½" = 1'-0"



NOTE:- APPLICABLE TO STAIRHALL #5 IN REVERSE LAYOUT

SECTION (B/609)

SCALE ¼" = 1'-0"



ELEVATION

SCALE ⅛" = 1'-0"

LAYOUT OF MECHANICAL ROOM IN THE BASEMENT OF OFFICE BUILDING

2185 - 612

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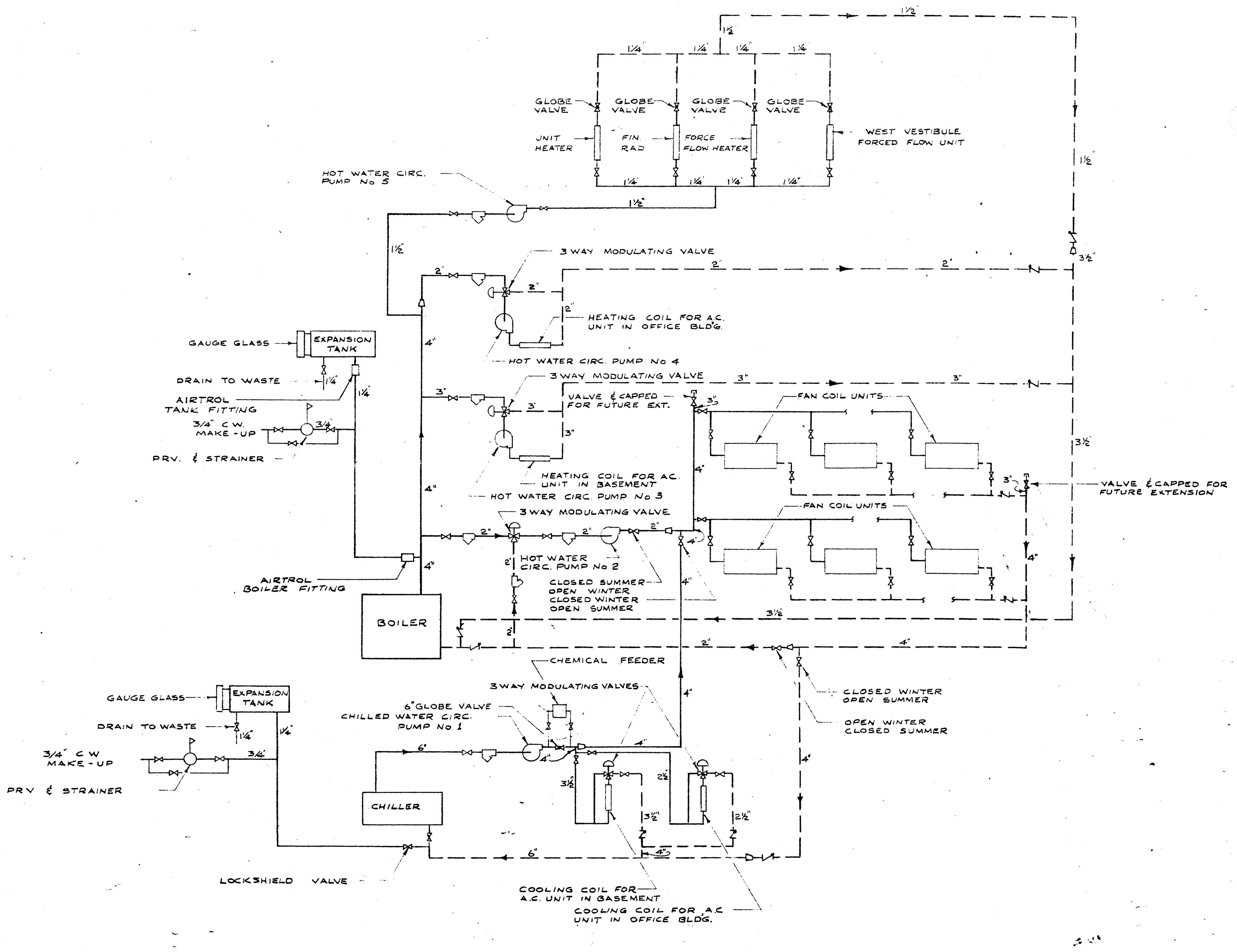
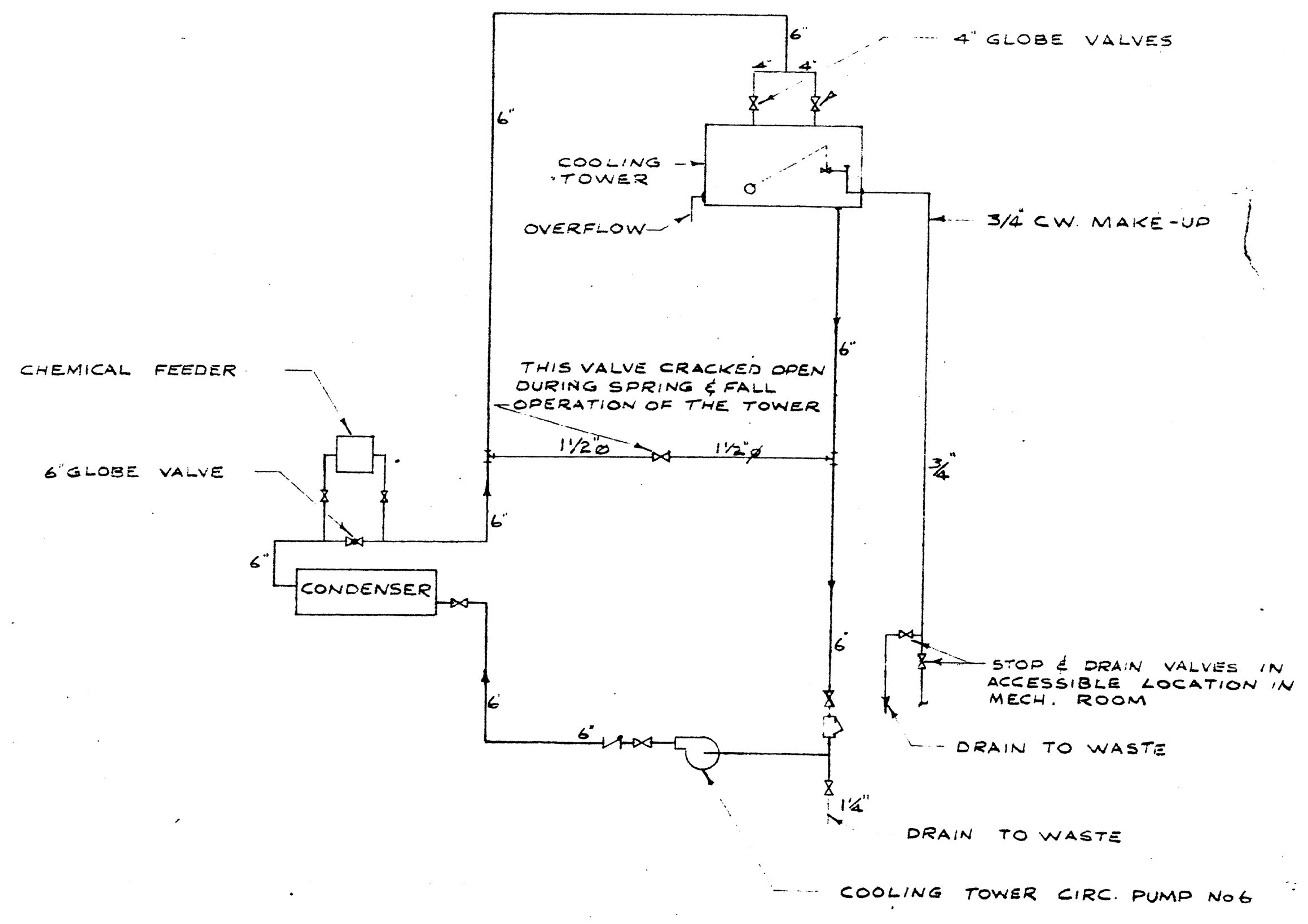


SCHEMATIC HOT & CHILLED WATER PIPING DIAGRAM

NOT TO SCALE



SCHEMATIC COOLING TOWER PIPING DIAGRAM

NOT TO SCALE

2185-613

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HEATING & AIR CONDITIONING
SCHEMATIC HOT & CHILLED WATER PIPING DIAGRAM

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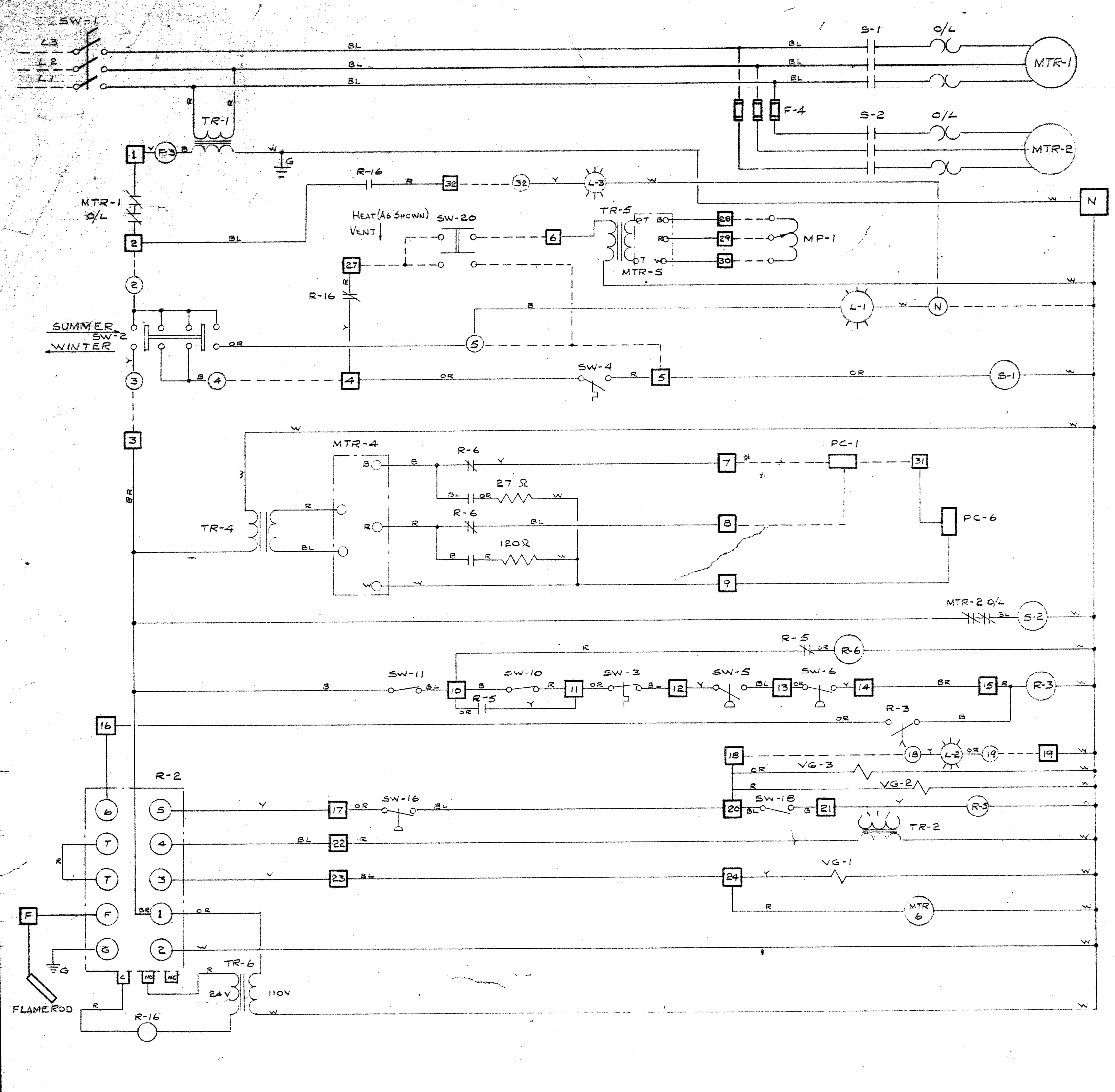
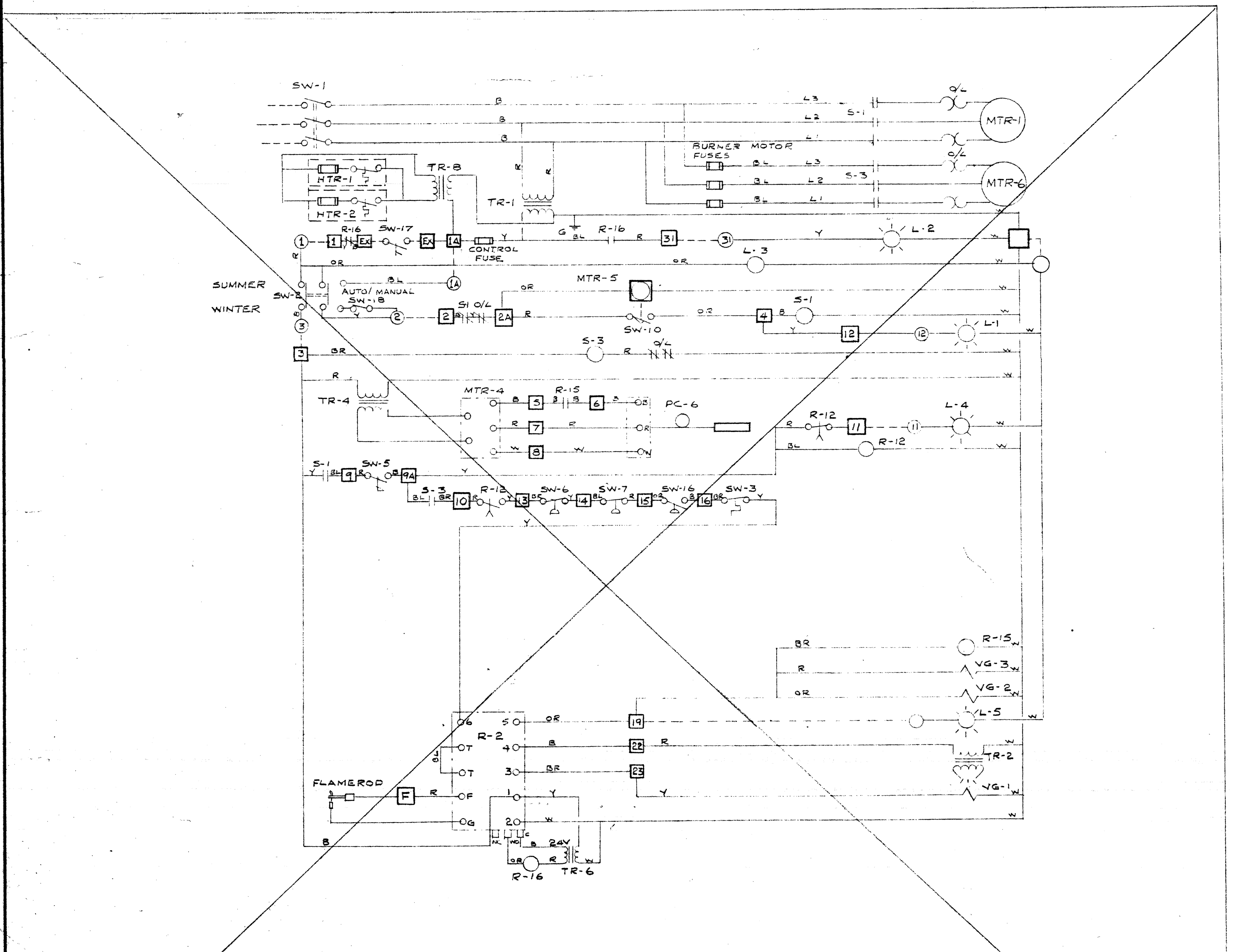


CONTROL DIAGRAM FOR INDIRECT GAS FIRED MAKE-UP AIR UNITS R2

NOT TO SCALE



CONTROL DIAGRAMS FOR DIRECT GAS FIRED MAKE-UP AIR UNITS

NOT TO SCALE

COMPONENT IDENTIFICATION FOR INDIRECT GAS FIRED MAKE-UP AIR UNITS	
SYMBOL	COMPONENT
F-3	CONTROL FUSE
F-4	INDUCED DRAFT FUSE
MTR-1	MAIN SUPPLY FAN MOTOR
MTR-2	INDUCED DRAFT FAN MOTOR
MTR-4	MODUTROL MOTOR
MTR-5	DAMPER MOTOR
MTR-6	BURNER MOTOR
S-1	MAIN FAN MOTOR STARTER
S-2	ID FAN MOTOR STARTER
R-2	BURNER RELAY
R-3	PRE-PURGE RELAY
R-5	LOW FIRE RELAY
R-6	LOW FIRE HOLD RELAY
R-16	ALARM CIRCUIT RELAY
PC-1	ROOM THERMOSTAT
PC-6	DUCTSTAT
TR-1	CONTROL TRANSFORMER
TR-2	GAS IGINITION TRANSFORMER
TR-4	MODUTROL MOTOR TRANSFORMER
TR-5	DAMPER MOTOR TRANSFORMER
TR-6	ALARM CIRCUIT TRANSFORMER
SW-1	MAIN DISCONNECT SWITCH
SW-2	FAN SELECTOR SWITCH
SW-3	HIGH LIMIT SWITCH
SW-4	FAN SWITCH
SW-5	DRAFT PROVING SWITCH
SW-6	LO-GAS CUTOUT SWITCH
SW-10	AUXILIARY END SWITCH No 1
SW-11	AUXILIARY END SWITCH No 2
SW-16	DIFFERENTIAL SWITCH
SW-18	LOW FIRE TEST SWITCH
SW-20	HEAT VENT SWITCH (LOCATE IN RM G104)
VG-1	PILOT GAS VALVE
VG-2	MAIN GAS VALVE
VG-3	AUXILIARY MAIN GAS VALVE
L-1	FAN ON LIGHT (GREEN)
L-2	BURNER ON LIGHT (WHITE)
L-3	ALARM LIGHT (RED)
MP-1	DAMPER MOTOR POTENTIOMETER

— — — DENOTES WIRING BY OTHERS

—○— DENOTES TERMINALS IN REMOTE CONTROL STATION

—□— DENOTES TERMINALS IN MAIN PANEL

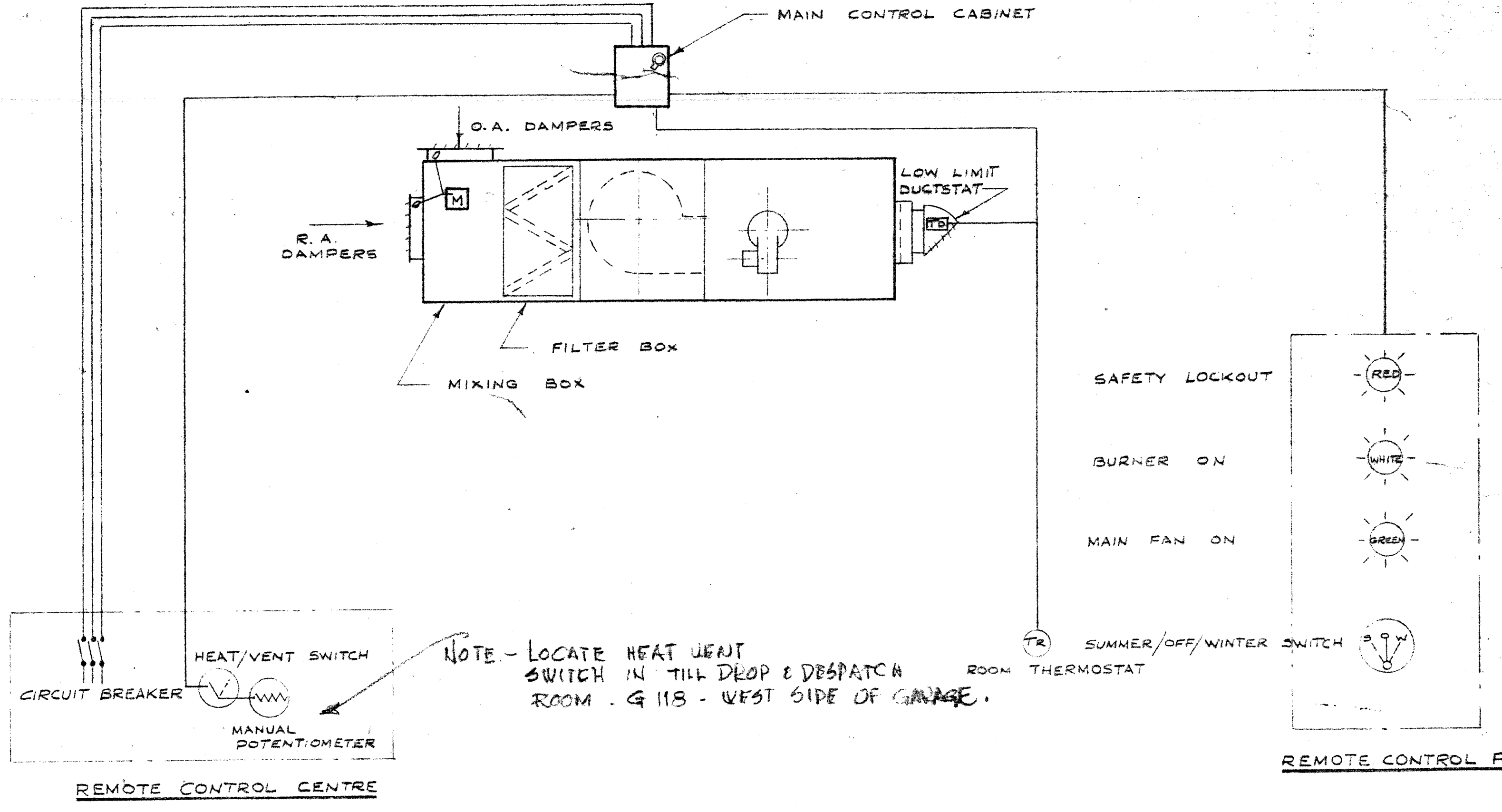
B - BLACK BR - BROWN Y - YELLOW OR - ORANGE

BL - BLUE W - WHITE R - RED

COMPONENT IDENTIFICATION FOR DIRECT GAS FIRED MAKE-UP AIR UNITS	
SYMBOL	COMPONENT
MTR-1	MAIN SUPPLY FAN MOTOR
MTR-4	MODUTROL MOTOR
MTR-6	DAMPER MOTOR
MTR-6	PREMIX BURNER MOTOR
S-1	MAIN FAN MOTOR STARTER
S-2	BURNER MOTOR STARTER
R-2	BURNER RELAY
R-12	PURGING TIMING RELAY
R-15	LOW FIRE HOLD RELAY
R-16	ALARM CIRCUIT RELAY
PC-6	AIR DISCHARGE THERMOSTAT
VG-1	PILOT GAS VALVE
VG-2	MAIN GAS VALVE
VG-3	AUXILARY MAIN GAS VALVE
TR-1	CONTROL VOLTAGE TRANSFORMER
TR-2	GAS IGNITION TRANSFORMER
TR-4	MODUTROL MOTOR TRANSFORMER
TR-6	ALARM CIRCUIT TRANSFORMER
TR-8	HEATER TRANSFORMER
SW-1	MAIN DISCONNECT SWITCH
SW-3	HIGH LIMIT SWITCH
SW-5	MAIN FAN PROVING SWITCH
SW-6	LOW-GAS CUTOUT SWITCH
SW-7*	HIGH-GAS CUTOUT SWITCH
SW-10	DAMPER MOTOR END SWITCH
SW-16	MIXER DIFFERENTAIL SWITCH
SW-17	EXHAUST FAN PROVING SWITCH
SW-18	SUMMER MANUAL/AUTOMATIC SWITCH
HTR1&2	HEATERS FOR MOTOR 4 & MOTOR 5

* SHORT BETWEEN TERM 14 & 15 WHEN NOT REQUIRED.

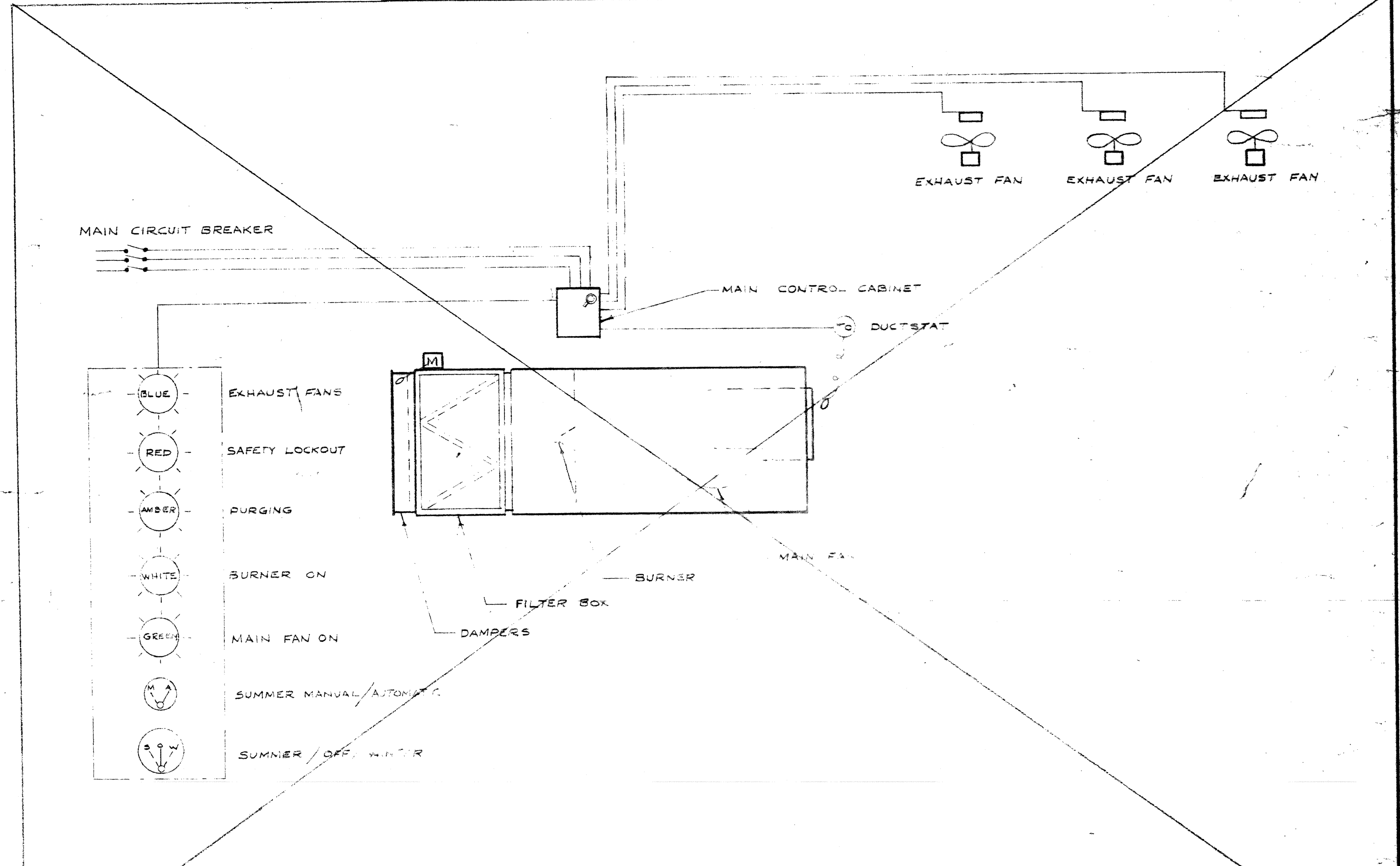
REMOTE CONTROL STATION	
SYMBOL	COMPONENT
SW-2	SUMMER - OFF - WINTER SWITCH
L-1	GREEN LIGHT - MAIN FAN
L-2	RED LIGHT - ALARM
L-3	BLUE LIGHT - EXHAUST FAN
L-4	AMBER LIGHT - PURGING
L-5	WHITE LIGHT - MAIN FLAME



NOTE - LOCATE HEAT VENT SWITCH IN TILL DROP & DESPATCH ROOM . G 118 - WEST SIDE OF GARAGE.

WIRING DIAGRAM FOR INDIRECT GAS FIRED MAKE-UP AIR UNIT R2

NOT TO SCALE



WIRING DIAGRAM FOR DIRECT GAS FIRED MAKE-UP AIR UNIT

NOT TO SCALE

2185 - 614

A. D. MARGISON ASSOCIATES LTD.
CONSULTING PROFESSIONAL ENGINEERS
SUITE 302—1320 YONGE STREET
TORONTO, ONTARIO M4T 1

MAY 1977

NUMBER TEN ARCHITECTURAL GROUP
ARCHITECTS & PLANNERS

APPROVED

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
1.11.79	6	2	AS BUILT - SEE EQUIP. SHOP DWG. WIRING DIAGRAM	J.M.
9.5.77	5	1	GARAGE ADDITION - FOR TENDER	
24/11/69	4		AS BUILT	R.McC.
29/3/68	3	0	FOR CONSTRUCTION	
19/1/68	2	0	FOR TENDER	
20/10/67	1	0	FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

HEATING & VENTILATING - CONTROL DIAGRAMS

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

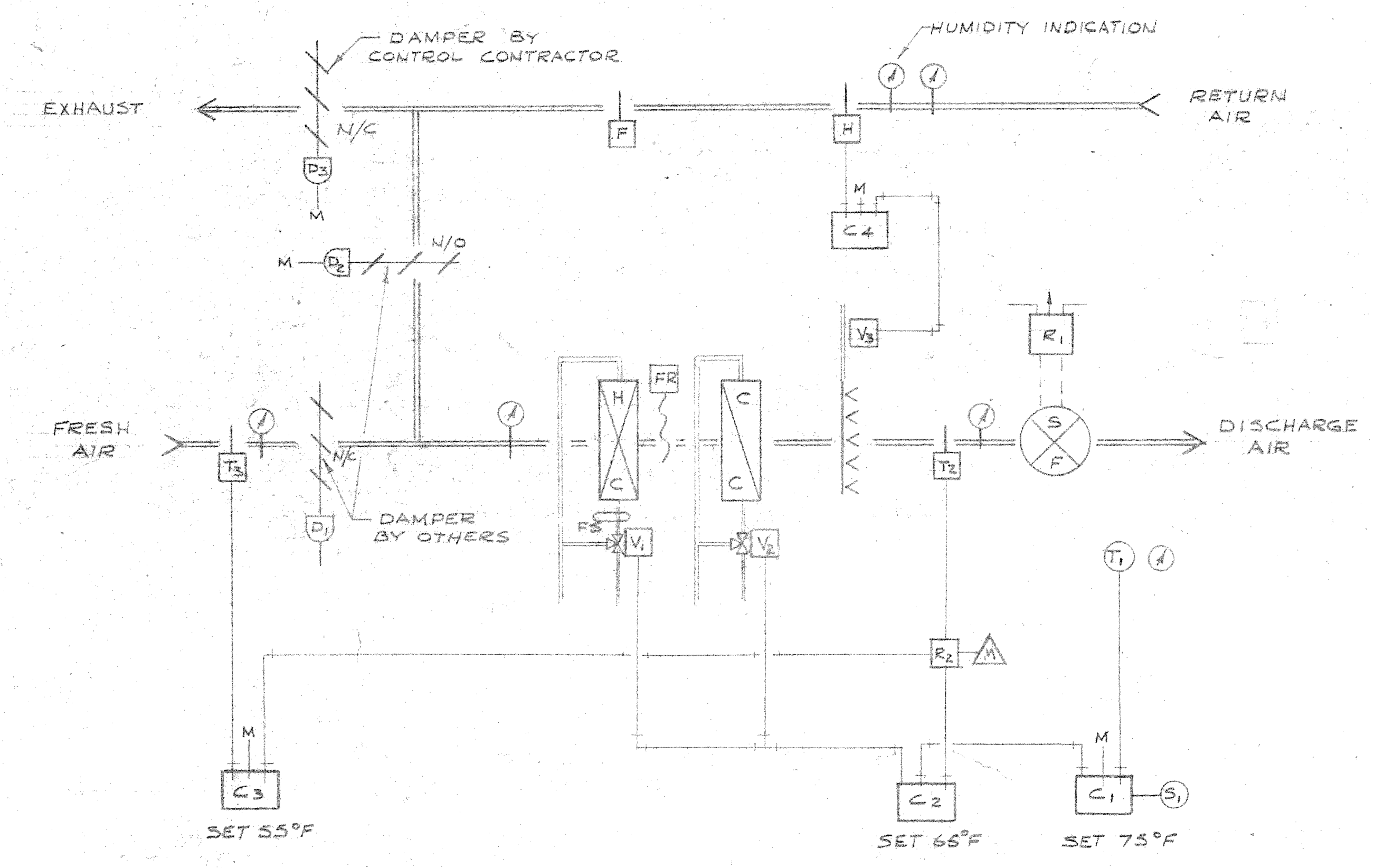
J. T. F. THORPE

LICENSED TO PRACTICE
IN THE
PROVINCE OF MANITOBA
My Licence Expires: 10 Jan. 1968

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY
CHECKED J.T.T.
FILE No.
SHEET No.

DATE AUGUST '67
SCALE NOT TO SCALE
DRAWING No. 2185-614
MECHANICAL



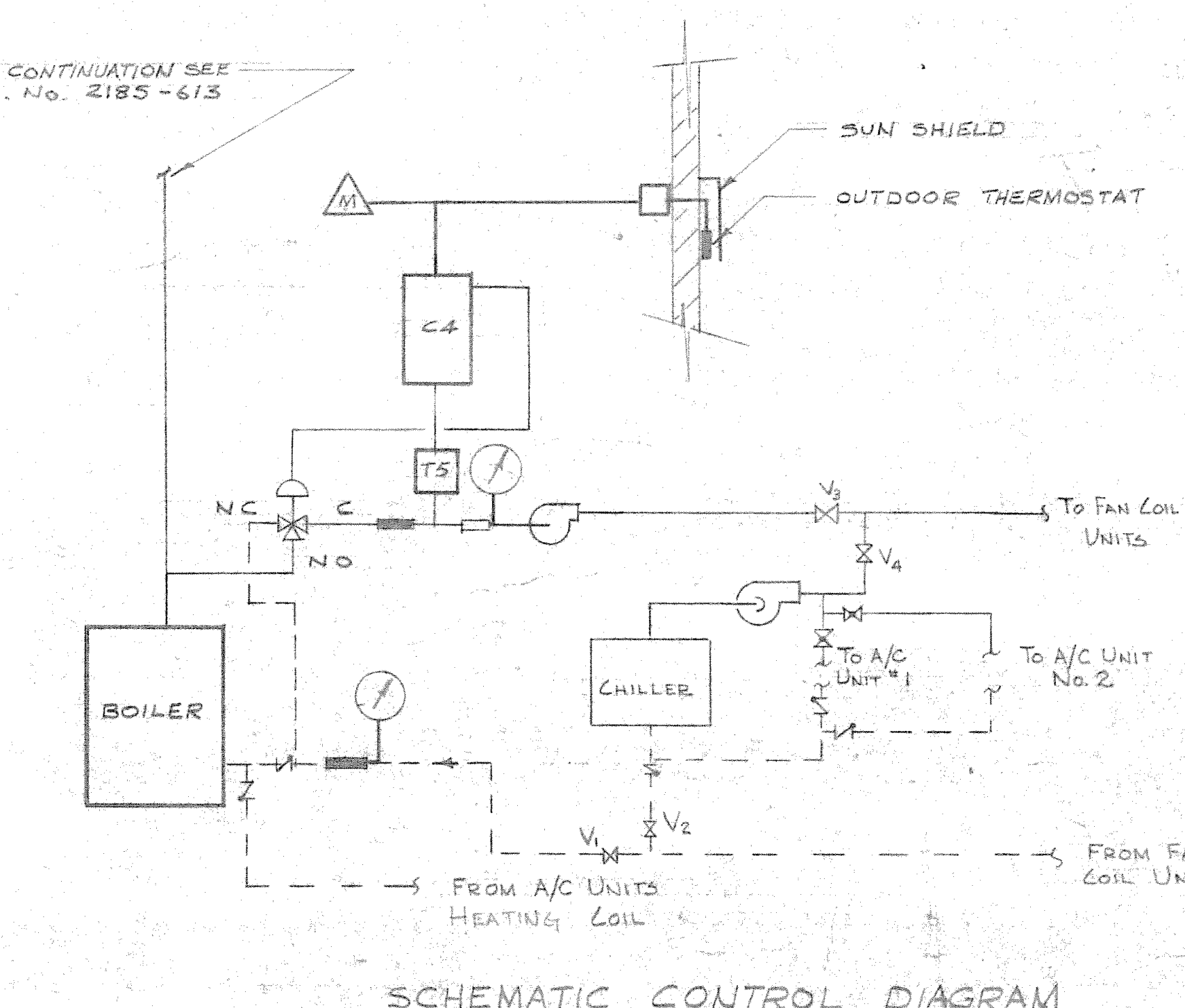
AIR CONDITIONING SYSTEM

NOT TO SCALE

(TWO SYSTEMS REQUIRED)

COMPONENT IDENTIFICATION FOR CONTROL DIAGRAMS FOR AIR CONDITIONING & HOT WATER TO FAN COIL UNITS

SYMBOL	COMPONENT
R1	EP RELAY
D_1, D_2, D_3,	DAMPER MOTOR
T_1, T_2, T_3	SENSOR
C_1, C_2, C_3, C_4,	CONTROLLER
S_1	CONTROL POINT ADJ.
R_2	RELAY
FR	FREEZESTAT
F	FIRESTAT
FS	FLOWSWITCH
H	HUMIDITY SENSOR
V_1, V_2	DIVERTING VALVES
V3	TWO-WAY VALVE
①	TEMPERATURE OR HUMIDITY INDICATOR



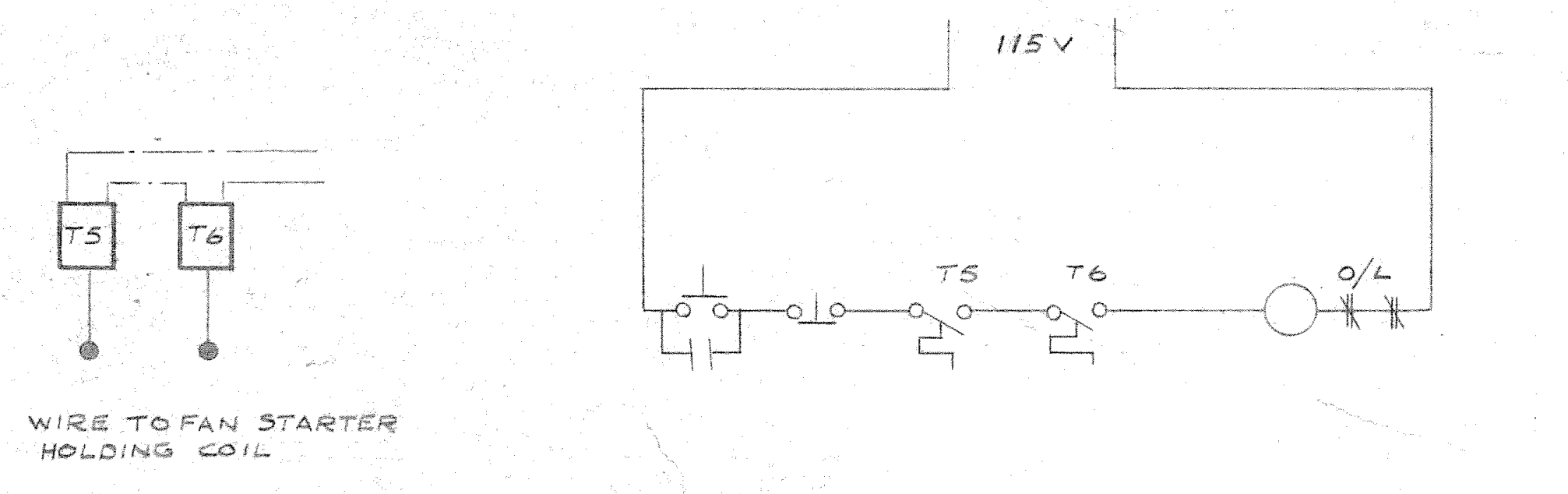
SCHEMATIC CONTROL DIAGRAM
HOT & CHILLED WATER CIRCUITS

NOT TO SCALE

(AUTOMATIC RESET OF HOT WATER TEMPERATURE TO FAN-COIL UNITS FROM OUTDOOR TEMPERATURE)

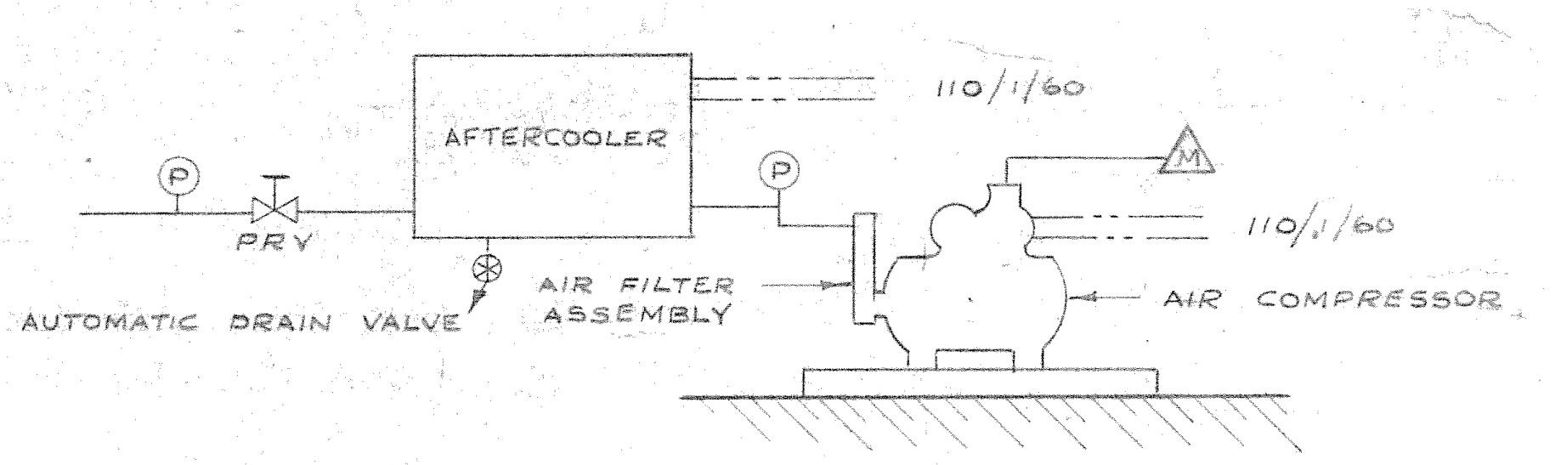
HOT WATER RESET	
OUTDOOR	WATER
-30°	200
65°	110

OPERATION OF VALVES		
SYMBOL	SUMMER	WINTER
V_1	CLOSED	OPENED
V_2	OPENED	CLOSED
V_3	CLOSED	OPENED
V_4	OPENED	CLOSED



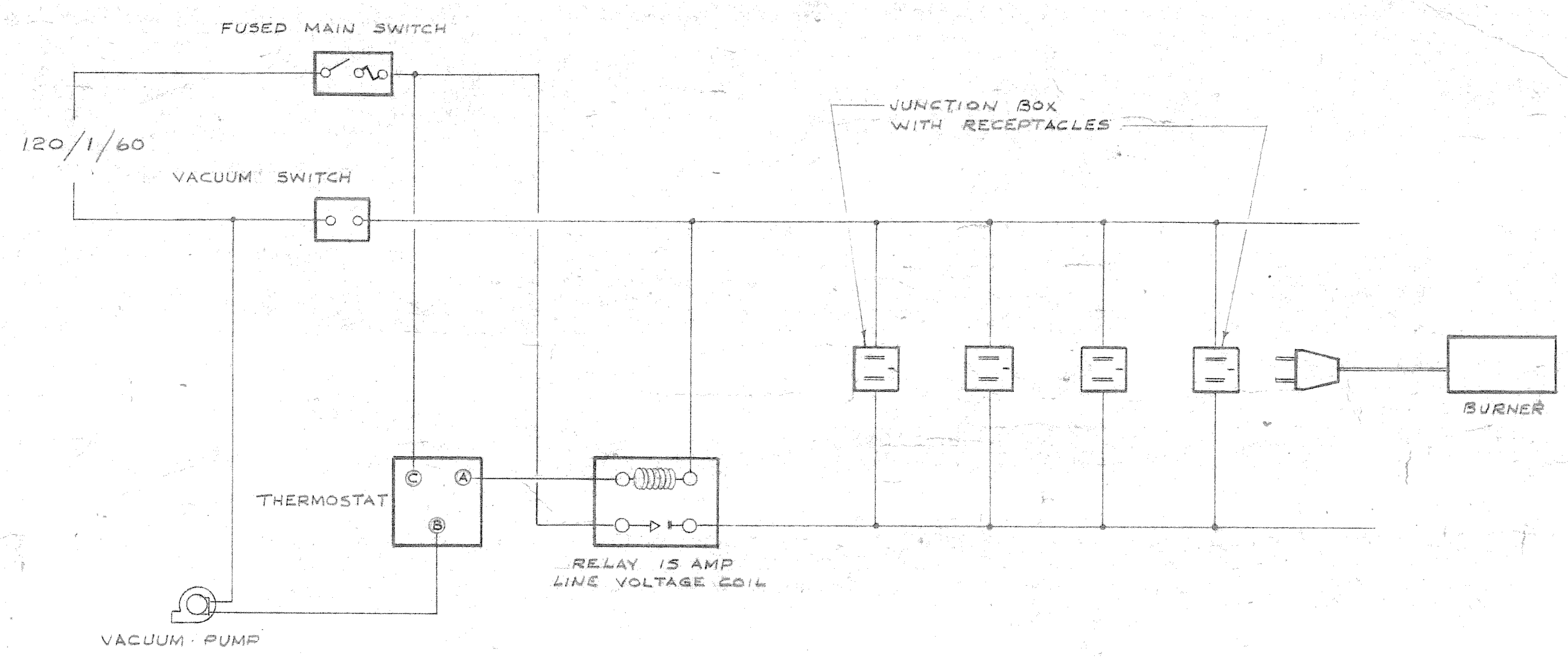
WIRING DIAGRAM FOR A/C SAFETY CONTROLS

NOT TO SCALE



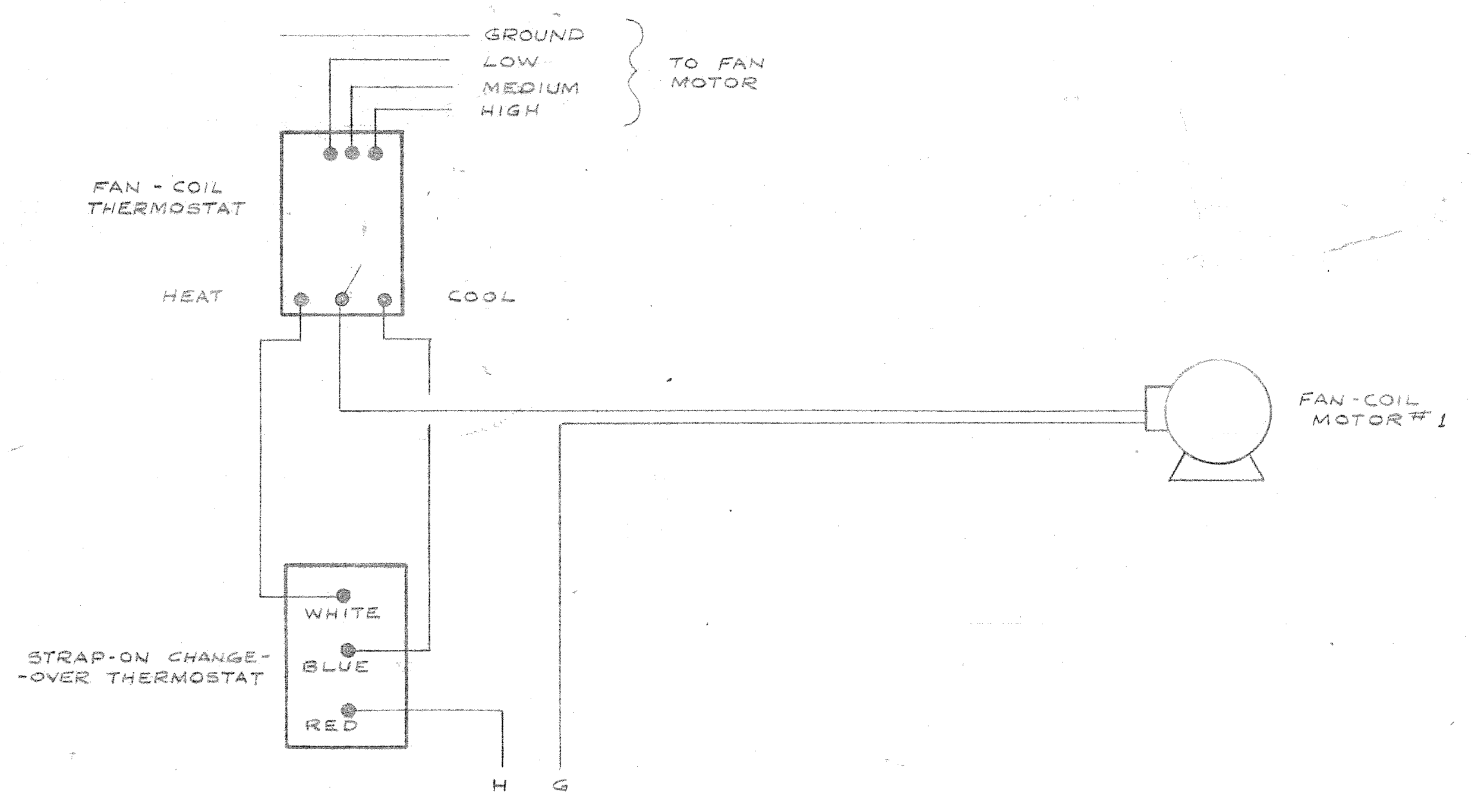
COMPRESSED AIR SUPPLY

NOT TO SCALE



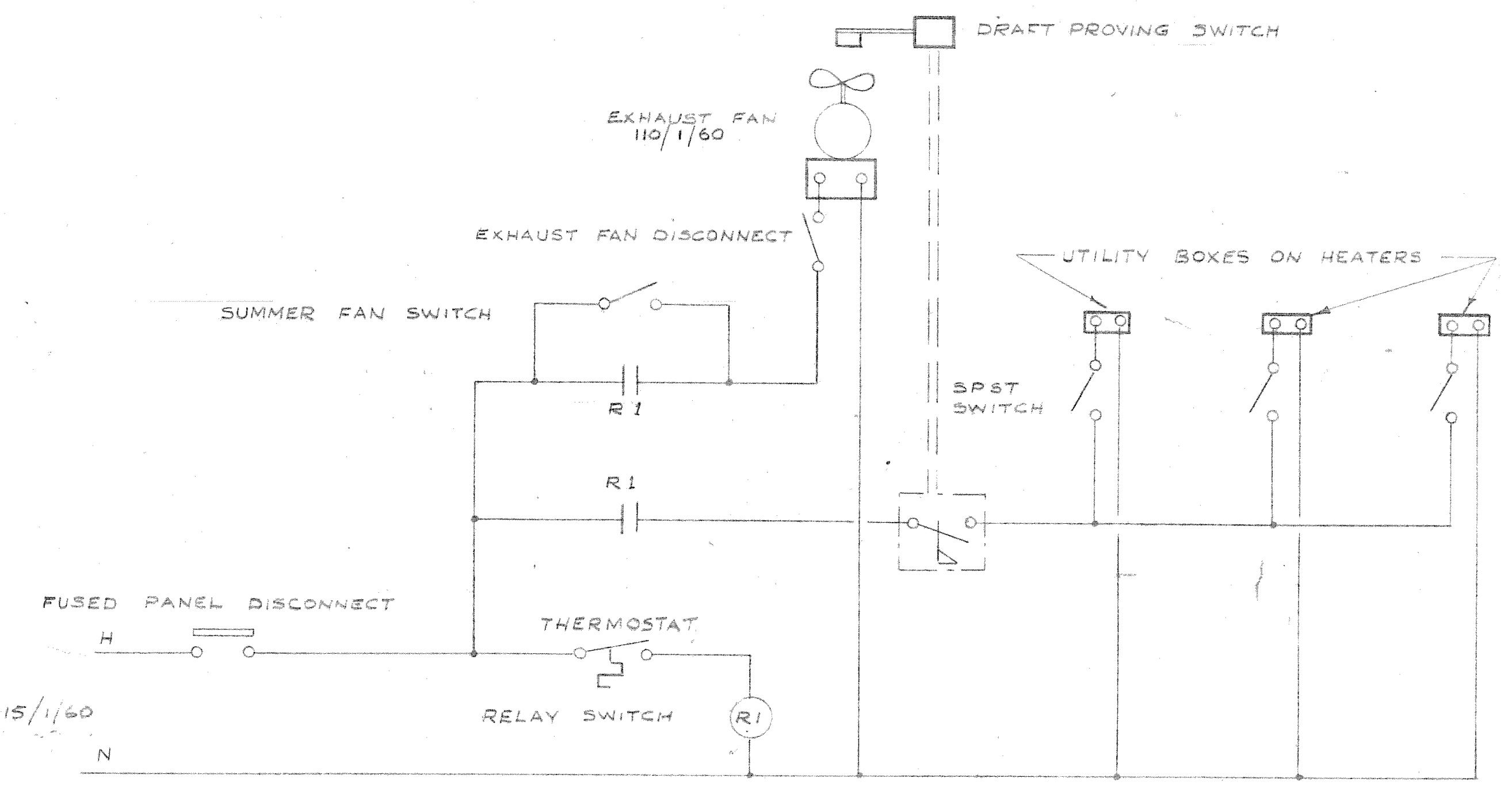
FIELD WIRING FOR TUBULAR INFRA-RED HEATING SYSTEM
SHOWING RELAY CARRYING BURNER LOAD

NOT TO SCALE



CONTROLS OF FAN-COIL UNITS

NOT TO SCALE



WIRING DIAGRAM FOR DIRECT IGNITION INFRA-RED HEATERS

NOT TO SCALE

2185-615

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
19/1/68	2	0	FOR TENDER	
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ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

HEATING, VENTILATING & AIR CONDITIONING CONTROL DIAGRAMS

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY
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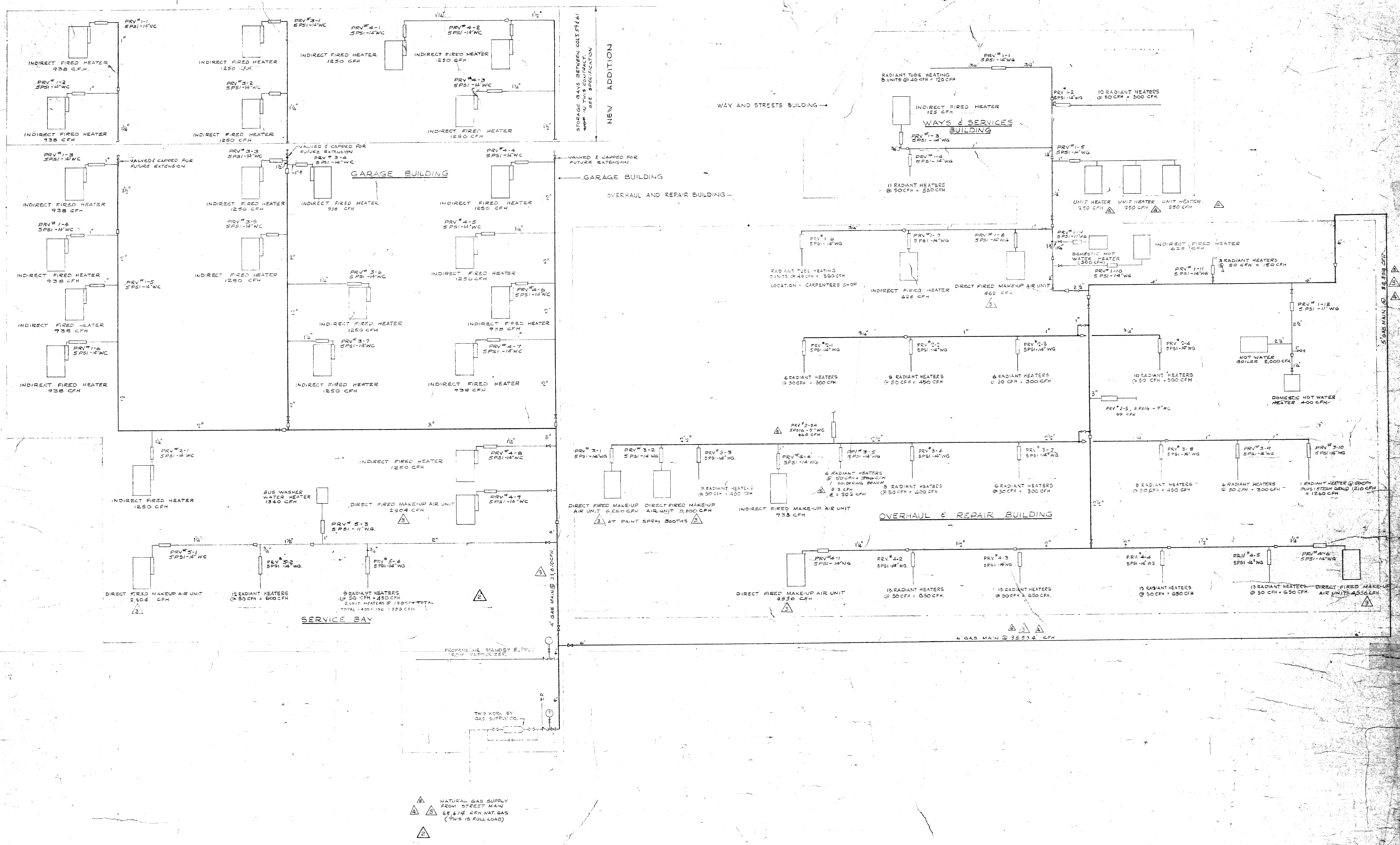
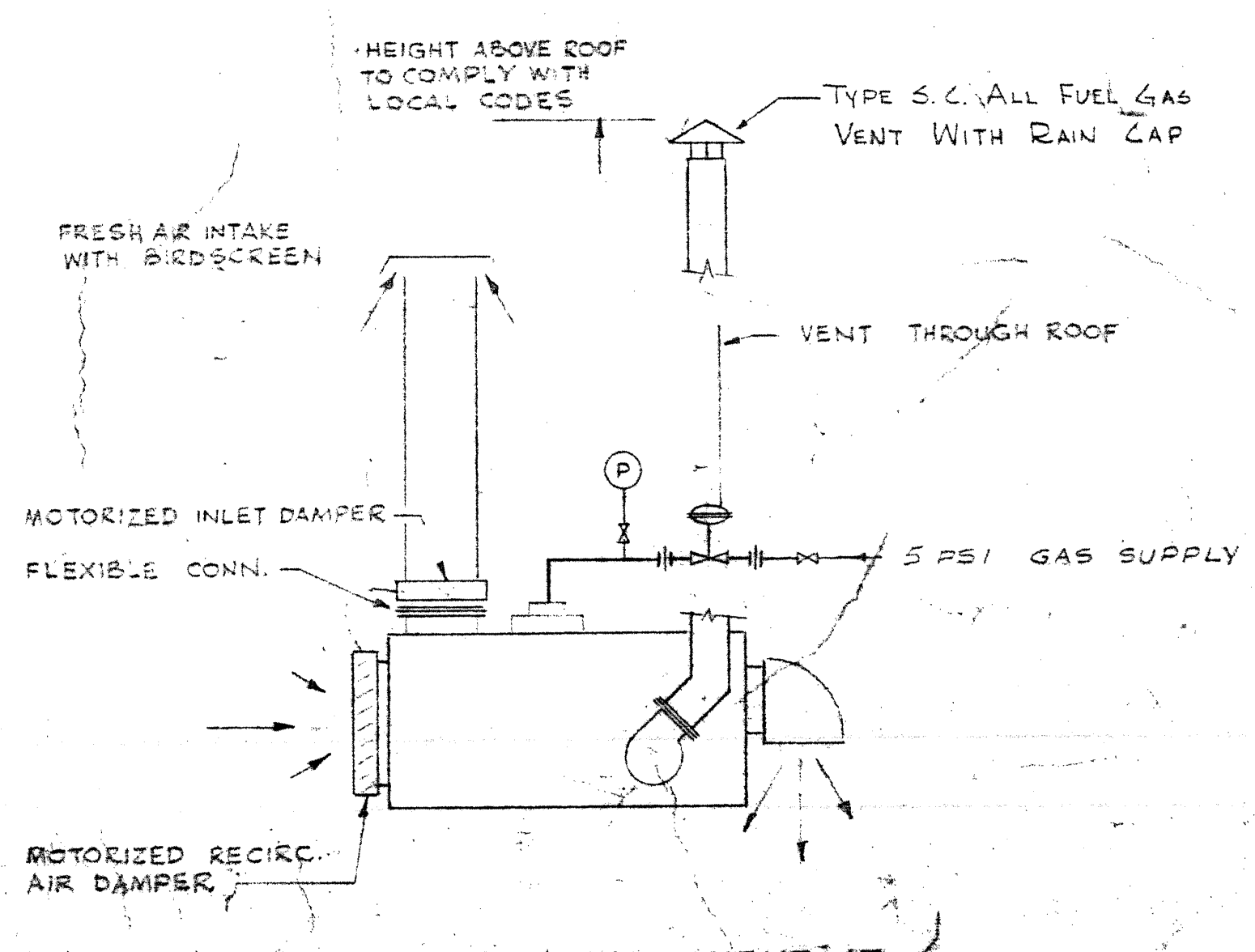
DRAWING No. 2185-615
MECHANICAL

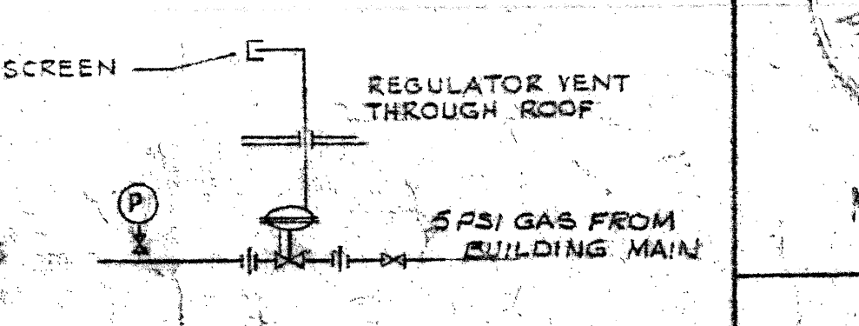
MECHANICAL
THORPE

LICENSED TO PRACTICE IN THE PROVINCE OF MANITOBA
My Licence Expires: 10 Jan. 1968





TYPICAL ARRANGEMENT AT MAKE-UP AIR HEATER



TYPICAL ARRANGEMENT AT LOCAL PRESSURE REDUCING STATION

2185-616

MAY 1977

A. D. MARGISON ASSOCIATES LTD.
CONSULTING PROFESSIONAL ENGINEERS
SUITE 302—1320 YONGE STREET
TORONTO, ONTARIO M4T 1X2

A. D. MARGISON

MAY 1977

J. T. F. THORPE

LICENSED TO PRACTICE IN THE PROVINCE OF MANITOBA
My Licence Expires: 10 Jan. 1968

NUMBER TEN ARCHITECTURAL GROUP
ARCHITECTS & PLANNERS 210-175 HARGRAVE ST., WINNIPEG, CANADA R3C 1R9 (204) 942-0981

APPROVED

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
1.11.77	10		GARAGE ADDITION - AS BUILT	J.M.
9.5.77	9	6	GARAGE ADDITION - FOR TENDER	
24.11.69	8		AS BUILT	R.McC
31.7.69	7	5	TOTAL CONSUMPTION REVISED - OWNER'S EQUIP'T & REQ'MENTS.	LFE.
18.9.68	6	4	REVISED AS PER NOTICE OF PROPOSED CHANGE No 33	LFE.
21/6/68	5	3	DIRECT FIRED UNITS CONSUMPTION REVISED AS PER SHOP DWG	LF.ENG
10/5/68	4	2	REVISED AS PER CHANGE ORDER # 13	D.A.C.
29/3/68	3	1	REVISED AS PER ADDENDA 1 TO 5; FOR CONSTRUCTION	W.O.K.
19/1/68	2	0	FOR TENDER	
20/10/67	1	0	FOR APPROVAL.	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

HEATING & VENTILATING
SCHEMATIC GAS PIPING

CONSULTING PROFESSIONAL ENGINEERS
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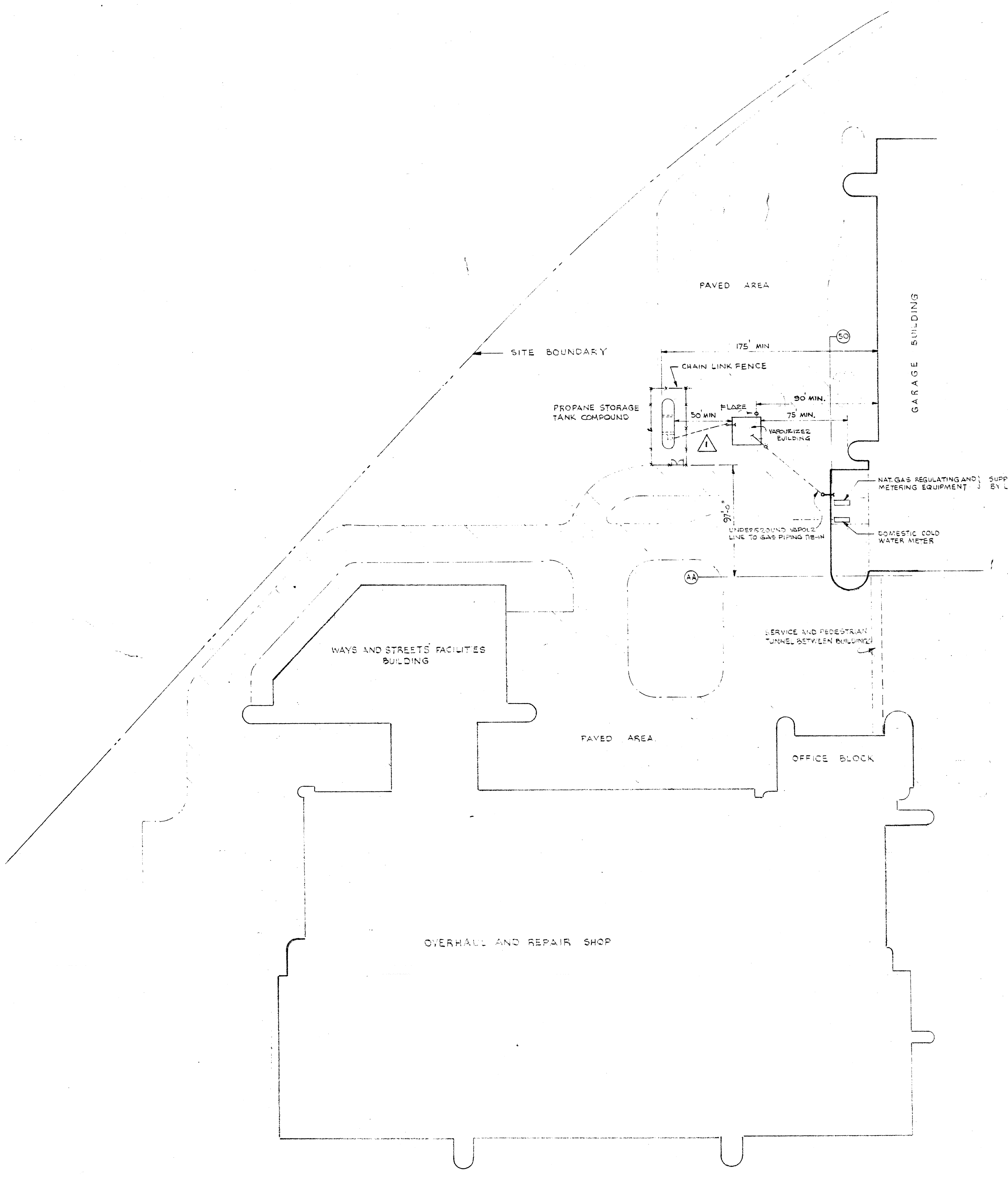
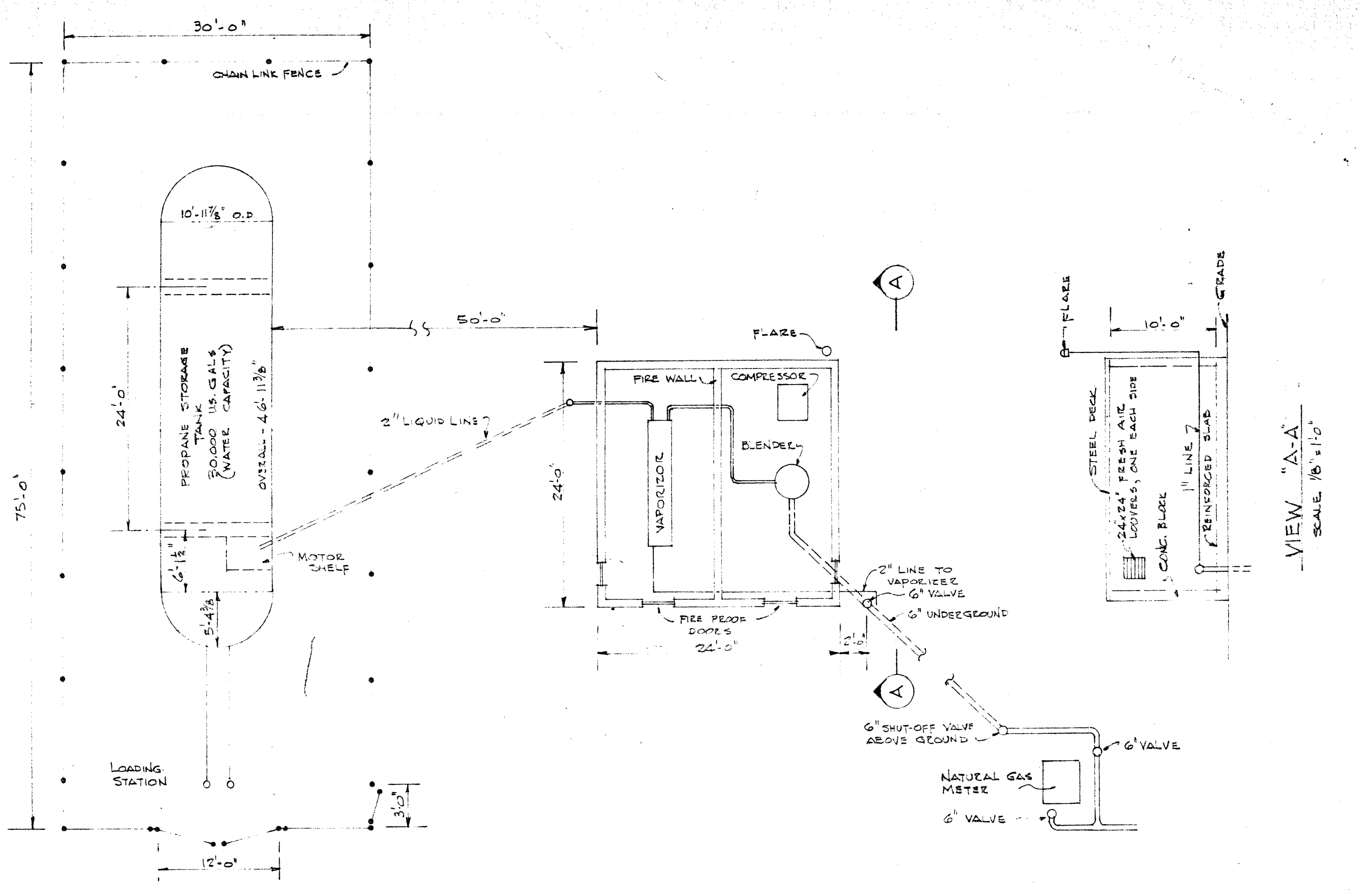
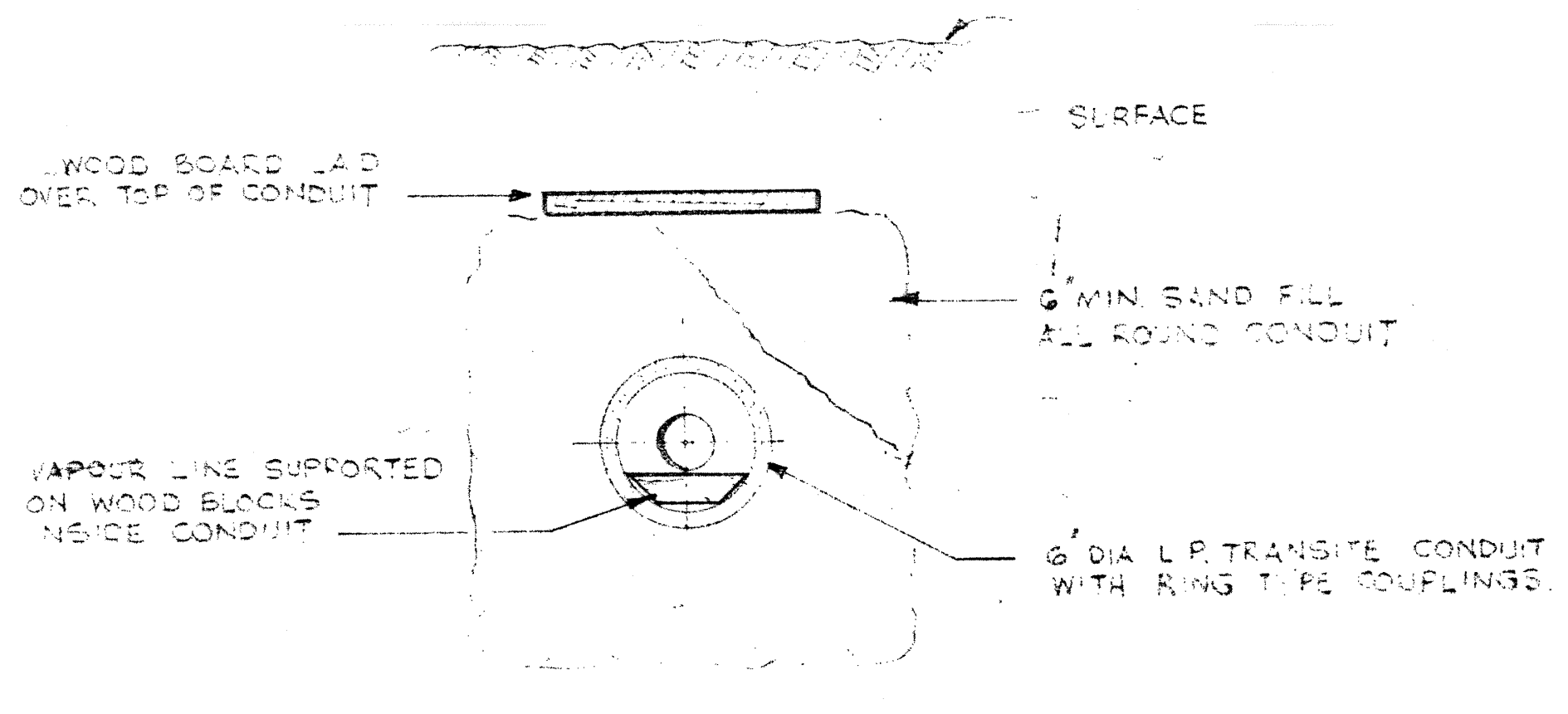
FILE No.
SHEET No.
DATE AUGUST 67
SCALE NOT TO SCALE
DRAWING No. 2185-616 MECHANICAL



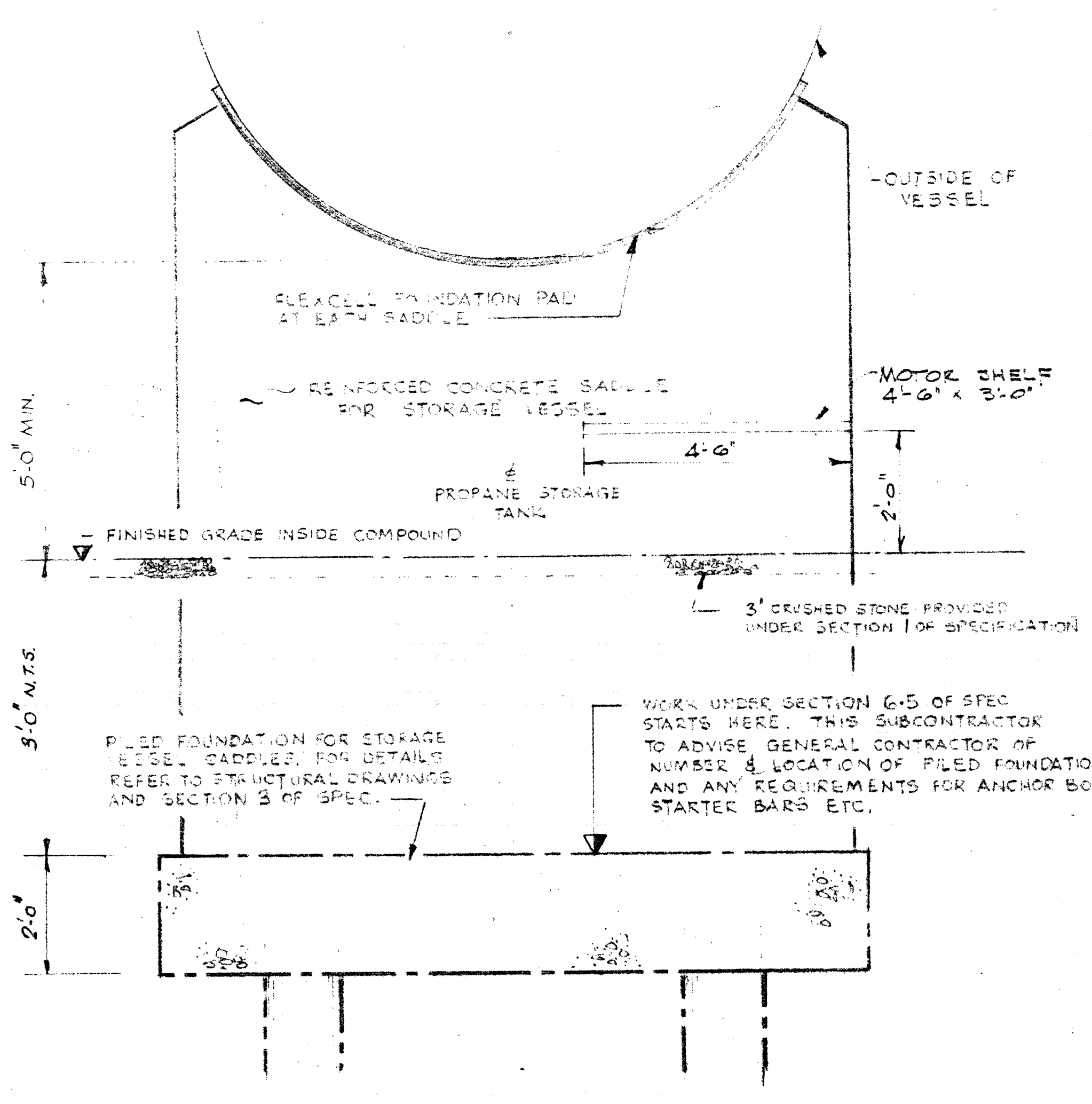
PARTIAL SITE PLAN
SCALE 1" = 50'-0"



LAYOUT of PROPANE-AIR-PLANT
SCALE 1/8" = 1'-0"



DETAIL OF BURIED VAPOUR LINE
SCALE 1/2" = 1'-0"



PROPANE STORAGE TANK FOUNDATION DETAIL

2185-651

J. T. F. THORPE
MECHANICAL

LICENSED TO PRACTICE
IN THE
PROVINCE OF MANITOBA
My Licence Expires: 10 Jan. 1968

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
24 NOV 69	5		AS BUILT.	H.H.G.
17 MAY 68	4	1	LAYOUT AT PROPANE TANK COMPOUND REVISED PER SK73 & PROV. DEPT OF LABOUR APPROVAL	
29/3/68	3	0	FOR CONSTRUCTION	
19 JAN. 68	2	0	FOR TENDER	
20. OCT 67	1	0	FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

BULK PROPANE STORAGE FACILITIES

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY
CHECKED JTT.
FILE No.
SHEET No.

DATE AUGUST '67
SCALE AS SHOWN
DRAWING No. 2185-651
MECHANICAL

Generic input/output for Metasys Control.

1. Controls must be able to interface to MSEA technology on the field device network using either the N2Open or BACnet Protocols. See note 2.
2. No LON protocols are to be accepted.
3. Controls contractor to provide commissioning sheets for all points on field devices as well as head end equipment.
4. Controls contractor to communicate with equipment provider to ensure proper field point integration as well as controllability of the equipment, if not package controls.
5. If not a Metasys product installed, the controls contractor must show seamless integration into the exiting Metasys Extended Architecture Operator Interface that is acceptable to City Staff prior to the award of the contract. See note 2.
6. Controls contractor to supply all drawings/graphics/sequence of operations in both a hard and soft copy. Drawings and graphics to be able to be read and modified by City of Winnipeg Staff. User interface graphics to be completed using *Graphic Generation Tool* software. Graphics must use City of Winnipeg graphic templates. Contractor to supply As-Built drawings in an editable format, able to be easily edited by City of Winnipeg Staff.
7. The use of either N2Open or BACnet to be determined based on type of building where the work is being performed. If the construction is a brand new facility, then BACnet can be used. The term BACnet should then be defined properly in it's use, see note 1 below. If the work is an addition to and the new work is to be tied into the existing controls, then the contractor should contact City of Winnipeg technical staff to determine the best protocol to use based on existing equipment.
8. If Other vendor (non-JCI) controls are to be used then a seamless integration must be proven before approval will be given.
9. Design Engineer must detail a complete sequence of operations for each controlled device. This is so the marriage of controls and mechanical equipment meets the design intent of the mechanical engineer.
10. A complete list of setpoints for all controlled equipment must be provided.
11. A points list is to be provided for all controlled objects.
12. The controls spec must be complete so that there is no interpretation required on behalf of the controls contractor so that the control system is built to meet the specific needs of the complete mechanical plan and design.
13. Alarm Messages. All objects that must be alarmed will have in the alarm message text the following information as per the included example.
    Alarm Message: Building Address, What is in alarm, see graphic for Instruction
    Example: 251 Donald SF-1 VFD Common Alarm, see graphic for Instruction

Rooftop Units, Make-Up Air / Air Handling Unit (MUA/AHU):

1. Where possible, the manufacturer of the equipment should be contacted to see if an N2Open or BACnet protocol equipped package controller is available from the factory.

2. If no interface from the factory is available then we would as a minimum expect the following points to monitor:
    a. Start/Stop
    b. Fan Status
    c. Economizer Status, command in on/off or %open
    d. Cooling Mode
    e. Heating Mode
    f. Supply Air Temperature
    g. Room Temperature for Single Zone Unit
    h. Return Air Temperature for Multizone Unit
    i. Supply Air Low Limit Status (Freeze Stat)

Exhaust Fans:

1. Exhaust fans will have start/stop/status points.

Boilers:

1. Boilers to come with own package controls and outdoor air temperature for reset control.
2. A Metasys Interface for the controls to be part of the package for direct connection on either the N2Bus or BACnet.
3. If no interface package exists, the following points are required as a minimum:
    a. Hot Water Supply Temperature
    b. Hot Water Return Temperature
    c. Boiler Status
    d. Boiler Alarm, this is to be a generic alarm for all mechanical safeties or other related devices, which would cause the boiler to be shut down.

Chillers:

1. Chillers to come with own package controls and outdoor air temperature for reset control.
2. A Metasys Interface for the controls to be part of the package for direct connection on either the N2Bus or BACnet.
3. If no interface package exists, the following points are required as a minimum:
    a. Chilled Water Supply Temperature
    b. Chilled Water Return Temperature
    c. Chiller Status
    d. Chiller Alarm, this is to be a generic alarm for all mechanical safeties or other related devices, which would cause the chiller to be shut down.
    e. Condenser Water Supply Temperature
    f. Condenser Water Return Temperature
    g. Water Tower fans/pumps Status

Pumps:

1. Pumps will have a start/stop/status as a minimum.

Variable Speed/Frequency drives:

1. All VFD/VSD to have N2/BACnet interface built into the device. If the manufacturer is not able to provide this, get another manufacturer. ABB would be the acceptable standard here.

Lighting Controls:

1. No LON lighting controls are to be accepted. No exceptions.

VAV boxes:

1. VAV boxes to have digital controller mounted directly to the VAV box actuator. This is to have a digital room thermostat and proportional control on the damper. This controller to use either N2Open or BACnet.

Sump Pits:

1. Sump pits to have high alarm status installed.
2. If lead/stby pumps are present, then sensing of the lead pump is required.

Generic Inputs from the Facility:

1. Room temperatures in corner office/rooms on each floor, especially if there are windows present

Notes:

1. The term BACnet refers to an industry standard protocol that basically states that all devices using the BACnet technology will be able to communicate to each other. This is not necessarily the case. The BACnet protocol is comprised of several layers of interoperability and intercommunications. The controls contractor performing the supervisory controller installation should confirm that all devices specified are able to communicate to the proposed devices using the BACnet PIC statement and then supply documentation such that all devices supplied will communicate to each other as required for proper operation of the system. This includes integration into the ADX server.
2. If Metasys Network Automation Engines (NAE/NIE/NCE) are to be installed on the project then the version of these devices and their software must be such that the City of Winnipeg does not be required to update/upgrade the existing ADX server in order for all user views, alarms, and point monitoring to occur. The contractor must co-ordinate with City staff to determine the correct version to be installed. All user views and graphics must not be installed in the local supervisory controller (NAE/NIE/NCE). All such items must be programmed into the existing ADX server. User views and graphics must be approved for use by City staff before implementation of such items.
3. All monitored points that have alarms must have operating instructions and alarm messages. These will be co-ordinated with the tech shop and operations supervisor.

HOLOPHANE
LEADER IN LIGHTING SOLUTIONS

Catalog Number

Notes

Type

Phuzion™

LED High Bay

DesignLights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at www.designlights.org to confirm which versions are qualified.

Description

The Phuzion LED luminaire takes high-bay lighting to new levels of lumen output and temperature tolerance. By marrying the latest in LED technology with the legendary illuminating dynamics of Holophane's prismatic glass, the Phuzion high bay brings to the industrial environment LED lighting of unparalleled performance and reliability.

Optics

- Prismatic borosilicate glass maintains highest levels of luminosity over time.
- Glass doesn't fade, discolor or otherwise degrade in harsh environments.
- Three distributions (narrow, medium and wide) available to maximize versatility.
- Highly engineered LED system ensures superior uniformity and maximizes spacing.
- IP65 rated optics.

Mechanical

- Robust cast aluminum housing with low copper content (0.6% CU content) withstands hot and dirty environments.
- Pendant mount standard.
- Achieves up to 149°F (65°C) ambient rating.

Electrical

- 0-10V dimming driver is standard (must specify the D option to enable dimming) , 2kV/1kA level of surge protection provided by driver.
- An added 6kV/3kA level of surge protection is an option on 120-277 and is a standard option on 347/480V.
- An added 20kA in-line surge protection is also an option on 120-277.
- CRI > 70 (nominal) is standard.
- 3000K, 4000K or 5000K CCT available.
- Fault-tolerant LED light engine continues to provide light even in the failure of one LED.
- Aluminum core printed circuit board.
- For AS (120-277V), dimming source current = 300 micro amps (18L, 24L, 27L) and 150 micro amps (12L).
- For AH (347/480V), dimming source current = 2000 micro amps (18L, 24L, 27L) and 1000 micro amps (12L).

Listings

- CSA Certified for use in damp locations, 65°C ambient environments.
- DesignLights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at www.designlights.org to confirm which versions are qualified.

Warranty

5-year limited warranty. Complete warranty terms located at: www.acuitybrands.com/CustomerResources/Terms_and_Conditions.aspx

Actual performance may differ as a result of end-user environment and application.

Actual wattage may differ by +12%/-12% when operating between 120-480V +/- 10%.

NOTE: Specifications subject to change without notice.

Typical Applications

- Heavy industrial
- Light manufacturing
- Warehousing
- Large indoor

Dimensions: *Inches (millimeters) unless otherwise noted.*

Diameter: 21.22 (538.99)
Height: 19.02-23.46 (483.11-595.88)
Weight: 33-38 lbs. (15.0-17.2 kg)

ORDERING INFORMATION

Example: PHZ 18L 4K AS P G W

PHZ														
Series	**Lumens**		**Color temperature[1]**		**Voltage**				**Mounting**		**Finish**		**Optics**	
PHZ	12L	12,000 nominal lumens	3K	3000K CCT	AS	Auto sensing (120-277)	27	277V	P	Pendant	W	White	N	Narrow
	18L	18,000 nominal lumens	4K	4000K CCT	12	120V	AH	Auto sensing (347/480)[2]	Q	Quick disconnect	G	Gray	M	Medium
	24L	24,000 nominal lumens	5K	5000K CCT	20	208V	34	347V[2]	N	Non-disconnect thru-wiring	K	Black paint	W	Wide
	27L	27,000 nominal lumens			24	240V	48	480V[2]	QR	Quick disconnect retrofit	L	Satin nickel paint		
									NR	Non-disconnect thru-wiring retrofit	TDC	Tiger Drylac paint		

Options

MSE6NDL	360° motion sensor embedded, high bay 15-45 ft., on/off. [3]
MSE62L3VDL	360° motion sensor embedded, high bay 15-45 ft., on/off with second time-out period, goes to a dimmed state before turning off max./ 3volt min. dim setting. [3,4]
MSE6NDL DSCNDL	Photocell with two selectable modes of operation. Defaults to on/off mode. Photocell has full control during periods of occupancy. [3]
AXA10	XPoint Wireless enabled [4,5]
MSE6XADL DSCXA	XPoint Wireless enabled with photocell sensor & occupancy sensor [4,5]
F1	Single fusing[6]
F2	Double fusing[7]
CDP-L5-15-X	120V cord and plug[8,9]
CDP-L6-15-X	208V/240V cord and plug[8,9]
CDP-L7-15-X	277V cord and plug[8,9]
CDP-L24-20-X	347V cord and plug[8,9]
CDP-L8-20-X	480V cord and plug[8,9]
CDP-5-15-X	Straight blade 120V plug and cord[8,9]
PF-129	Anti-rotational hook, 3/4" male
PF-105	Loop, 3/4" male
PF-121-A	Safety hook, 3/4" male
CD-3	3 ft. cord[8]
CD-6	6 ft. cord[8]
CD-X	X ft. cord[8,9]
C3	3 ft. Safety chain
C6	6 ft. Safety chain
CX	X ft. Safety chain [9]
SPAS	Surge protector, 120V-277V , added 6kV/3kA level of surge protection
SPAH	Surge protector, 347V-480V , added 6kV/3kA level of surge protection, STANDARD OPTION
SPAS20K	Surge protector, 120V-277V , added 20kA in-line surge protection
D	Dimming terminal[10]
PHCB	Powerhook cord for 120V-277V, 347V[11,12]
PHCB-L8-480	Powerhook cord for 480V[12]
WG	Wire guard installed
FR	Frosted glass
80CRI	80 CRI CCT
BSL722	Remote emergency battery pack, standard version [13,14]
BSL722C	Remote emergency battery pack, cold version [13,14]

For accessories and footnotes, see page 2.

AcuityBrands.

ORDERING INFORMATION (cont'd.)

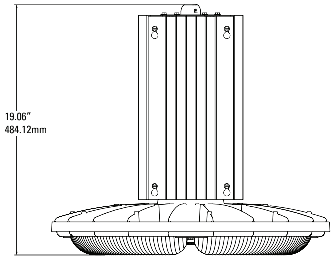
Accessories: *Order as separate catalog number.*

PHZCHAIN3	3 ft. safety chain	UPH-35-L8-480-WH	Thru-way powerhook for 480V	PF-122-A	Safety hook, 3/4" female
PHZCHAIN6	6 ft. safety chain	UPH-36-***-WH	Powerhook for 120V, 208V, 240V, 277V and 347V[12]	PF-129-A	Anti-rotational hook, 3/4" male
PHZCHAINX	X ft. safety chain[9]	UPH-36-L8-480-WH	Pendant powerhook for 480V	PF-105-B	Loop, 3/4" male
UPH-35-***-WH	Thru-way powerhook for 120V, 208V, 240V, 277V and 347V[12]	PF-116-A	Loop, 3/4" female	PF-121-A	Safety hook, 3/4" male
				WGLED	Wire guard

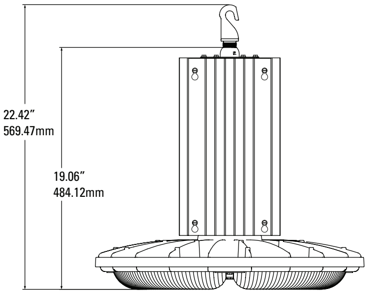
Notes

1 70 CRI standard.
2 60° C max. ambient.
3 Not available with XPoint, 50°C max. ambient.
4 Not available with D option.
5 AS voltage not available; 120V 50°C rated; 208, 240 and 277V 60°C rated only.
6 For 120V, 240V, 277V and 347V units; factory installed.
7 For 208V, 240V and 480V units; factory installed.
8 Order PF also; 3ft to 6ft standard cord length.
9 X = length of cord/chain in feet; 6 feet is standard.
10 Not available with MSE62L3VDL, AXA10, MSE6XADL DSCXA.
11 Order UPH also, PF-105 installed.
12 *** = voltage.
13 P mount only, 120-277V only, not available with F2 fusing. Not available with CDP options. Battery pack ships separate. Max 50°C listed.
14 Un-switched supply power must be provided. To switch emergency fixture, controls must be used (sensor, X-point, etc.). Remote emergency battery pack provided with 20-ft flex conduit.

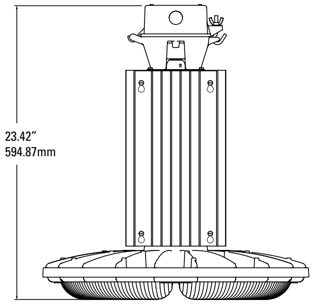
DIMENSIONAL DATA



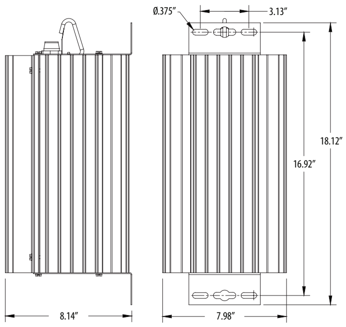
Pendant (P)



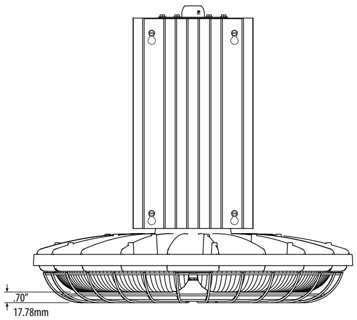
Hook (PF-129)



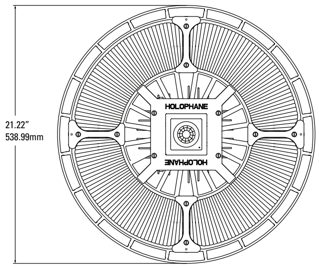
Quick Disconnect (Q)



Remote Emergency Battery Pack



Wire Guard (WG)



Diameter

OPERATIONAL DATA

Ambient Temperature Ratings

Mounting	Thru-wire	Fuse, Surge	Occupancy Sensor	QDH or Non-disconnect	Voltage	Ambient C° 18L, 24L, 27L [1,2]	Ambient C° 12L [3,4]	Ambient C° 12L, 18L, 24L, 27L with Emergency option	Supply Wire Temperature
Ceiling	Yes	Yes	Yes	Yes	120-277 347/480	50	60	NA	194°F (90°C)
Ceiling	Yes	Yes	No	Yes	120-277 347/480	55	55	NA	194°F (90°C)
Ceiling	Yes	Yes	No	Yes	120-277	65	65	NA	221°F (105°C)
Ceiling	Yes	Yes	No	Yes	347/480	60	60	NA	221°F (105°C)
Ceiling	No	Yes	No	Yes	120-277	65	65	NA	194°F (90°C)
Ceiling	No	Yes	No	Yes	347/480	60	60	NA	194°F (90°C)
Pendant	No	Yes	Yes	No	120-277 347/480	50	60	50	194°F (90°C)
Pendant	No	Yes	No	No	120-277	65	65	50	194°F (90°C)
Pendant	No	Yes	No	No	347/480	60	60	50	194°F (90°C)

Notes

1 For Xpoint option with 18L, 24L, 27L no sensor = 50C (120V only), 60C (208V, 240V,277V only). Above ambient values over-ride this ambient if lower. -20°C.
2 For Xpoint option with 18L, 24L, 27L with sensor = 50C (120-277V only), -20°C.
3 For Xpoint option with 12L, no sensor = 65C (120-277V only). Above ambient values over-ride this ambient if lower, -20°C.
4 For Xpoint option with 12L with sensor = 60C (120-277V only), -20°C.

Operating Characteristics

Lumen Package	Ambient Rating (120V-277V)	Ambient Rating (347V-480V)	Distribution	Delivered Lumens, 3000K CCT, 70 CRI @25°C[1]	Delivered Lumens, 4000K CCT, 70 CRI @25°C[1]	Delivered Lumens, 5000K CCT, 70 CRI @25°C[1]	Delivered Lumens, 3000K CCT, 80 CRI @25°C[1]	Delivered Lumens, 4000K CCT, 80 CRI @25°C[1]	Delivered Lumens, 5000K CCT, 80 CRI @25°C[1]	Frosted Lens Multiplier
12L	-40°F to 149°F (-40°C-65°C)	-40°F to 140°F (-40°C-60°C)	N	11129	12310	12278	10314	11409	11380	0.92
18L	-40°F to 149°F (-40°C-65°C)	-40°F to 140°F (-40°C-60°C)		16918	18713	18665	15680	17344	17299	0.92
24L	-40°F to 149°F (-40°C-65°C)	-40°F to 140°F (-40°C-60°C)		22143	24493	24430	20523	22701	22642	0.92
27L	-40°F to 149°F (-40°C-65°C)	-40°F to 140°F (-40°C-60°C)		23331	25808	25741	21624	23919	23858	0.92
12L	-40°F to 149°F (-40°C-65°C)	-40°F to 140°F (-40°C-60°C)	M	11136	12318	12286	10321	11416	11387	0.92
18L	-40°F to 149°F (-40°C-65°C)	-40°F to 140°F (-40°C-60°C)		16928	18725	18676	15689	17355	17310	0.92
24L	-40°F to 149°F (-40°C-65°C)	-40°F to 140°F (-40°C-60°C)		22157	24508	24445	20535	22715	22656	0.92
27L	-40°F to 149°F (-40°C-65°C)	-40°F to 140°F (-40°C-60°C)		23346	25824	25757	21638	23934	23872	0.92
12L	-40°F to 149°F (-40°C-65°C)	-40°F to 140°F (-40°C-60°C)	W	11151	12334	12302	10335	11432	11402	0.91
18L	-40°F to 149°F (-40°C-65°C)	-40°F to 140°F (-40°C-60°C)		16951	18750	18702	15711	17378	17333	0.91
24L	-40°F to 149°F (-40°C-65°C)	-40°F to 140°F (-40°C-60°C)		22187	24542	24478	20563	22746	22687	0.91
27L	-40°F to 149°F (-40°C-65°C)	-40°F to 140°F (-40°C-60°C)		23377	25859	25792	21667	23967	23905	0.91

Notes

1 Absolute photometry calculated in accordance with IESNA LM-79-08

OPERATIONAL DATA CONTINUED

Emergency Lumens

Package	Narrow	Medium	Wide	Frosted Lens Multiplier
PHZ 12L, 18L, 24L, 27L	1666 Lumens	1706 Lumens	1691 Lumens	.92

Projected Lumen Maintenance (TM-21)[1]

Package	0 Hours	15,000 Hours	30,000 Hours	45,000 Hours	60,000 Hours	100,000 Hours
PHZ 12L, 18L, 24L, 27L @ 25C	1.00	0.99	0.98	0.98	0.97	0.96
PHZ 12L, 18L, 24L, 27L @ 40C	1.00	0.98	0.97	0.96	0.96	0.94
PHZ 12L, 18L, 24L, 27L @ 55C	1.00	0.98	0.96	0.95	0.94	0.91
PHZ 12L, 18L, 24L, 27L @ 65C	1.00	0.96	0.94	0.93	0.91	0.88

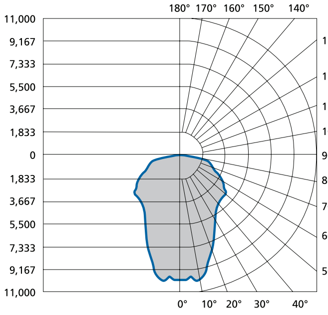
Notes

1 Calculated using data collected according to LM-80 and represents lumen maintenance of the LED package.

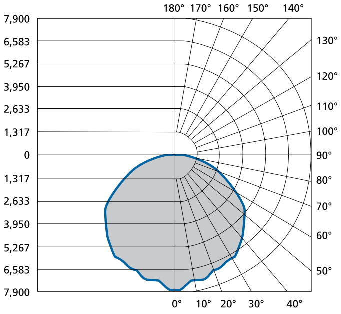
Wattage

Lumen Package	120V	277V	347V	480V	C omparable Light Source
12L	120	118.8	121.0	120.3	4-lamp T8, 250W HID
18L	185	183.1	186.6	185.4	4-lamp T5HO, 6-lamp T8
24L	238	235.6	240.1	238.5	6-lamp T5HO, 8-lamp T8, 400W HID
27L	255	252.4	257.2	255.6	8-lamp T5HO, 8-lamp T8

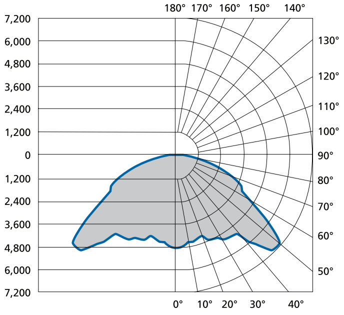
DISTRIBUTION DATA



Narrow



Medium



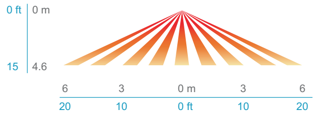
Wide

CONTROLS

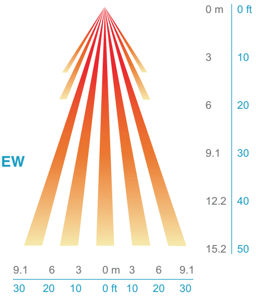
MSE6NDL, MSE62L3VDL, MSE6NDL DSCNDL, AXA10, MSE6XADL DSCXA; Sensor Coverage Data

- Best choice for 15 to 45 ft. (4.57 to 13.72 m) mounting heights
- 15 to 20 ft. (4.57 to 6.10 m) radial coverage overlaps area lit by a typical high bay fixture
- Large motion (e.g., walking) detection up to a 35-ft. (10.76 m) mounting height
- Extra large motion (e.g., forklifts) detection up to a 45-ft. (13.72 m) mounting height

LOW VIEW

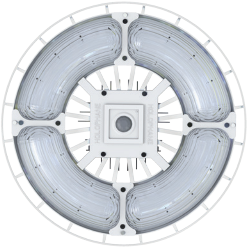


HIGH VIEW



COMPONENTS & OPTIONS DATA

XPoint wireless
Integrated wireless control technology connecting fixtures, sensors, and other modules together.



Sensors
Occupancy-only mode that controls on/off and dimming of the fixture. Photocell option reads daylight levels to dim lights or prevent start-up.

Dimming drivers
Drivers use 0-10V protocol with dimming down to 10% power / 30% lumen output.

Surge protection
Phuzion drivers provide 2kV of surge protection as standard. The optional (SPAS or SPAH) provides 10kV of protection while the SPAS20 provides 20kV of protection.

Fusing
Integrated internal fast-blow fusing is available for all configurations.

Optics
Standard prismatic, borosilicate glass that doesn't fade or degrade. Optional frosted optics provide even greater visual comfort.

Wireguard
Steel wireguard available to further protect fixture from impact.

Hook and cord
3/4" hub standard. Multiple hooks and other mountings available. Cord sets can be specified with or without plug.

B Series Quick Reference Guide

Intrusion—Small Commercial/Retail/Banking

B3512/B4512/B5512

Miscellaneous

CX4010 Transformer (18 VAC)

RADION Wireless Devices

RFRP-A/B810 SDI2 Wireless Repeater/Receiver

RFGB-A Glass Break Detector

RFDW-RM-A Recessed Door/Window Contact

RFDW-SM-A Surface Mount Door/Window Contact

RFUN Wireless Universal Transmitter w/ Door/Window Contact

RFPR-C12-A Curtain PIR, Pet Immune 40 x 5 ft.

RFDL-11-A PIR Microwave TriTech 35 x 25 ft.

RFPR-12-A PIR, Pet Immune 40 ft.

RFSM-A Wireless Smoke Detector

RFBT-A Wireless Billtrap Transmitter

RFPB-SB/TB-A 1 & 2 Button Panic Devices

RFKF-TB/FB-A 2 & 4 Button Keyfobs

Blue Line 2

ISC-BDL2-WP12G/WP6G/W12G TriTech 40 X 40 ft./20 x 20 ft./40 x 40 ft.

ISC-BPR2-W12/WP12 PIR 40 x 40 ft.

ISC-BPQ2-W12 Quad PIR 40 x 40 ft.

Plug-in Modules

B440/441 Cellular Module

B430 Phone Plug-in Module

B201 Smoke Module

D166 Phone Jack

SDI2 Devices

B930 ATM Style Keypad

B208 Octo-Input Module

B920 2-Line Keypad

B308 Octo-Output Module

B915 Text Keypad

B56 Surface Mount Backbox

B520 Power Supply

B921C Capacitive Keypad

B426 Ethernet Communication Module
SDI or SDI2

B942/B942W Touchscreen Keypad

B96 Trim Plate for B Series Keypads

B450 Plug-in Module Interface for B44x cards
SDI or SDI2

Inovonics Wireless Devices

EN1247 Wireless Glass Break

EN1265 Wireless 360 PIR

EN1249 Wireless Billtrap Transmitter

EN1261HT Wireless PIR

EN1260 Wireless PIR

EN1262 Wireless PIR

EN1210/W Wireless Transmitter

EN1242 Wireless Smoke Detector

EN1224-ON Multiple Condition Pendant

EN1223D/S Water Resistant Wireless Pendant

EN1235S/D Belt Clip Wireless Pendant

EN1233S/D Necklace Wireless Pendant

B820 SDI2 Wireless Interface

EN4200 Serial Receiver

Conventional Devices

D132A Reversing Relay

D125B Dual Class B Initiating Module

D130 AUX Relay

D192G Bell Card

D133/D134 Relay

F220/F220-B6R Smoke Detector plus Base

Ceiling Mount Motions

DS938Z 360 PIR 50 ft.

DS9370/DS9360/ DS9371 (black) 360 TriTech 50 ft./70 ft.

DS936 Low-profile 360 PIR

Enclosures

B10 Medium Enclosure

B11 Small Enclosure

D137

D138

ICP-EZTS Universal Tamper

D8103

D8108A

B12 Bracket for D8103/ D8108A Enclosure

Credentials

RFID Tags for B942 Kepads

ACA-ATR13

ACD-ATR11ISO

ACD-ATR14CS

RPS

D5370-USB

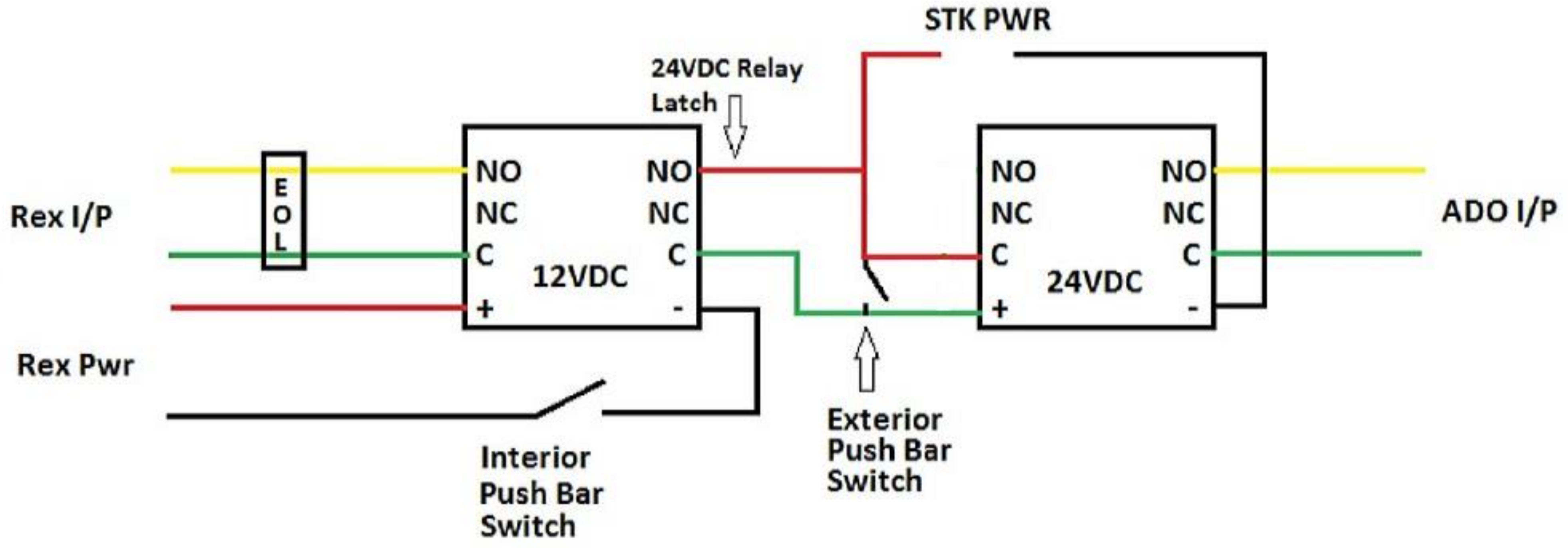
D5371-USB

D5500CU RPS Upgrade

D5500CU-LITE RPS Lite

B99 USB Cable

Standard ADO Wiring Diagram



Interior: When interior PBS is pushed, 12VDC relay is energized. Rex I/P and 24VDC relay latch are triggered. Strike is then energized and 24VDC relay is latched. ADO I/P is triggered.

Exterior: A valid card read energizes the strike. When the exterior PBS is pushed, the 24VDC relay latches. ADO I/P is triggered.

Tech Shop Specs

Winnipeg

ADO Wiring Diagram

Winnipeg
Embrace the Spirit • Vivez l'esprit

January 2016

DATE

NO.

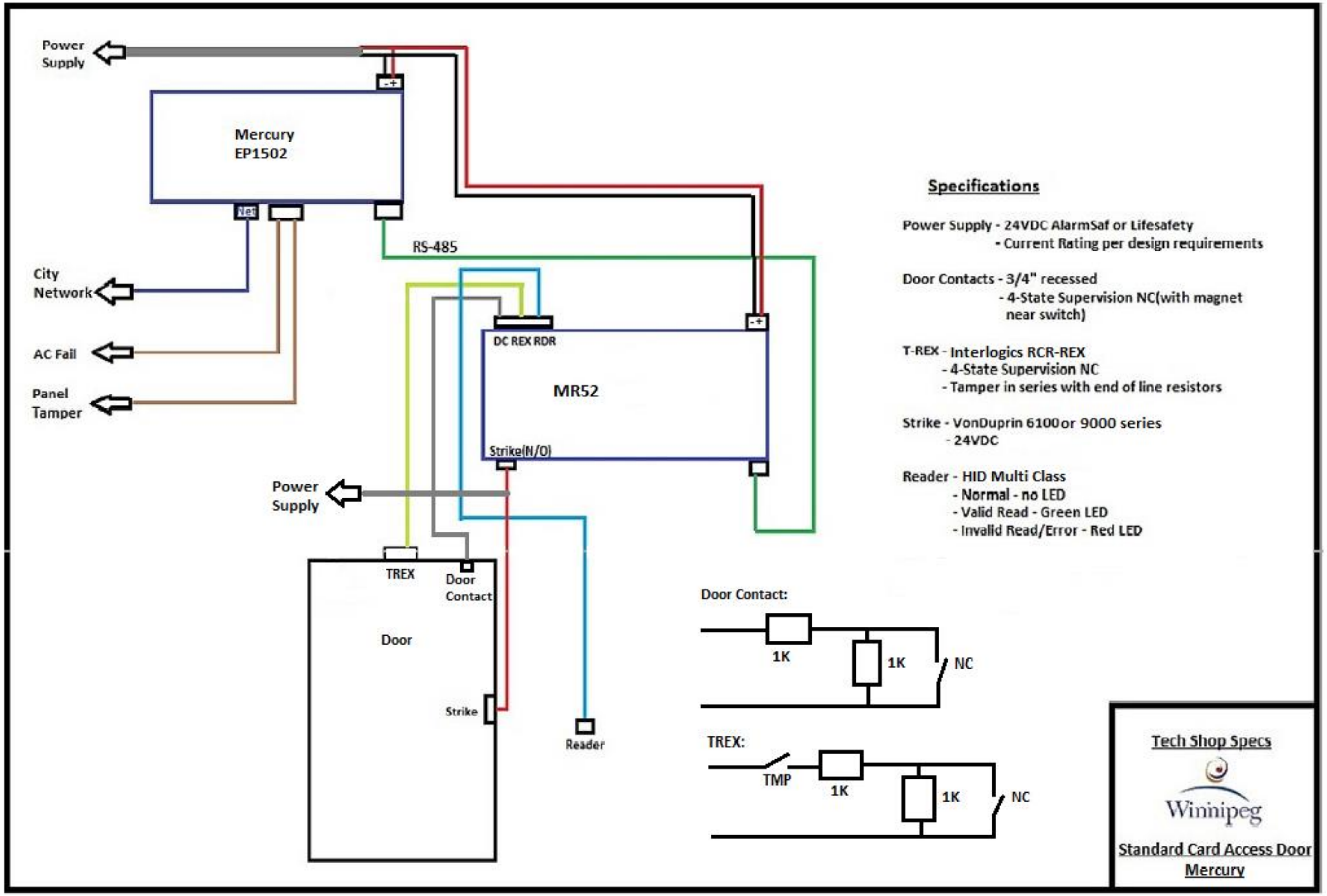
Card Access ADO
wiring diagram

PROJECT NUMBER:
D Miousse

DRAWING TITLE:
Card Access ADO wiring

DRAWING No.

CA02



Specifications

Power Supply - 24VDC AlarmSaf or Lifesafety
- Current Rating per design requirements

Door Contacts - 3/4" recessed
- 4-State Supervision NC(with magnet near switch)

T-REX - Interlogics RCR-REX
- 4-State Supervision NC
- Tamper in series with end of line resistors

Strike - VonDuprin 6100 or 9000 series
- 24VDC

Reader - HID Multi Class
- Normal - no LED
- Valid Read - Green LED
- Invalid Read/Error - Red LED

Tech Shop Specs

Winnipeg

Standard Card Access Door Mercury

Winnipeg
Embrace the Spirit • Vivez l'esprit

January 2016
DATE
NO.

Card Access
Mercury 1502

PROJECT NUMBER:
D Miousse

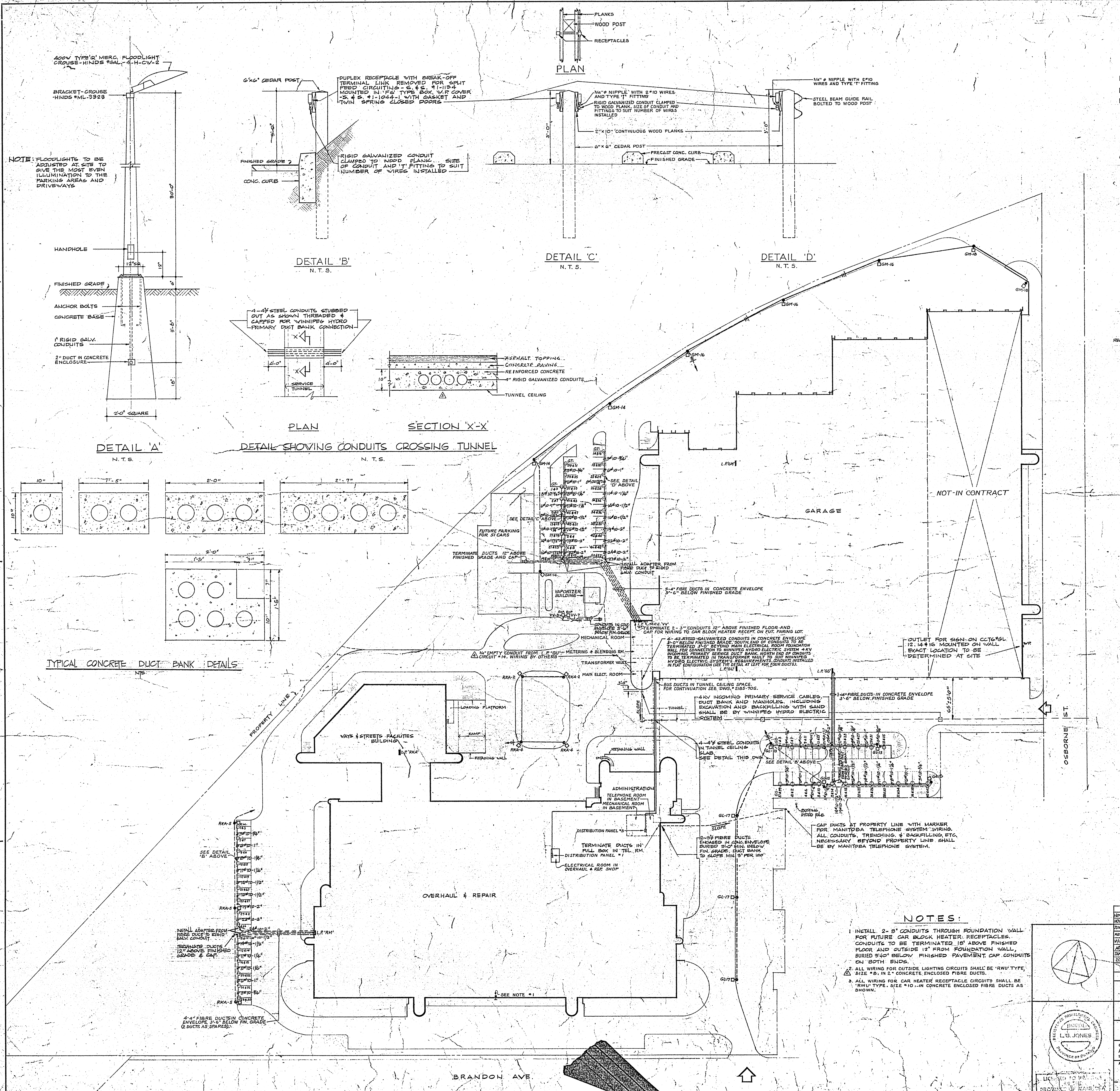
DRAWING TITLE:
Card Access Mercury 1502

DRAWING No.
CA01

421 Osborne St.
address

Transit Garage
Shop Facilities
project no. 2185-701
sheet no.

Site Plan & Details
description



LEGEND

▭ A RG-7	FLUORESCENT LIGHTING FIXTURE, CEILING MOUNTED, TYPE 'A' CONNECTED TO LIGHTING PANEL 'RG', CIRCUIT #7
⊠	FLUORESCENT LIGHTING FIXTURE, USED AS NIGHT LIGHT
▭	FLUORESCENT LIGHTING FIXTURE, BRACKET TYPE
○	OUTLET BOX
Ⓗ	INCANDESCENT OR MECURY VAPOUR LIGHTING FIXTURE
Ⓜ	INCANDESCENT OR MECURY VAPOUR LIGHTING FIXTURE, BRACKET TYPE
Ⓧ BRACKET Ⓧ CEILING	EXIT LIGHT
$3	3-WAY SWITCH
$P	SWITCH WITH PILOT LIGHT
$	SINGLE POLE SWITCH
⊖	DUPLEX RECEPTACLE
⊕	DUPLEX RECEPTACLE MOUNTED ABOVE COUNTER TOP
⊖ EXP.	DUPLEX RECEPTACLE. EXPL. PROOF. 20 A. 125 V. CROUSE HINDS #CPS 152-212.
●	WELDING RECEPTACLE 100A, 3PH, 4W, 208V TO MATCH EQUIP.
⊜	DUPLEX RECEPTACLE. 208V. 15 A HUBBELL #5662.
MASTER SINGLE FACE DOUBLE FACE	CLOCK MOUNTED 12'-0" ABOVE FINISHED FLOOR IN GARAGE, OVERHAUL & REPAIR SHOP AND 7'-6" IN OFFICE BUILDING UNLESS OTHERWISE NOTED
⊙	FLOOR RECEPTACLE, HUBBELL #5261 IN NEPCO 800 BOX
●	SHAVING OUTLET, MOUNTED 3'-6" ABOVE FINISHED FLOOR
▶	TELEPHONE WALL MOUNTED OUTLET
○	P.A. MICROPHONE
▷	P.A. HORN SINGLE PROJECTION MOUNTED APPROX. 15'-0" ABOVE FINISHED FLOOR
▷ RECESSED ▷ SURFACE	P.A. SPEAKER CEILING MOUNTED
⋈	P.A. HORN DOUBLE PROJECTION MOUNTED APPROX. 15'-0" ABOVE FINISHED FLOOR UNLESS OTHERWISE NOTED
F	FIRE ALARM MANUAL STATION
F	FIRE ALARM BELL 10" DIA. OR AS NOTED
F	FIRE ALARM HORN DOUBLE PROJECTION
◐	136°F COMBINATION TYPE F.A. DETECTOR
⊗	190°F FIXED TYPE F.A. DETECTOR
☐	DISCONNECT SWITCH
☒	MANUAL STARTER
◩	MAGNETIC STARTER
◩	COMBINATION MAGNETIC STARTER
○	SINGLE PHASE MOTOR
⊗	3 PHASE MOTOR
⊡	REMOTE PUSHBUTTON
Ⓣ	THERMOSTAT
E 2	EMERGENCY LIGHTING UNIT MOUNTED 7'-6" ABOVE FINISHED FLOOR UNLESS OTHERWISE NOTED
▬	LIGHTING PANEL
▨	POWER PANEL
═□═	UNDER FLOOR DUCT
●	CONDUIT STUB-UP
⊗	SPRINKLER SYSTEM FLOW SWITCH SUPPLIED BY OTHERS
⊀	SPRINKLER SYSTEM GATE VALVE SUPERVISORY SWITCH SUPPLIED BY OTHERS
⊙	WEATHER PROOF RECEPTACLE FOR CAR BLOCK HEATERS
▱	ELECTRIC HEATER 208V 1PH. SUPPLIED AND INSTALLED BY OTHERS
▨	ELECTRIC HEATER 208V 3PH. SUPPLIED AND INSTALLED BY OTHERS
WP	DENOTES WEATHER PROOF
EXP.	DENOTES EXPLOSION PROOF
●□	30'-0" HIGH STANDARD WITH ONE 400W. TYPE 'Q' MERCURY VAPOUR FLOODLIGHT.
⊖	INTERCOM. SYSTEM MICROPHONE
▷	INTERCOM. SYSTEM SPEAKER TALK-BACK STATION (M.H. 5'-6") & ASSOCIATED TRUMPET (M.H. 15'-0")
⊘	OUTLET BOX FOR GAS-FIRED INFRA-RED HEATER MOUNTED ADJACENT TO HEATER, WIRING & CONNECTION TO HEATERS BY OTHERS.
●	OUTLET BOX FOR 208V CONNECTION TO CARBON MONOXIDE ANALYZER MTD. 6'-0" ABOVE FINISHED FLOOR.
●	OUTLET BOX FOR 120V CONNECTION TO CARBON MONOXIDE MONITOR MTD. 6'-0" ABOVE FINISHED FLOOR.
▭	FAN COIL UNIT COMPLETE WITH TERMINAL JUNCTION BOX SUPPLIED & INSTALLED BY OTHERS. ELECTRICAL CONTRACTOR SHALL TERMINATE & CONNECT WIRING IN JUNCTION BOX.
UP DN	DENOTES NUMBER OF WIRES IN CONDUIT, EXPOSED IN UNFINISHED AREAS, OR CONCEALED IN WALL OR CEILING SPACE ABOVE IN FINISHED AREAS. ARROW HEAD DENOTES HOME RUN TO RESP. PANEL. UNMARKED RUNS INDICATE 2 WIRES IN CONDUIT.
— — —	DENOTES CONDUIT RUN IN SLAB.
FH	FIRE ALARM TROUBLE STATION

2185-701

NOTES:

1. INSTALL 2-3" CONDUITS THROUGH FOUNDATION WALL FOR FUTURE CAR BLOCK HEATER RECEPTACLES. CONDUITS TO BE TERMINATED 18" ABOVE FINISHED FLOOR AND OUTSIDE 12" FROM FOUNDATION WALL, BURIED 3'-0" BELOW FINISHED PAVEMENT. CAP CONDUITS ON BOTH ENDS.
2. ALL WIRING FOR OUTSIDE LIGHTING CIRCUITS SHALL BE 'RWU' TYPE, SIZE #8, IN 2" CONCRETE ENCLOSED FIBRE DUCTS.
3. ALL WIRING FOR CAR HEATER RECEPTACLE CIRCUITS SHALL BE 'RWU' TYPE. SIZE #10 - IN CONCRETE ENCLOSED FIBRE DUCTS AS SHOWN.

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
NOV. 6, 69			AS BUILT	
NOV. 29. 68	7	4	ADDED 3/4" EMPTY CONDUIT FROM L.P. 'GU' TO VAPORIZER BUILDING.	
JUNE 27. 68	6	3	SECTION 'X'-'X' REVISED.	
MAY 24. 68	5	2	FIBRE DUCTS FOR OUTSIDE LIGHTING CHANGED TO 2".	
MAR 29/68	4		ISSUED FOR CONSTRUCTION	
14/2/68	3	1	GENERAL REVISIONS	
JAN. 19. 68	2		FOR TENDER.	
20/10/67	1	0	FOR APPROVAL.	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

SITE PLAN & DETAILS

REGISTERED PROFESSIONAL ENGINEER
L.G. JONES
PROVINCE OF ONTARIO

LICENSED TO PRACTISE IN THE PROVINCE OF MANITOBA

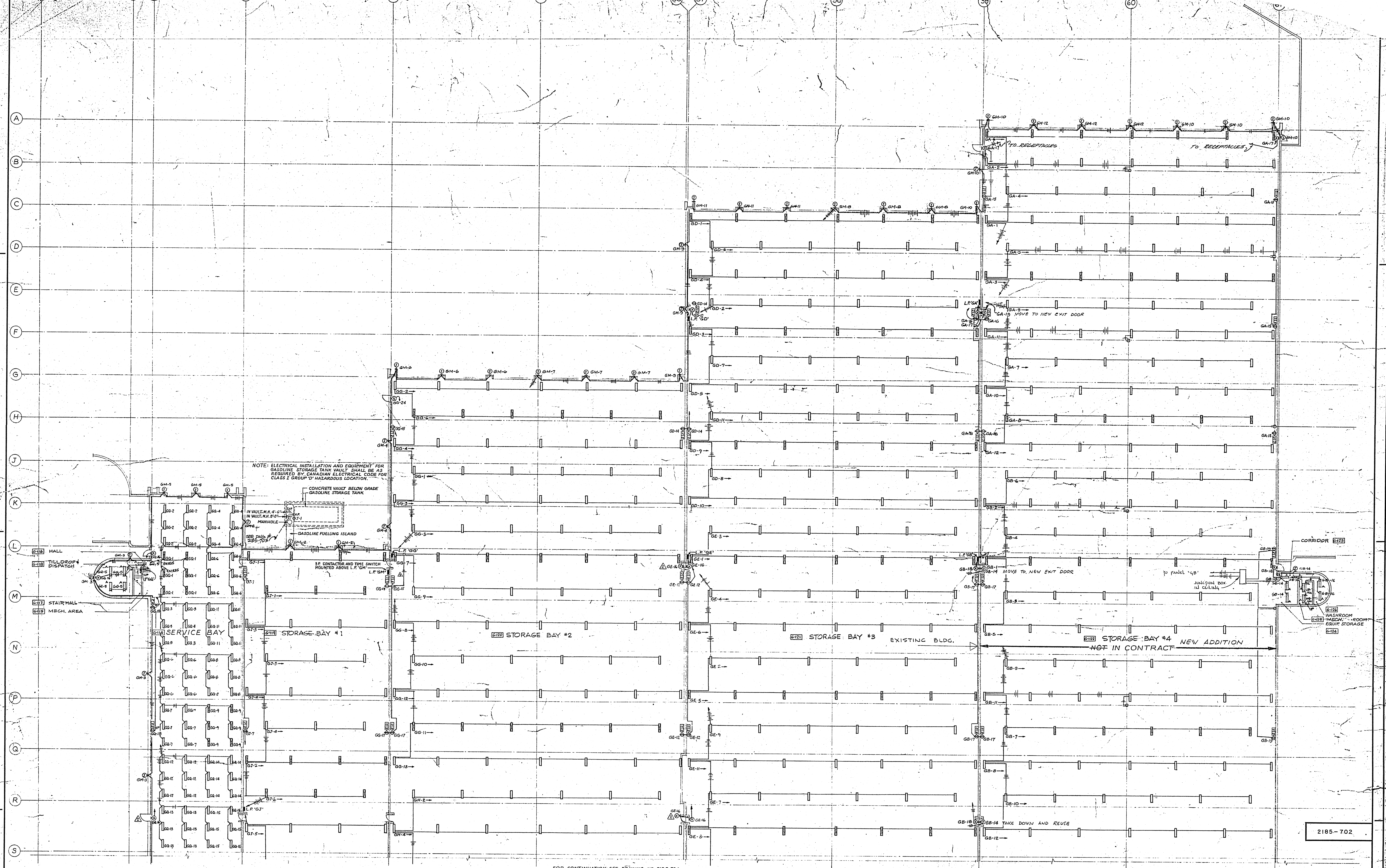
CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

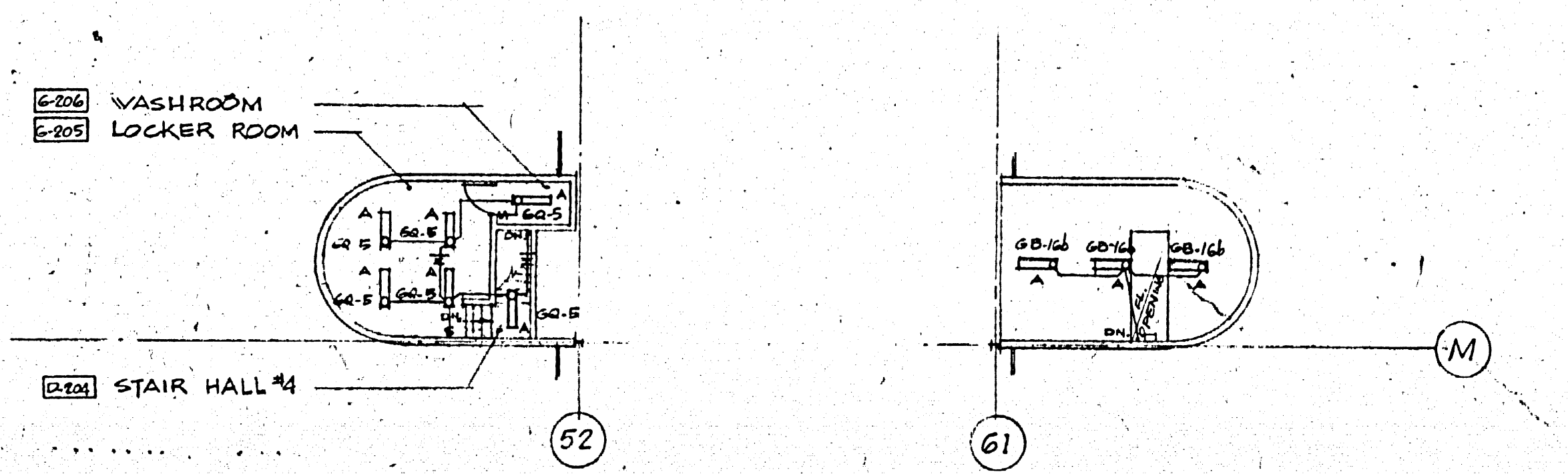
DRAWN BY: P.T.
CHECKED: L.G.J.
FILE No.:
SHEET No.:
DATE: 21 JULY 1967.
SCALE: 1" = 50' & AS NOTED
DRAWING No.: 2185-701
ELECTRICAL

421 Osborne St.
address
Transit Storage
Shop Facilities
Scanned
project no.
2185-702
sheet no.
Part Floor Plan - Garage
description
North - Lighting



NOTE: ELECTRICAL INSTALLATION AND EQUIPMENT FOR GASOLINE STORAGE TANK VAULT SHALL BE AS REQUIRED BY CANADIAN ELECTRICAL CODE FOR CLASS I GROUP 'D' HAZARDOUS LOCATION.

FOR CONTINUATION SEE DRAWING NO. 2185-704



UPPER LEVEL OF SERVICE PROJECTION
SCALE 1/16" = 1'-0"

NOTE: FOR NOTES. & TYPICAL MOUNTING DETAIL OF FLUORESCENT LIGHTING FIXTURES IN GARAGES SEE DRAWING NO. 2185-704.

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
APR. 17/79			AS BUILT DRAWING UPDATE - BAY #4	
MAR, 79			REVISE WIRING IN BAY #4	
MAY 9,77	7	4	GARAGE ADDITION - FOR TENDER	
MAR.18/69	6	3	AS BUILT	
MAY 21.68.	5	2	DOOR & EXIT LIGHT ADDED ON WEST WALL BETWEEN COL. LINES R & S, EXIT LIGHTS ADDED.	
MAR.29/68	4		ISSUED FOR CONSTRUCTION	
14/2/68	3	1	GENERAL REVISIONS	
JAN.19.68	2		FOR TENDER.	
20/10/67	1	0	FOR APPROVAL	

ISSUE OR REVISION

APPROVED
MAY 1977
A. D. MARGISON ASSOCIATES LTD.
CONSULTING PROFESSIONAL ENGINEERS
SUITE 302—1920 YONGE STREET
TORONTO, ONTARIO M4T 1X2

REGISTERED PROFESSIONAL ENGINEER
ELECTRICAL
F. I. L. DYKE
PROVINCE OF ONTARIO

MANITOBA LICENCE PEND.

NUMBER TEN ARCHITECTURAL GROUP
ARCHITECTS & PLANNERS 210-175 HARGRAVE ST., WINNIPEG, CANADA R3C 3R9 (204) 942-0981

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

PART FLOOR PLAN — GARAGE NORTH — LIGHTING

REGISTERED PROFESSIONAL ENGINEER
L. G. JONES
PROVINCE OF MANITOBA

LICENSED TO PRACTICE IN THE PROVINCE OF MANITOBA
My Licence Expires 10 Jun 1968

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

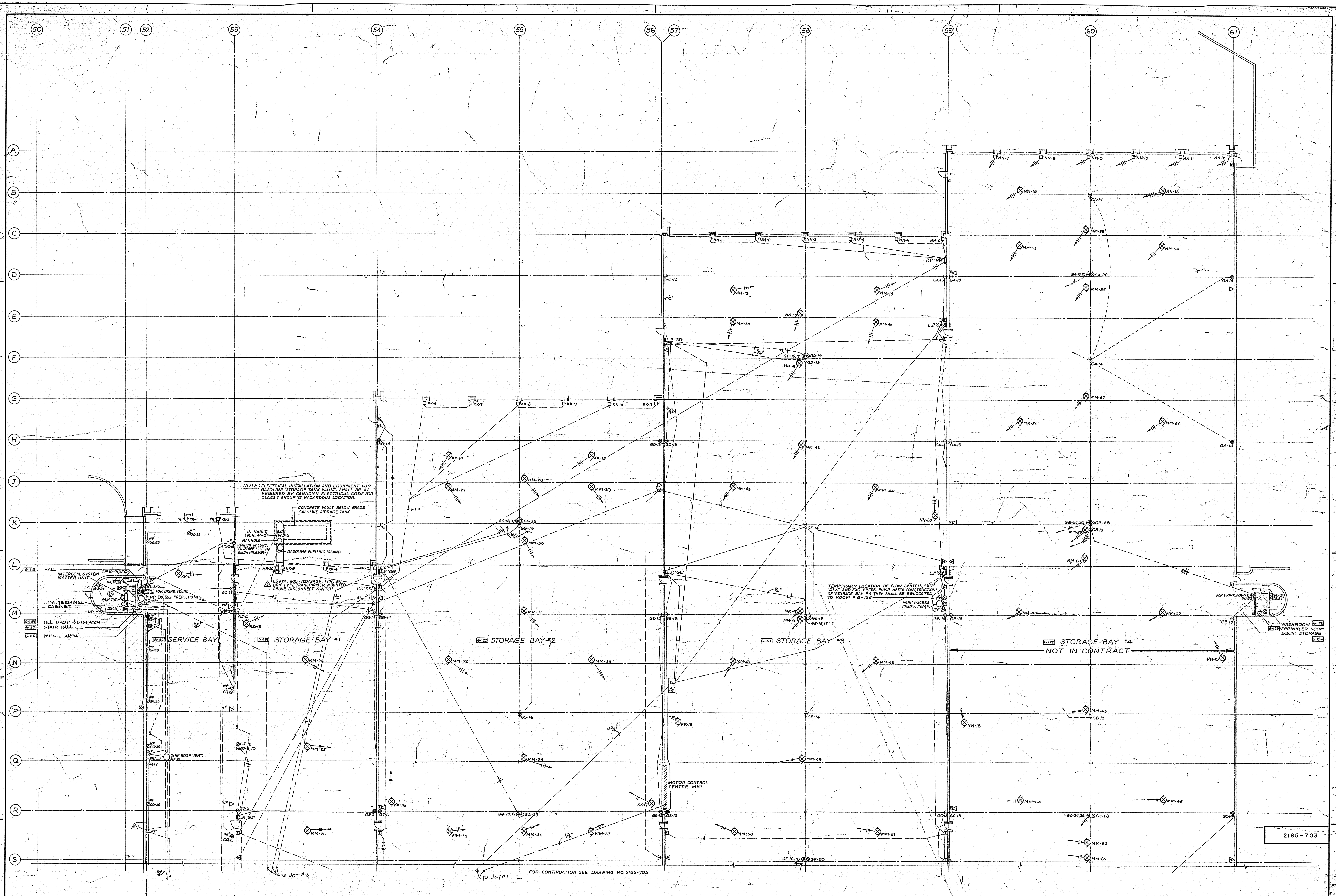
APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY R.M.
CHECKED L.G.J.
FILE No.
SHEET No.
DATE 21 JULY 1967
SCALE 1/16" = 1'-0"
DRAWING No. 2185-702
ELECTRICAL

421 Osborne St.
address
Transit Storage & Shop Facilities

SCANNED
project no.
2185-703
sheet no.

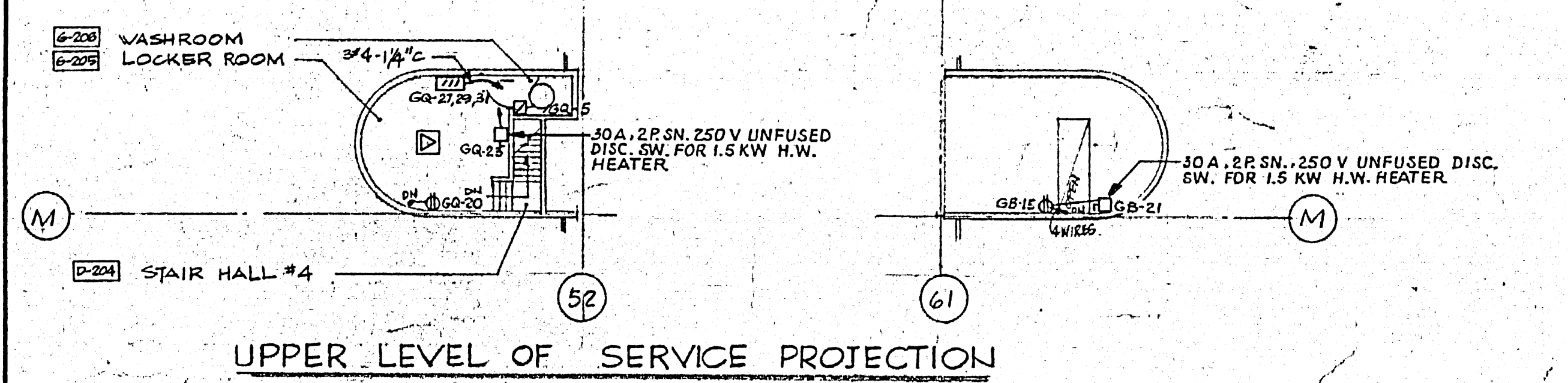
Part Floor Plan - Garage North -
description
Power



NOTE: ELECTRICAL INSTALLATION AND EQUIPMENT FOR GASOLINE STORAGE TANK VAULT SHALL BE AS REQUIRED BY CANADIAN ELECTRICAL CODE FOR CLASS I GROUP 'D' HAZARDOUS LOCATION.

TEMPORARY LOCATION OF FLOW SWITCH, GATE VALVE AND EXC. PRESS. PUMP. AFTER CONSTRUCTION OF STORAGE BAY #4 THEY SHALL BE RELOCATED TO ROOM # G-125

FOR CONTINUATION SEE DRAWING NO. 2185-705



30A, 2P. SN. 250V UNFUSED DISC. SW. FOR 1.5KW H.W. HEATER

30A, 2P. SN., 250V UNFUSED DISC. SW. FOR 1.5 KW H.W. HEATER

UPPER LEVEL OF SERVICE PROJECTION

SCALE 1/16"=1'-0"

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
MAR.18/69	7	4	AS BUILT	
NOV.14.68.	6	3	CIRCUIT # KK-20 REVISED.	
MAY 21.68	5	2	DOOR & F.A. STATION ADDED ON WEST WALL BETWEEN COL. LINES R & S.	
MAR.29/68	4		ISSUED FOR CONSTRUCTION	
14/2/68	3	1	GENERAL REVISIONS	
JAN.19.68	2		FOR TENDER.	
20/10/67	1	0	FOR APPROVAL.	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

PART FLOOR PLAN – GARAGE NORTH – POWER

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

L.G. JONES

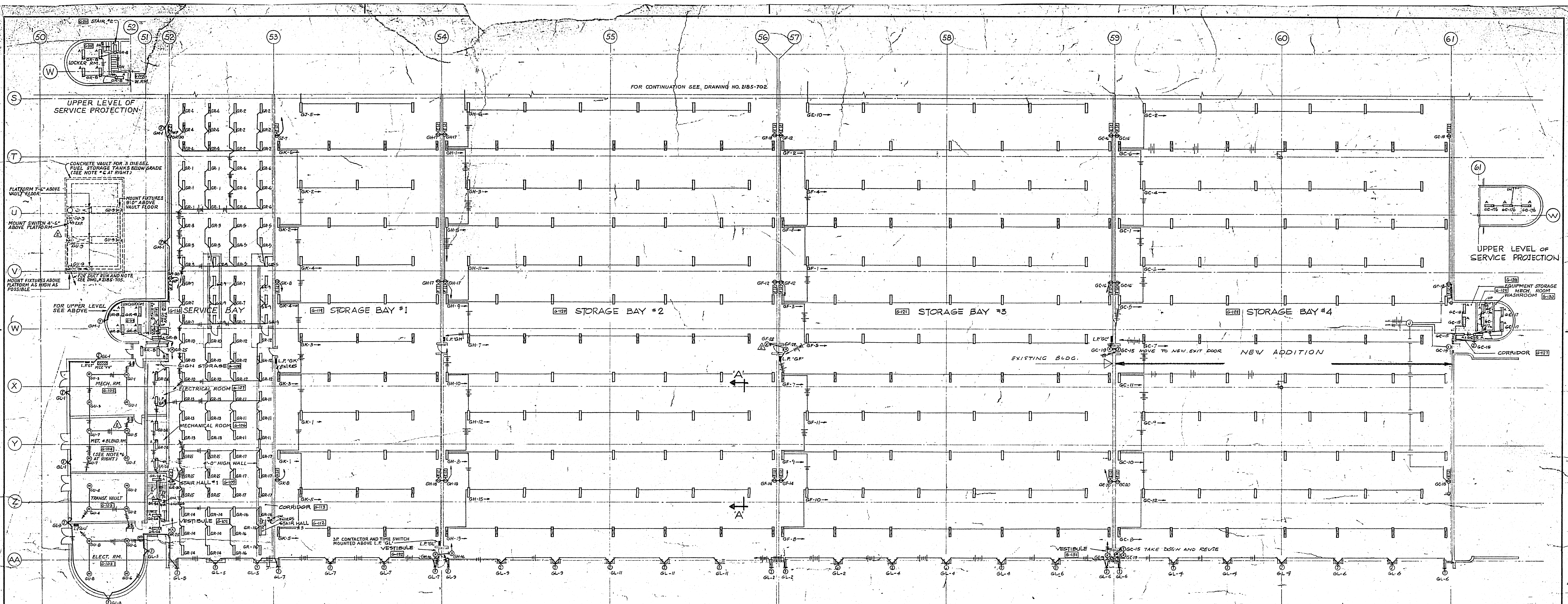
APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY R.M.	DATE 21 JULY 1967
CHECKED L.G.J.	SCALE 1/16"=1'-0"
FILE No.	DRAWING No. 2185-703 ELECTRICAL
SHEET No.	

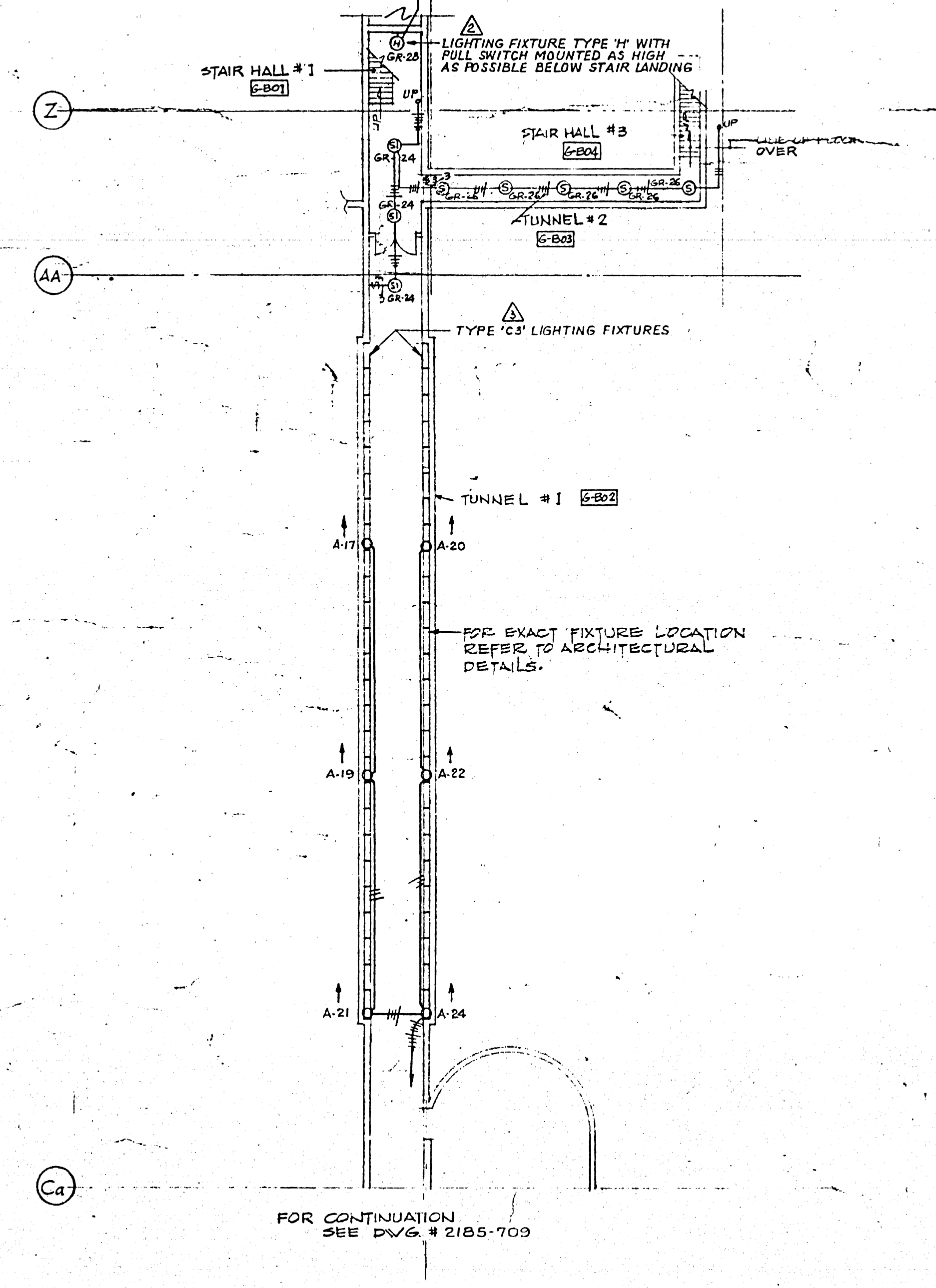
421 OSBORNE ST.
address
TRANSIT STORAGE SHOP FACILITIES

SCANNED
project no.
2185-704
sheet no.

PART FLOOR PLAN - GARAGE SOUTH - LIGHTING
description



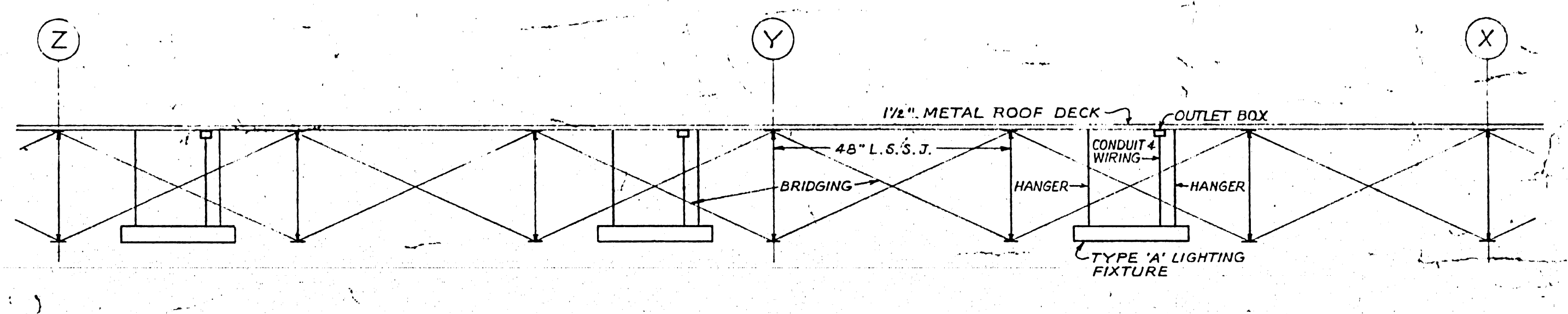
NOTE: LIGHTING FIXTURES IN ROOMS #G-102, G-103, G-104 AND G-105 TO BE MOUNTED 12'-0" ABOVE FIN. FLOOR. EXACT LOCATION TO BE DETERMINED AT SITE TO SUIT THE INSTALLATION OF EQUIPMENT BY OTHER TRADES.



FOR CONTINUATION SEE DWG # 2185-709

PLAN OF TUNNEL

SCALE 1/16"=1'-0"



SECTION 'A-A'

SCALE: 1/4"=1'-0"

SHOWING TYPICAL MOUNTING OF TYPE 'A' LIGHTING FIXTURES IN STORAGE BAYS.

NOTES:

1. ALL 1'x 4' FLUORESCENT LIGHTING FIXTURES IN GARAGES SHALL BE TYPE 'A'. FOR TYPICAL MOUNTING SEE SECTION 'A-A'.
2. ALL WALL MOUNTED, TYPE 'X' EXIT LIGHTS TO BE MOUNTED 8'-0" ABOVE FINISHED FLOOR.
3. EMERGENCY LIGHTING BATTERY UNITS AND RECEPTACLES FOR THEM TO BE MOUNTED 12'-0" ABOVE FINISHED FLOOR. PROVIDE SUITABLE STEEL SHELVES FOR MOUNTING OF BATTERY UNITS.
4. ALL OUTDOOR, TYPE 'J' LIGHTING FIXTURES TO BE MOUNTED 9'-0" ABOVE FINISHED GRADE EXCEPT AS NOTED ON ARCHITECTURAL DRAWINGS.
5. ALL 1'x 4' FLUORESCENT LIGHTING FIXTURES IN SERVICE BAY (BETWEEN COLUMN LINES 52 AND 53) SHALL BE TYPE 'B'.
6. △2 ELECTRICAL INSTALLATION AND EQUIPMENT FOR DIESEL FUEL STORAGE TANKS VAULT SHALL BE AS REQUIRED BY CANADIAN ELECTRICAL CODE FOR CLASS I GROUP 'D' HAZARDOUS LOCATION.
7. △3 TYPE 'C3' LIGHTING FIXTURE SHALL BE 1'x 4' FLUORESCENT, COMPLETE WITH 2-40 W C.W. R.S. LAMPS, H.P.F. BALLASTS AND ½" STYRENE CUBE LOUVRE, WAKEFIELD # THR-21451-LL OR APPROVED EQUAL.

2185-704

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
APR, 79			AS BUILT DRAWING UPDATE - BAY #4	
MAR, 79			REVISE WIRING IN BAY #4	
MAY 9.77	8	4	GARAGE ADDITION - FOR TENDER	
MAR. 18/69	7		AS BUILT	
OCT. 24.68	6	△3	LIGHTING FIXTURES TYPE 'A' IN TUNNEL CHANGED TO TYPE 'C3'.	
MAY 21.68.	5	△2	IN ROOM #G-104 LTG. FIXT. CHANGED TO TYPE 'M', EXIT LIGHTS ADDED. 1 LIGHTING FIXT. TYPE 'H' ADDED IN STAIR HALL #1 (G-B01). 1 TYPE 'N1' ADDED AND LIGHTING REVISED IN DIESEL FUEL STORAGE TANK VAULT.	
MAR. 29/68	4		ISSUED FOR CONSTRUCTION	
14/2/68	3	1	GENERAL REVISIONS	
JAN. 19.68	2		FOR TENDER.	
20/10/67	1	0	FOR APPROVAL.	

ISSUE OR REVISION

APPROVED
MAY 1977

A. D. MARGISON ASSOCIATES LTD.
CONSULTING PROFESSIONAL ENGINEERS
SUITE 302—1320 YONGE STREET
TORONTO, ONTARIO M4T 1X2

F. L. DYKE
PROVINCE OF ONTARIO

MANITOBA LICENCE PEND.

NUMBER TEN ARCHITECTURAL GROUP
ARCHITECTS & PLANNERS 210-175 HARGRAVE ST. WINNIPEG, CANADA R3C 3R9 (204) 942-0981

L. G. JONES

LICENSED TO PRACTISE IN THE PROVINCE

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

PART FLOOR PLAN - GARAGE SOUTH - LIGHTING

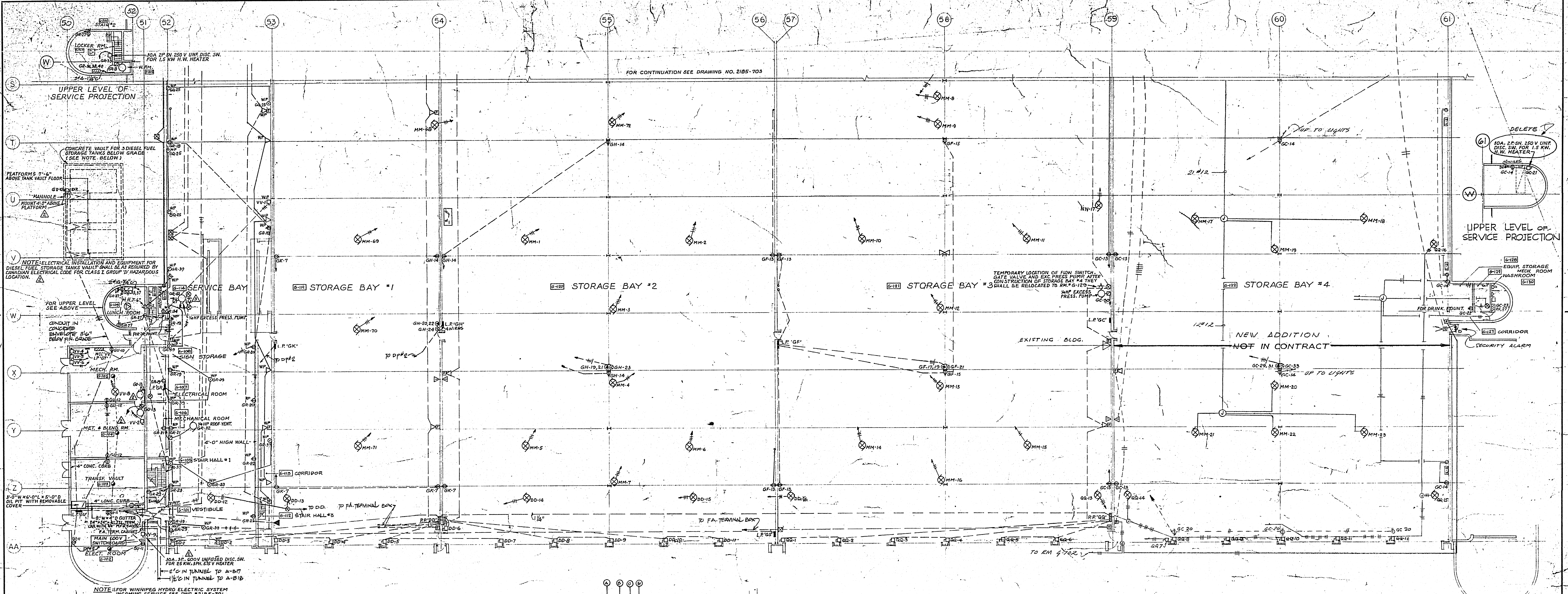
CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

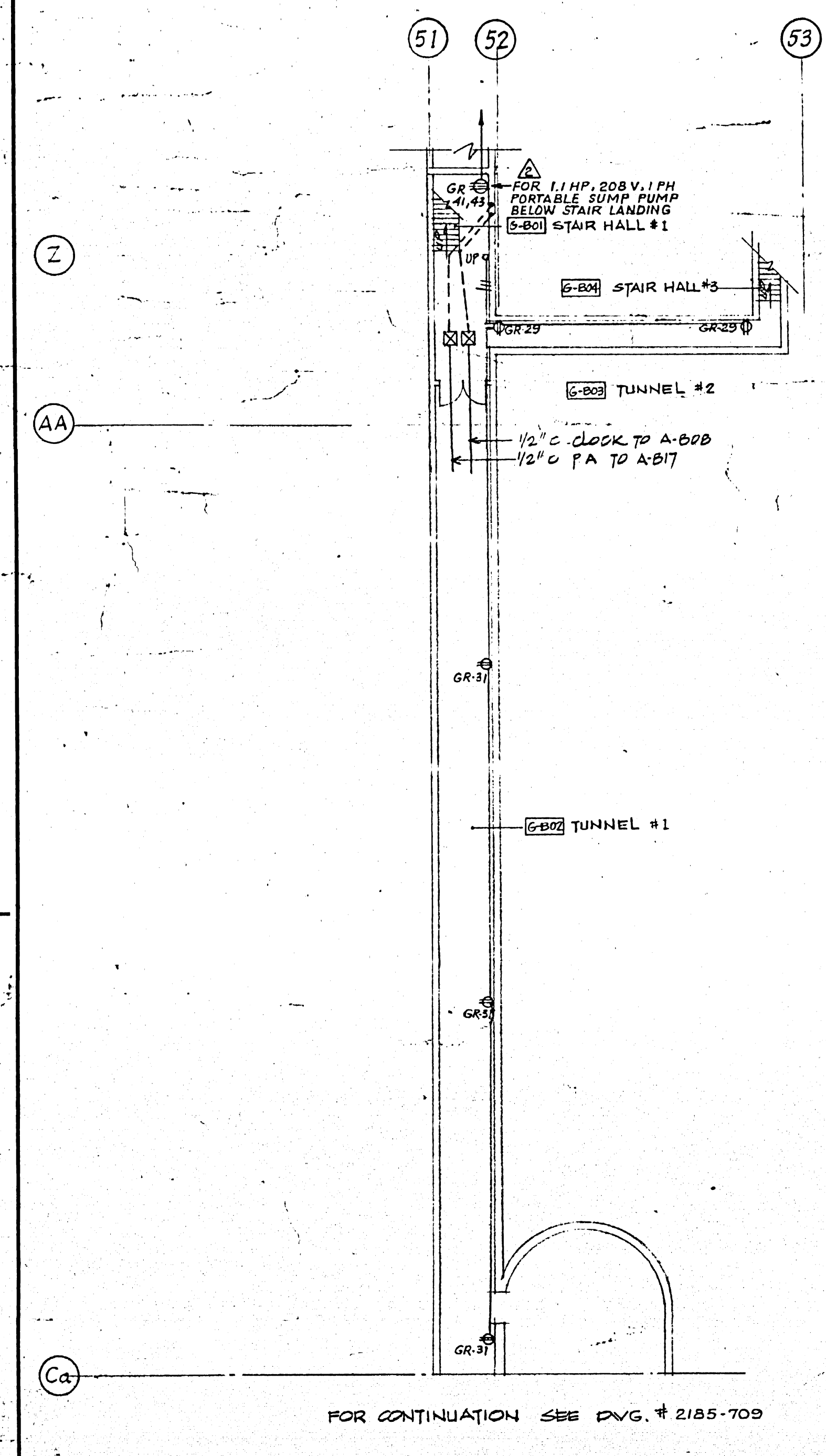
ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY R.M.
CHECKED L.G.J.
FILE No.
SHEET No.
DATE 21 JULY 1967
SCALE AS SHOWN
DRAWING No. 2185-704 ELECTRICAL

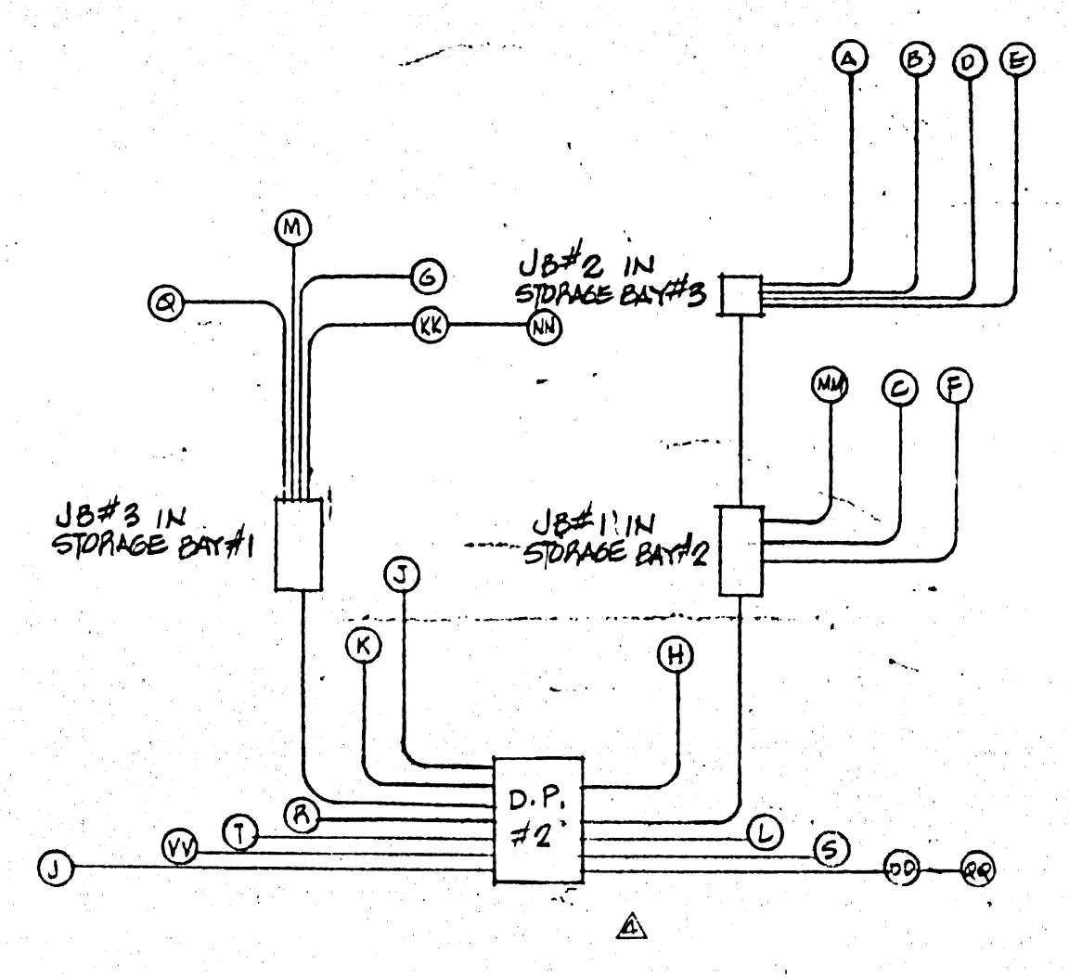
421 OSBORNE ST. address
TRANSIT STORAGE SHOP FACILITIES
SCANNED project no.
2185-705 sheet no.
PART FLOOR PLAN - GARAGE SOUTH - description
POWER

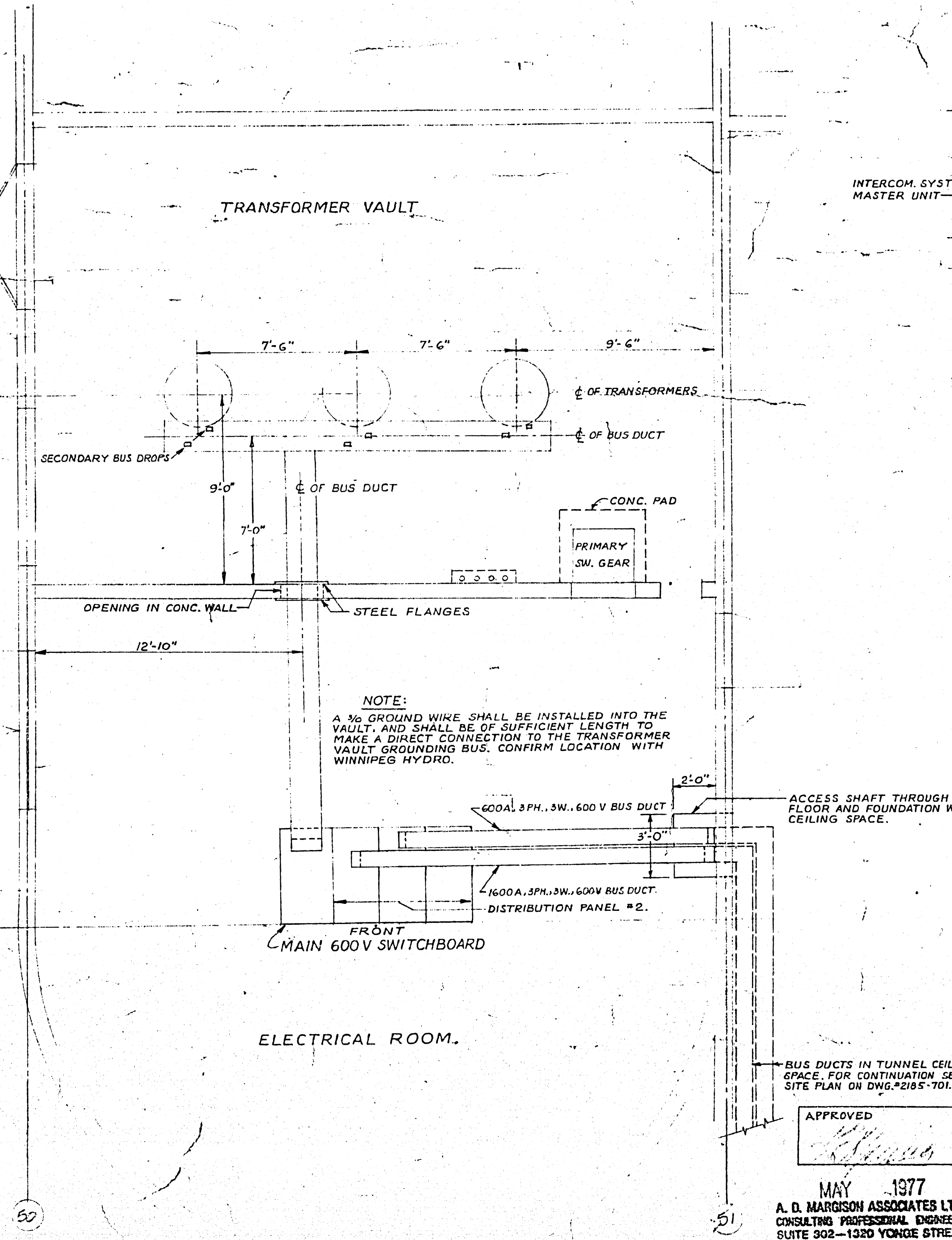




PLAN OF TUNNEL

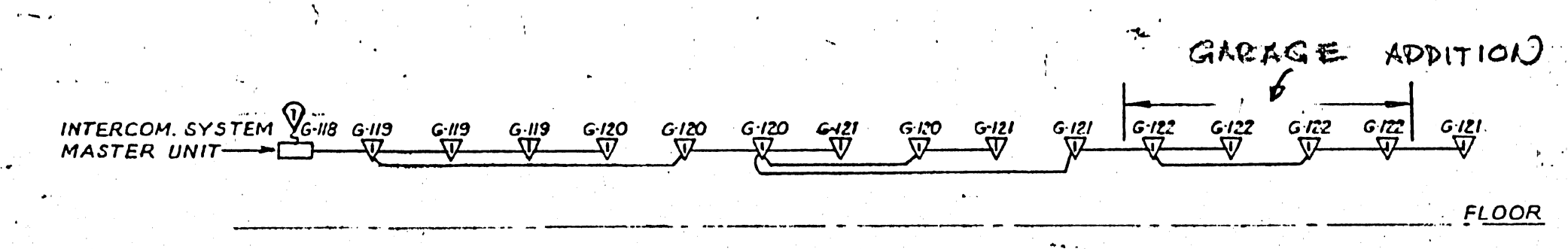
SCALE 1/16" = 1'-0"





ELECTRICAL ROOM AND TRANSFORMER VAULT LAYOUT

SCALE: 1/4" = 1'-0"



INTERCOM. SYST. RISER DIAGRAM IN GARAGE BUILDING

(N.T.S.)

2185-705

APPROVED

MAY 1977
A. D. MARGISON ASSOCIATES LTD.
CONSULTING PROFESSIONAL ENGINEERS
SUITE 302—1320 YONGE STREET
TORONTO, ONTARIO M4T 1X2

L. G. JONES

MANITOBA LICENCE PNLD.

NUMBER TEN ARCHITECTURAL GROUP
ARCHITECTS & PLANNERS 210-175 HARGRAVE ST., WINNIPEG, CANADA R3C 3R9 (204) 942-0981

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
APR /79			AS BUILT DRAWING UPDATE - BAY #4	
MAR/79			REVISE WIRING IN BAY #4	
MAY 9.77	8	5	GARAGE ADDITION – FOR TENDER.	
MAR.18/69	7	4	AS BUILT	
OCT.18.68	6	3	EXCESS PRESS. PUMP ADDED IN ROOM #G-111 ON CCT. #GR-42.	
MAY 21.68	5	2	ELECT. EQUIP. IN RM. #G-104 CHANGED TO NON-HAZARDOUS, HEATERS ADDED IN RMS. #G-102, 104, 105. 15A, 208V, 1PH. RECEPTACLE ADDED IN STAIR HALL #1 (G-B01), DIESEL FUEL STORAGE TANK VAULT MANHOLE AND RECEPTACLE RELOCATED.	
MAR.29/68	4		ISSUED FOR CONSTRUCTION	
FEB.14.68	3	1	GENERAL REVISION.	
JAN.19.68	2		FOR TENDER.	
20/10/67	1	0	FOR APPROVAL.	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

PART FLOOR PLAN – GARAGE SOUTH – POWER

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

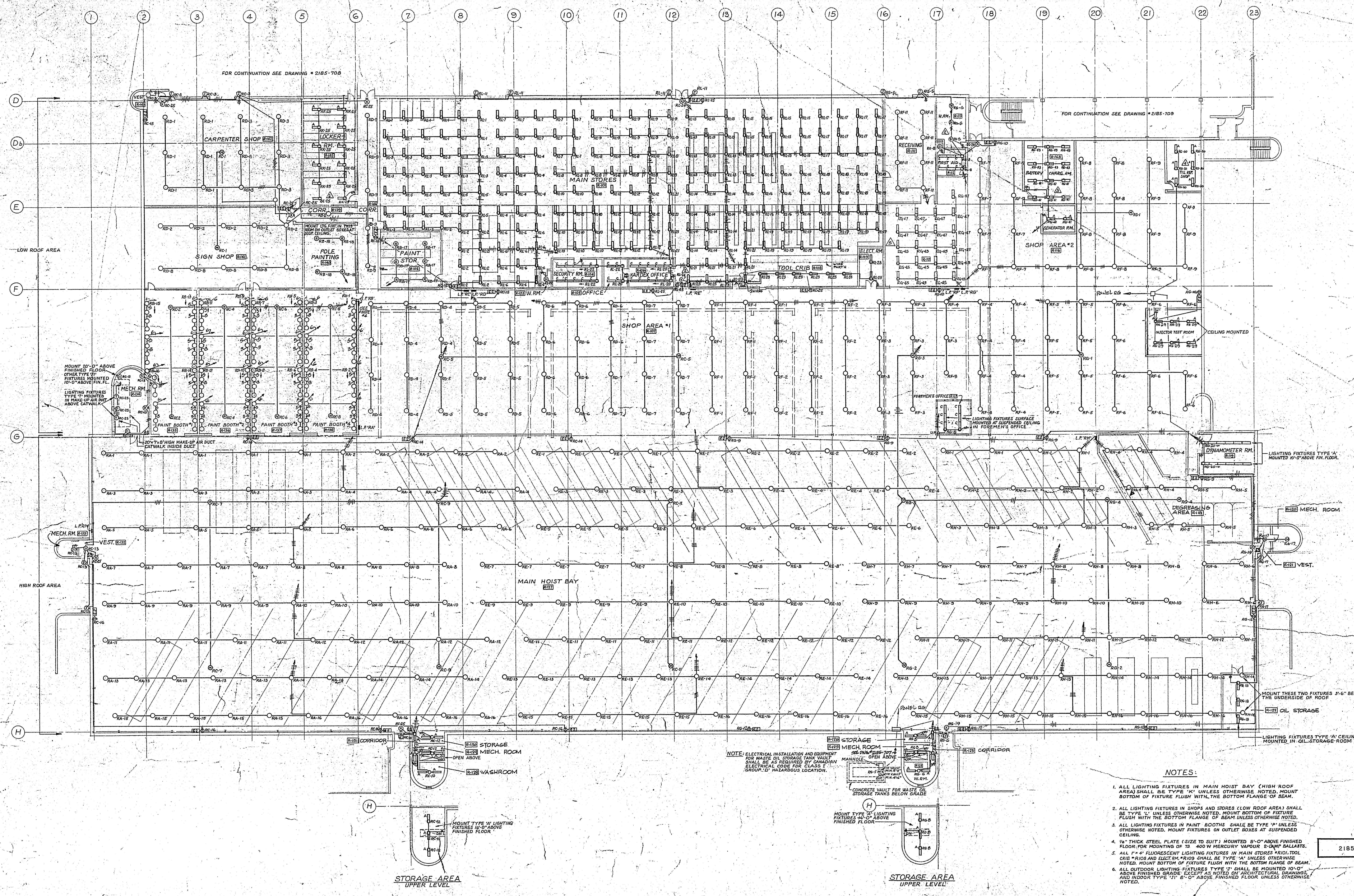
APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY R.M. P.T.
DATE 21 JULY 1967
CHECKED L.G.J.
SCALE 1/16" = 1'-0" OR AS SHOWN.
FILE No.
DRAWING No. 2185-705 ELECTRICAL
SHEET No. 1

421 Osborne St.
address
Transit Storage
Shop Facilities

Scanned
project no.
2185-706
sheet no.

Overhaul & Repair Shop Floor Plan – Lighting
description



FOR CONTINUATION SEE DRAWING # 2185-708

FOR CONTINUATION SEE DRAWING # 2185-709

MOUNT LTG. FIXT. IN THIS ROOM ON OUTLET BOXES AT SUSP. CEILING.

MOUNT 20'-0" ABOVE FINISHED FLOOR. OTHER TYPE 'J1' FIXTURES MOUNTED 10'-0" ABOVE FIN. FL.

LIGHTING FIXTURES TYPE 'T' MOUNTED IN MAKE-UP AIR DUCT ABOVE CATWALK

20'×7'×8' HIGH MAKE-UP AIR DUCT CATWALK INSIDE DUCT

LIGHTING FIXTURES SURFACE MOUNTED AT SUSPENDED CEILING IN FOREMEN'S OFFICE

LIGHTING FIXTURES TYPE 'A' MOUNTED 10'-0" ABOVE FIN. FLOOR.

MOUNT THESE TWO FIXTURES 3'-6" BELOW THE UNDERSIDE OF ROOF

LIGHTING FIXTURES TYPE 'A' CEILING MOUNTED IN OIL STORAGE ROOM

NOTE: ELECTRICAL INSTALLATION AND EQUIPMENT FOR WASTE OIL STORAGE TANK VAULT SHALL BE AS REQUIRED BY CANADIAN ELECTRICAL CODE FOR CLASS I GROUP 'D' HAZARDOUS LOCATION.

CONCRETE VAULT FOR WASTE OIL STORAGE TANKS BELOW GRADE

MOUNT TYPE 'A' LIGHTING FIXTURES 14'-0" ABOVE FINISHED FLOOR

STORAGE AREA
UPPER LEVEL

MOUNT TYPE 'A' LIGHTING FIXTURES 14'-0" ABOVE FINISHED FLOOR

STORAGE AREA
UPPER LEVEL

OVERHAUL AND REPAIR SHOP FLOOR PLAN

NOTES:

1. ALL LIGHTING FIXTURES IN MAIN HOIST BAY (HIGH ROOF AREA) SHALL BE TYPE 'K' UNLESS OTHERWISE NOTED. MOUNT BOTTOM OF FIXTURE FLUSH WITH THE BOTTOM FLANGE OF BEAM.
2. ALL LIGHTING FIXTURES IN SHOPS AND STORES (LOW ROOF AREA) SHALL BE TYPE 'L' UNLESS OTHERWISE NOTED. MOUNT BOTTOM OF FIXTURE FLUSH WITH THE BOTTOM FLANGE OF BEAM UNLESS OTHERWISE NOTED.
3. ALL LIGHTING FIXTURES IN PAINT BOOTHS SHALL BE TYPE 'P' UNLESS OTHERWISE NOTED. MOUNT FIXTURES ON OUTLET BOXES AT SUSPENDED CEILING.
4. 1/8" THICK STEEL PLATE (SIZE TO SUIT) MOUNTED 8'-0" ABOVE FINISHED FLOOR FOR MOUNTING OF 73 400 W MERCURY VAPOUR 2-LAMP BALLASTS.
5. ALL 1'×4' FLUORESCENT LIGHTING FIXTURES IN MAIN STORES #R101, TOOL CRIB #R108 AND ELECT. RM. #R109 SHALL BE TYPE 'A' UNLESS OTHERWISE NOTED. MOUNT BOTTOM OF FIXTURE FLUSH WITH THE BOTTOM FLANGE OF BEAM.
6. ALL OUTDOOR LIGHTING FIXTURES TYPE 'J' SHALL BE MOUNTED 10'-0" ABOVE FINISHED GRADE EXCEPT AS NOTED ON ARCHITECTURAL DRAWINGS, AND INDOOR TYPE 'J1' 8'-0" ABOVE FINISHED FLOOR UNLESS OTHERWISE NOTED.

2185-706

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
NOV.6.69			AS BUILT	
JUN·18·69		5	REVISED LIGHTING IN TIRE STORAGE RM. 110.	
FEB.26.1969.	7	4	TILL REP. SHOP AND 6 TYPE 'A' LTG. FIXT. ADDED. 1 TYPE 'L' LTG. FIXT. DELETED.	
FEB.5.1969.	6	3	BATTERY CHARGING ROOM ADDED, RECTIF. RM. AND 1 TYPE 'L' LTG. FIXT. DELETED.	
MAY 21.68	5	2	REVISED AS PER ARCHITECTURAL CHANGES, EXIT LIGHT ADDED IN RM. #R-101.	
MAR.29/68	4	--	ISSUED FOR CONSTRUCTION	
14/2/68	3	1	GENERAL REVISIONS	
JAN.19.68	2		FOR TENDER.	
20/10/67	1	0	FOR APPROVAL.	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

OVERHAUL & REPAIR SHOP FLOOR PLAN – LIGHTING

L. G. JONES

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

APPROVED

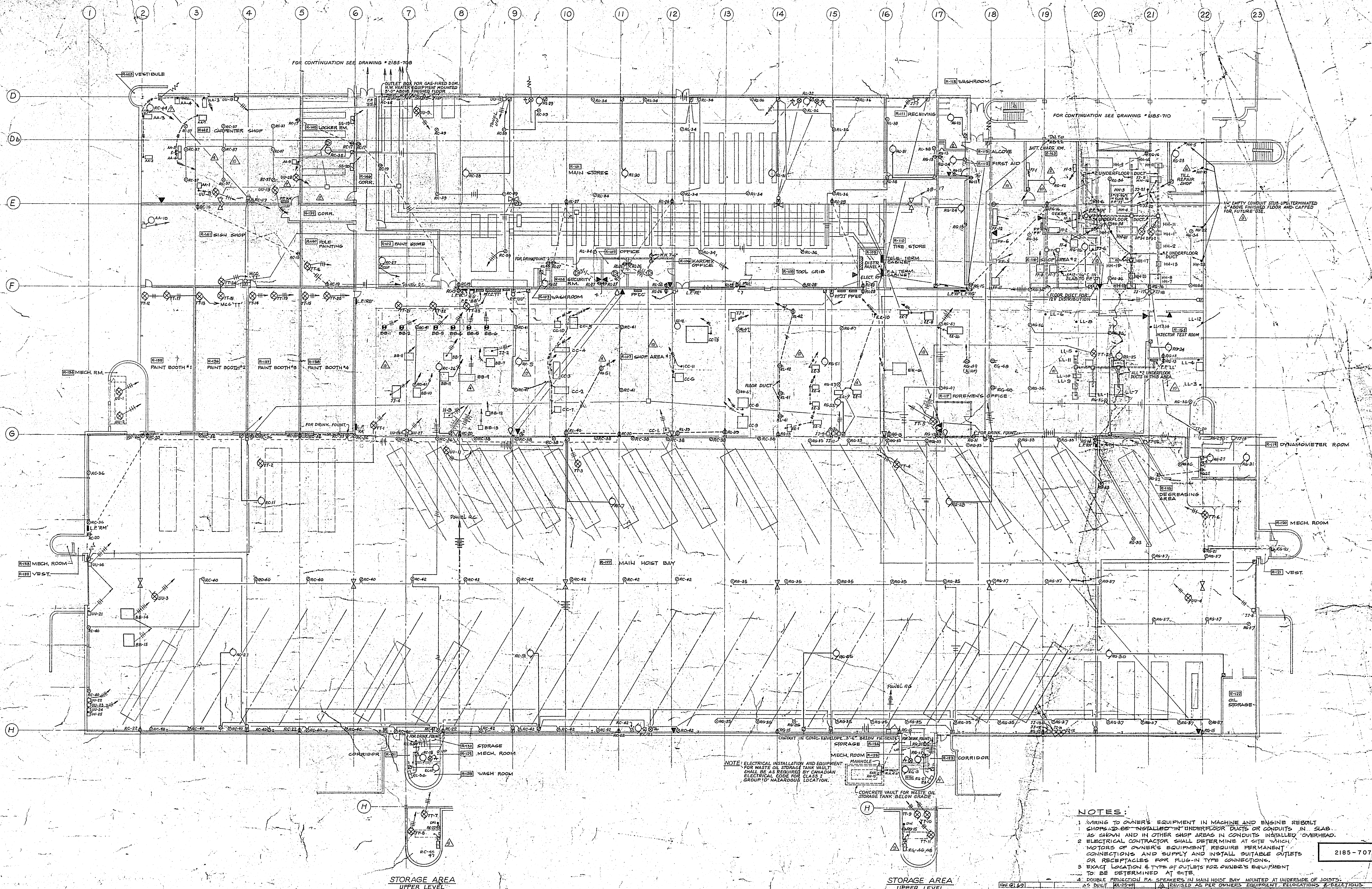
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY R.M.
CHECKED L.G.J.
FILE No.
SHEET No.
DATE 21 JULY 1967
SCALE 1/16"=1'-0"
DRAWING No. 2185-706
ELECTRICAL

421 OSBORNE ST. TRANSIT STORAGE SHOP FACILITIES
address

SCANNED 2185-707
project no. sheet no.

OVERHAUL & REPAIR SHOP FLOOR PLAN –
description
POWER



NOTE: ELECTRICAL INSTALLATION AND EQUIPMENT FOR WASTE OIL STORAGE TANK VAULT SHALL BE AS REQUIRED BY CANADIAN ELECTRICAL CODE FOR CLASS I GROUP 'D' HAZARDOUS LOCATION.

STORAGE AREA
UPPER LEVEL

STORAGE AREA
UPPER LEVEL

OVERHAUL AND REPAIR SHOP FLOOR PLAN SCALE 1/16"=1'-0"

NOTES:

1. WIRING TO OWNER'S EQUIPMENT IN MACHINE AND ENGINE REBUILT SHOPS TO BE INSTALLED IN UNDERFLOOR DUCTS OR CONDUITS IN SLAB AS SHOWN AND IN OTHER SHOP AREAS IN CONDUITS INSTALLED OVERHEAD.
2. ELECTRICAL CONTRACTOR SHALL DETERMINE AT SITE WHICH MOTORS OF OWNER'S EQUIPMENT REQUIRE PERMANENT CONNECTIONS AND SUPPLY AND INSTALL SUITABLE OUTLETS OR RECEPTACLES FOR PLUG-IN TYPE CONNECTIONS.
3. EXACT LOCATION & TYPE OF OUTLETS FOR OWNER'S EQUIPMENT TO BE DETERMINED AT SITE.
4. DOUBLE PROJECTION P.A. SPEAKERS IN MAIN HOIST BAY MOUNTED AT UNDERSIDE OF JOISTS.

2185-707

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
NOV. 6, 69			AS BUILT	
JUL-25-69		10	REVISED AS PER OWNERS EQUIPMENT RELOCATIONS & DELETIONS	
JUNE-17-69		9	RELOCATED HEATERS.	
		8		
MARCH 12.69	10	7	CIRCUITS #UU-28 REVISED, CIRCUIT #RC-44 ADDED.	
FEB.26.69	9	6	TILL REP. SHOP AND UNIT HEATER ADDED, 2 INF. RED HEATER OUTLETS ON CCT. #RG-33 DELETED.	
FEB.17.1969.	8	5	BATTERY CHARG. RM., VENT FAN & CCT. #UU-28 ADDED, OWNER'S EQUIPMENT RELOCATED.	
DEC. 2.68.	7	4	LOCATION OF OWNER'S EQUIPMENT IN SHOPS REVISED.	
OCT. 18.68	6	3	EMPTY CONDUIT STUB-UPS ADDED IN RM. # R-116	
MAY 21.68	5	2	REVISED AS PER ARCHITECTURAL CHANGES.	
MAR 29/68	4		ISSUED FOR CONSTRUCTION	
14/2/68	3	1	GENERAL REVISIONS	
JAN.19.68	2		FOR TENDER.	
20/10/67	1	0	FOR APPROVAL.	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

OVERHAUL & REPAIR SHOP FLOOR PLAN – POWER

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1135 LESLIE STREET, DON MILLS, ONTARIO

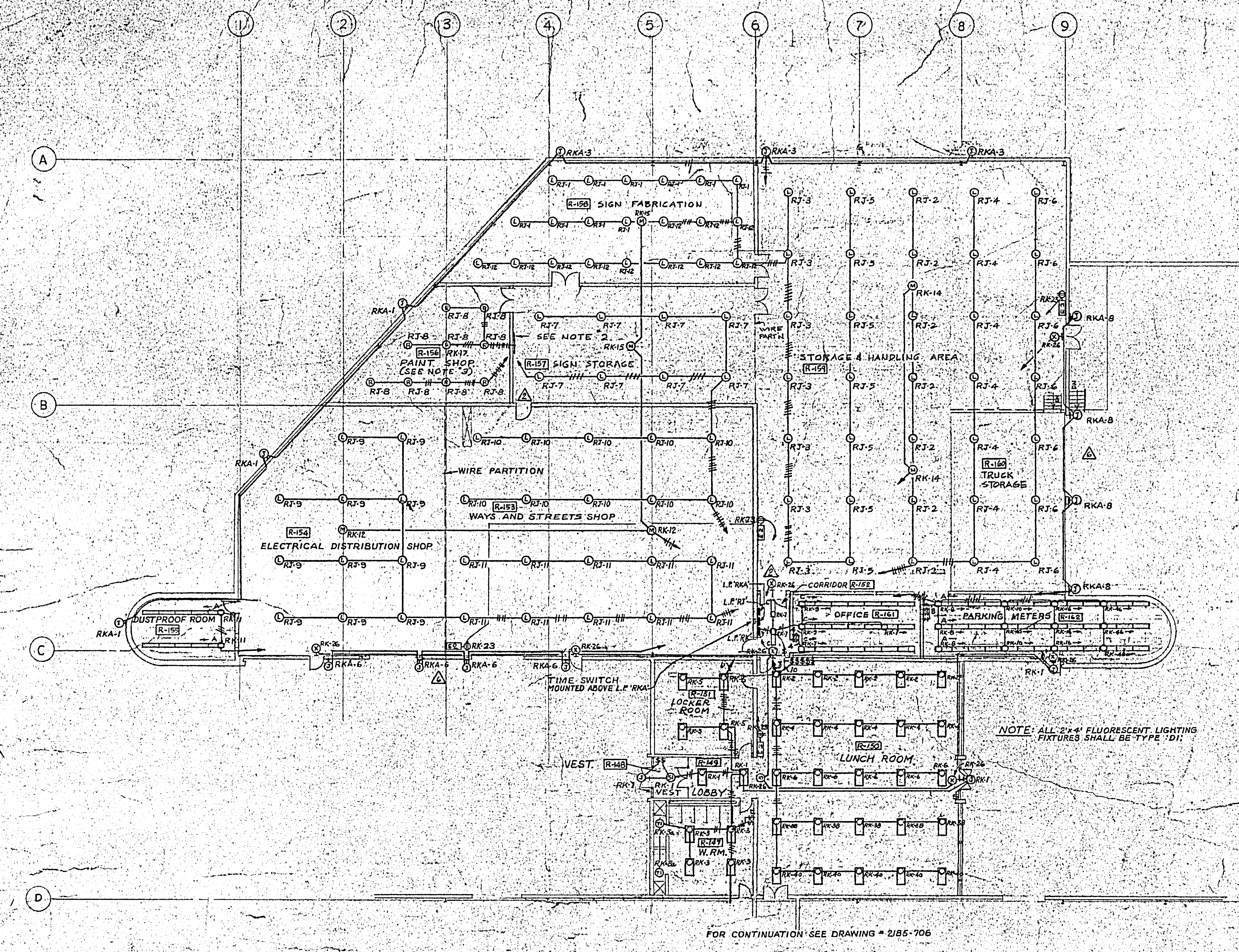
ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

ELECTRICAL
L. G. JONES

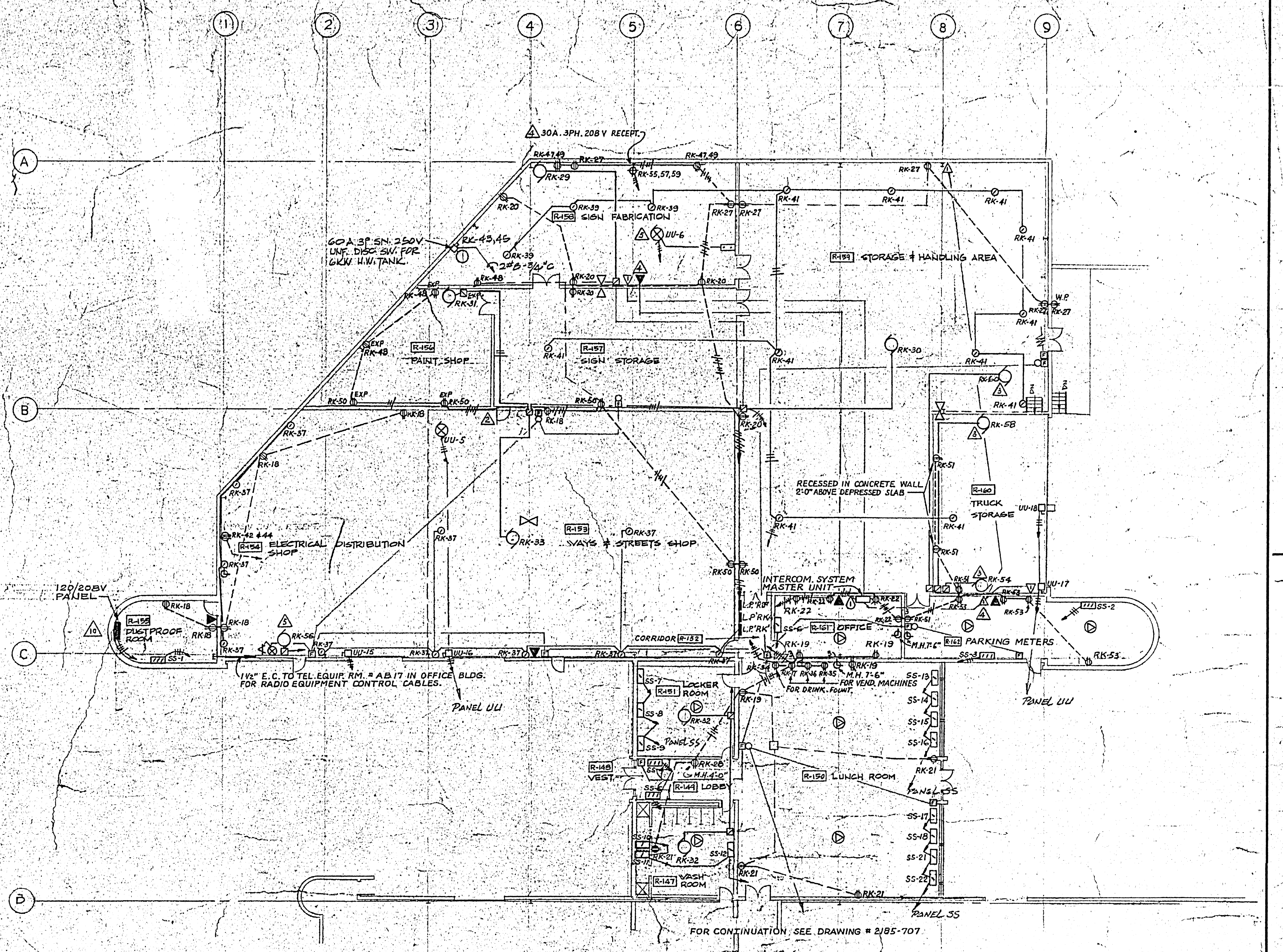
LICENSED TO PRACTISE IN THE PROVINCE OF MANITOBA
My Licence Expires 10 Jan 196

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

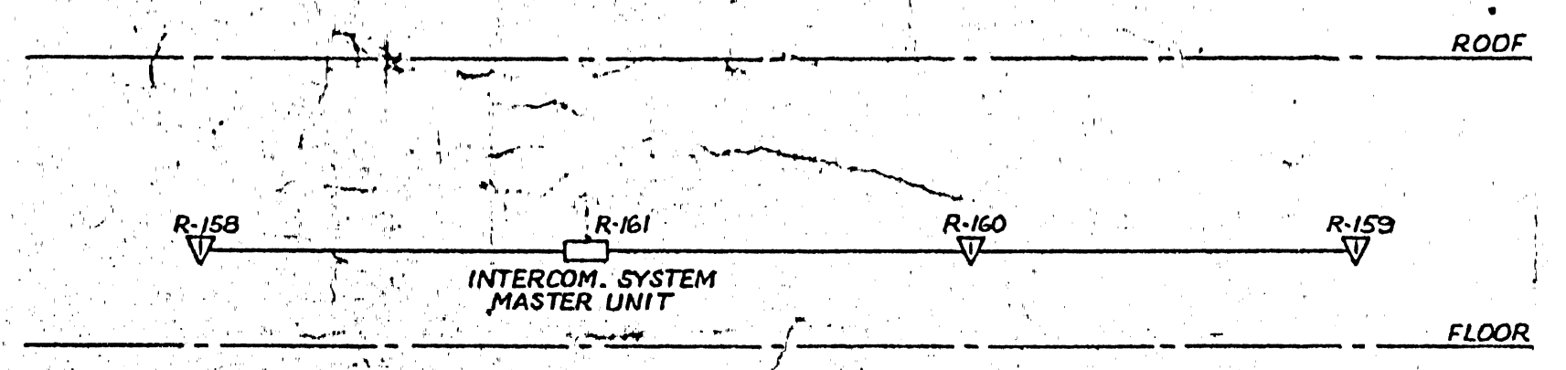
DRAWN BY R.M.
DATE 2 JULY 1967
CHECKED L.G.J.
SCALE 1/16"=1'-0"
FILE No.
SHEET No.
DRAWING No. 2185-707
ELECTRICAL



LIGHTING SCALE 1/16"=1'-0"



POWER SCALE 1/16"=1'-0"

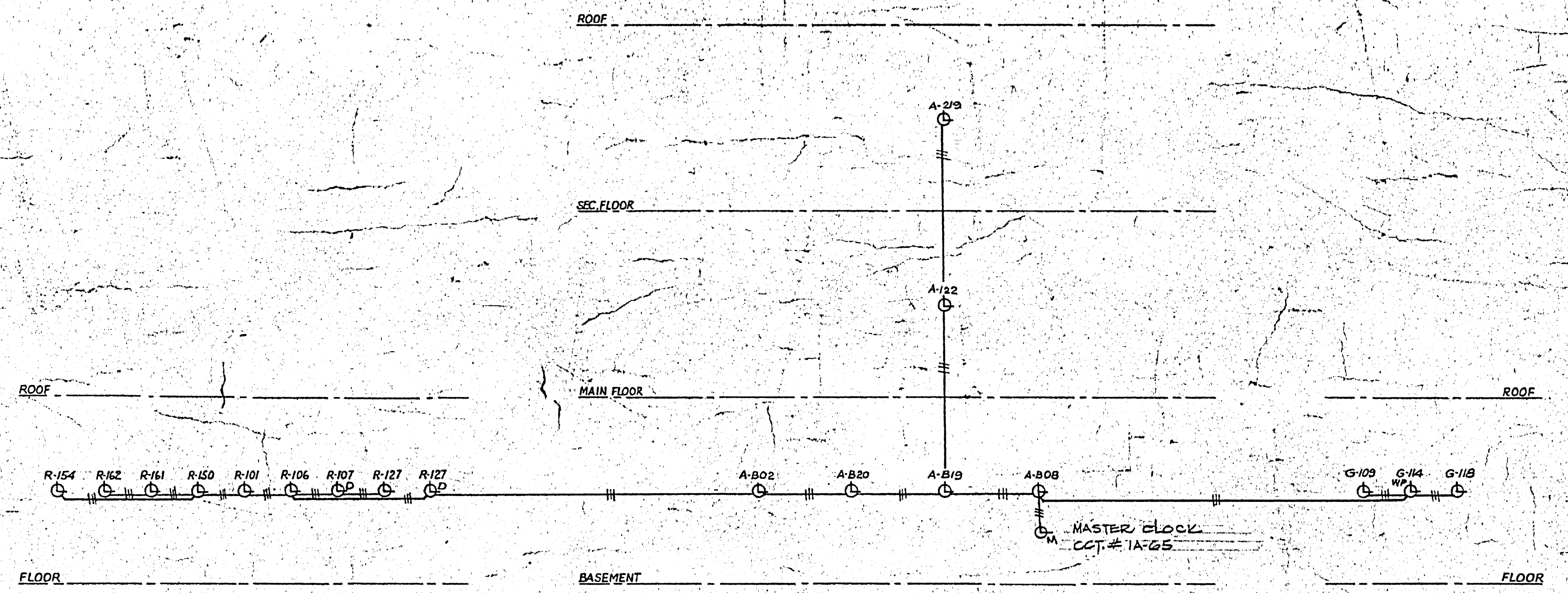


INTERCOM SYST. RISER DIAGRAM
IN WAYS & STREETS FACIL. BLDG.

(N.T.S.)

NOTES:

1. MOUNT BOTTOM OF LIGHTING FIXTURES TYPE 'L' AND 'M' FLUSH WITH THE BOTTOM FLANGE OF BEAM.
2. 1/8" THICK STEEL PLATE (SIZE TO SUIT) MOUNTED 8'-0" ABOVE FINISHED FLOOR FOR MOUNTING OF 4 400 W MERCURY VAPOUR 2-LAMP BALLASTS & 1 SINGLE LAMP BALLAST
3. MOUNT TYPE 'R' LIGHTING FIXTURES IN PAINT SHOP ON OUTLET BOXES ON SUSPENDED CEILING.



CLOCK SYSTEM RISER DIAGRAM

(N.T.S.)

421 OSBORNE ST. TRANSIT STORAGE & SHOP FACILITIES
address
SCANNED
project no. 2185-708 sheet no.
WAYS & STREETS FACILITIES BLDG – LIGHTING & POWER
description

2185-708

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
NOV.6,69			AS BUILT	
JUN.10.69		10	ADDED PANEL AS PER FIELD INSTRUCTION No. 159.	
APR.7.69.	9	6	CIRCUIT NUMBERS CHANGED: #RK-13 TO #RKA-6 AND #RK-24 TO #RKA-8, SWITCHES DELETED.	
FEB.26.69	8	5	ADDED EXCESS PRESS. PUMP IN RM.# R-154 AND EXH. FAN IN RM.# R-158 WITH CONTROL EQUIPMENT.	
OCT.2.'68.	7	4	30A RECEPT. ADDED. TEL. OUTL. RELOC. TO RM.# R-158. TALK-BACK STATION ADDED IN RM.# R-162.	
SEPT.18.68	6	3	MAKE-UP AIR UNITS ON CCTS. #UU-6.7 & 8 DELETED. UNIT HEATERS ADDED ON CCTS. #RK-52, 54 & 56.	
JUNE 10.68.	5	2	IN ROOM #R-159 TYPE 'X' FIXTURE ADDED. IN CORRIDOR #R-152: TYPE 'L' FIXTURE DELETED, 2 TYPE 'C' FIXTURES ADDED. CIRCUITS #RK-1 AND #RK-7 REVISED.	
[illegible]	[illegible]	2	DOOR ADDED AS PER ARCHITECTURAL CHANGES.	
MAR.29/68	4		ISSUED FOR CONSTRUCTION	
14/2/68	3	1	GENERAL REVISIONS	
JAN.19.68	2		FOR TENDER.	
20/10/67	1	0	FOR APPROVAL.	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

WAYS & STREETS FACILITIES BUILDING –
LIGHTING & POWER

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

L. G. JONES

LICENSED TO PRACTICE IN THE PROVINCE OF MANITOBA

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

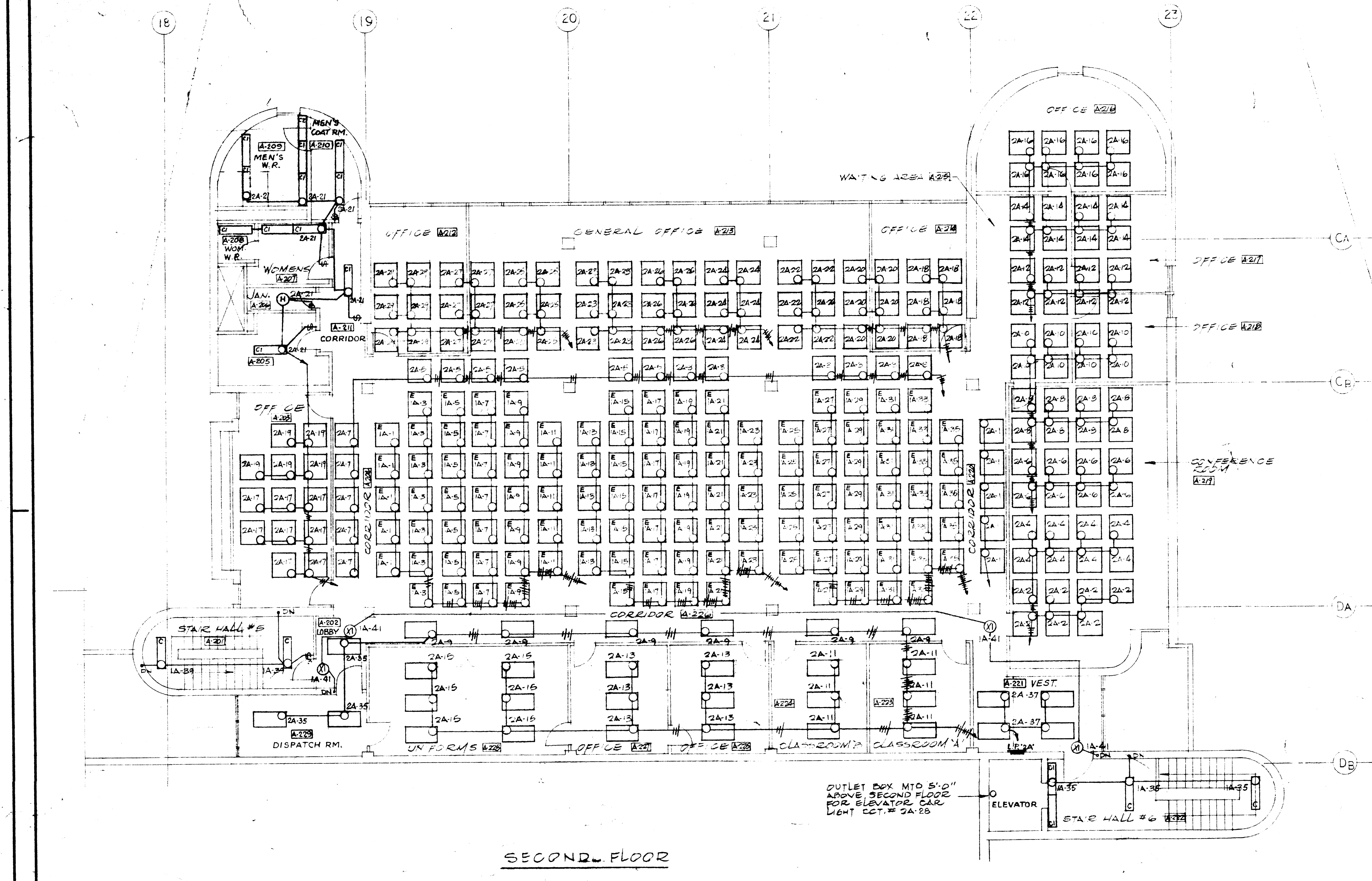
DRAWN BY R.M.
DATE 21 JULY 1967
CHECKED L.G.J.
SCALE AS SHOWN
FILE No.
SHEET No.
DRAWING No. 2185-708
ELECTRICAL

421 Osborne St.
address

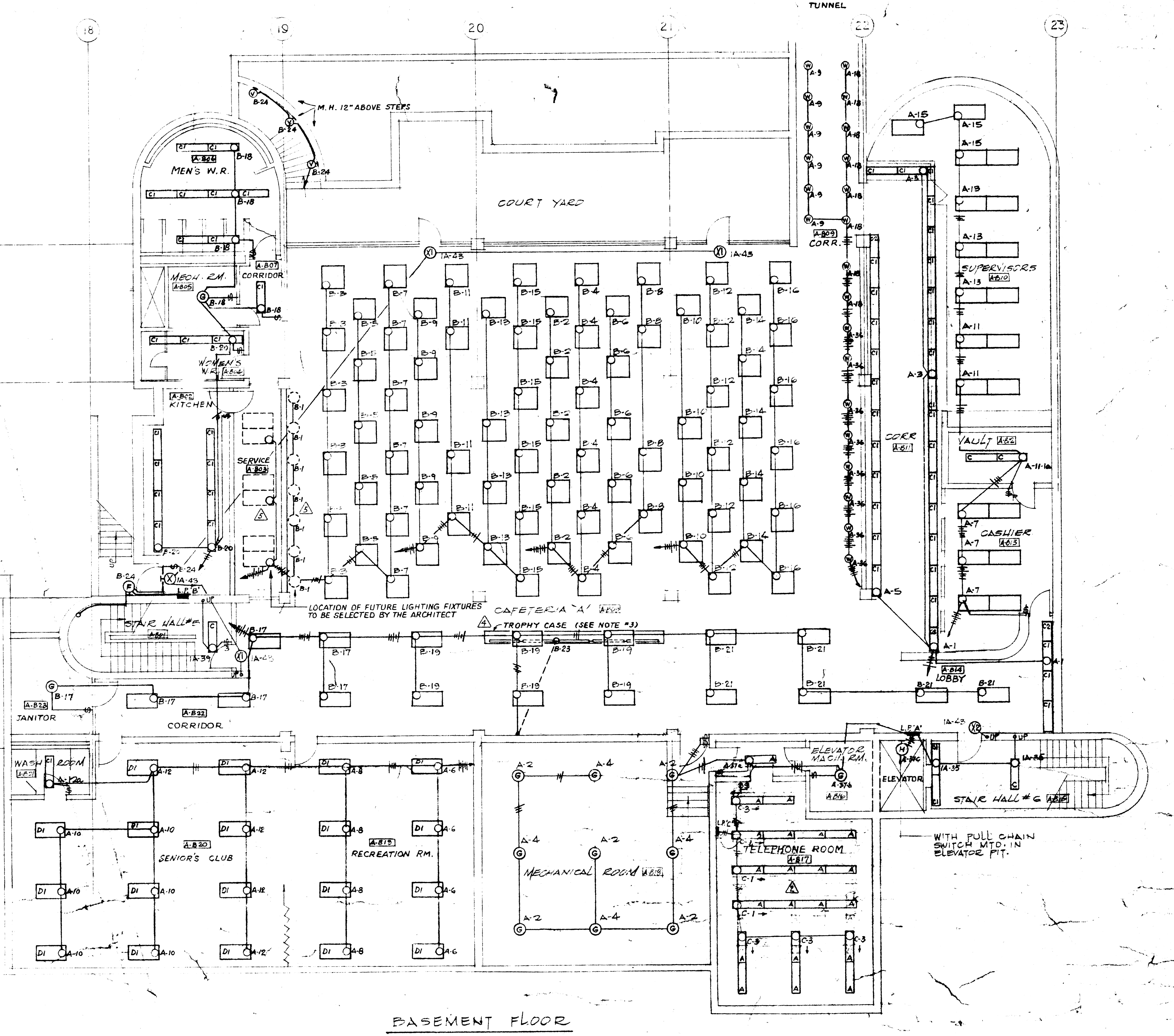
Transit Storage
Shop Facilities
project no.

2185-709
sheet no.

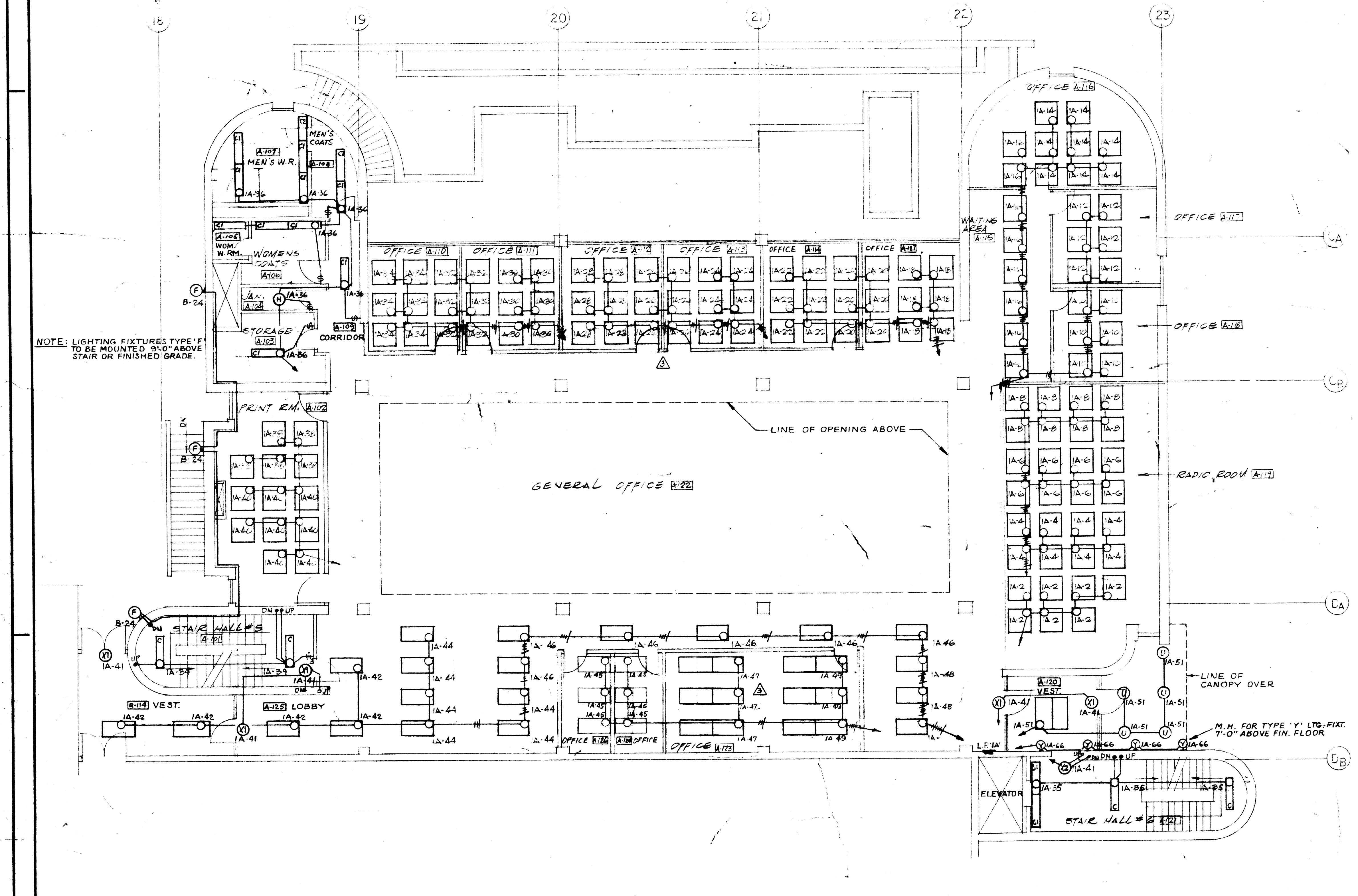
Office Building Plans -
Lighting
description



SECOND FLOOR



BASEMENT FLOOR



MAIN FLOOR

NOTES:

1. ALL 3'-0" x 3'-0" FLUORESCENT LIGHTING FIXTURES SHALL BE TYPE 'E1' UNLESS OTHERWISE NOTED.
2. ALL 2'-0" x 4'-0" FLUORESCENT LIGHTING FIXTURES SHALL BE TYPE 'D' UNLESS OTHERWISE NOTED.
3. (4) LIGHTING FIXTURES IN TROPHY CASE SHALL BE GARCY #4601-P COMPLETE WITH 40W C.W. R.S. LAMPS AND H.P.F. BALLASTS. FOR EXACT LOCATION OF LIGHTING FIXTURES AND REMOTELY MOUNTED BALLASTS IN TROPHY CASE SEE ARCH. DWG. # 2185-219.

2185-709

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
Nov. 6, 69			AS BUILT	
OCT. 24. 68.	8	5	LIGHTING IN ROOMS #A-B03 AND #A-B08 REVISED.	
AUG. 9. 68.	7	4	TROPHY CASE LIGHTING ADDED.	
MAY 21. 68	6	3	REVISED AS PER ARCHITECTURAL CHANGES.	
MAY 9. 68	5	2	TELEPHONE RM. #A-B17 LAYOUT REVISED AS REQUIRED BY M.T.S.	
MAR. 29/68	4		ISSUED FOR CONSTRUCTION	
14/2/68	3	1	GENERAL REVISIONS	
JAN. 19. 68	2		FOR TENDER.	
20/10/67	1	0	FOR APPROVAL.	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

OFFICE BUILDING PLANS - LIGHTING

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

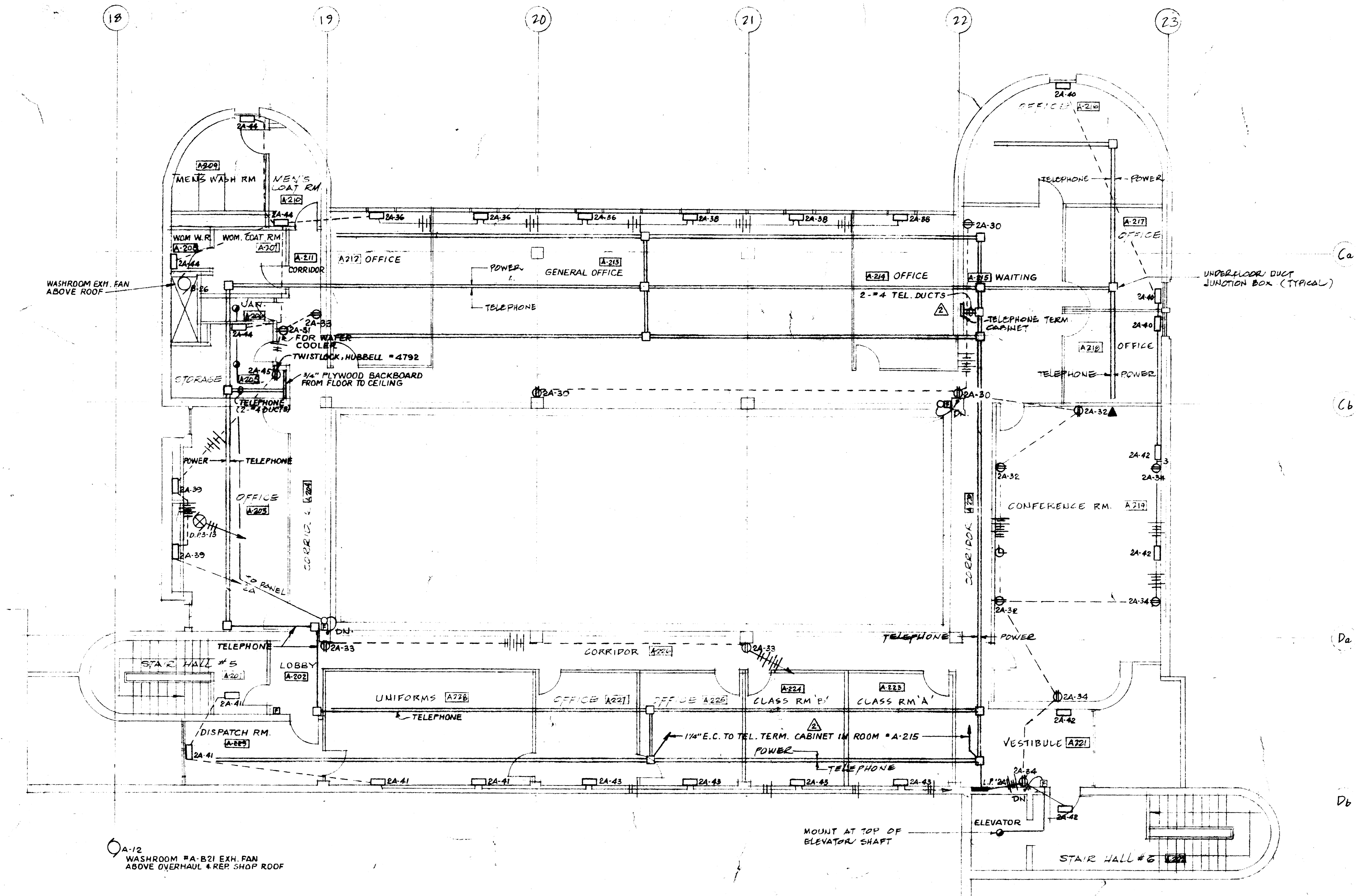
ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

L. G. JONES

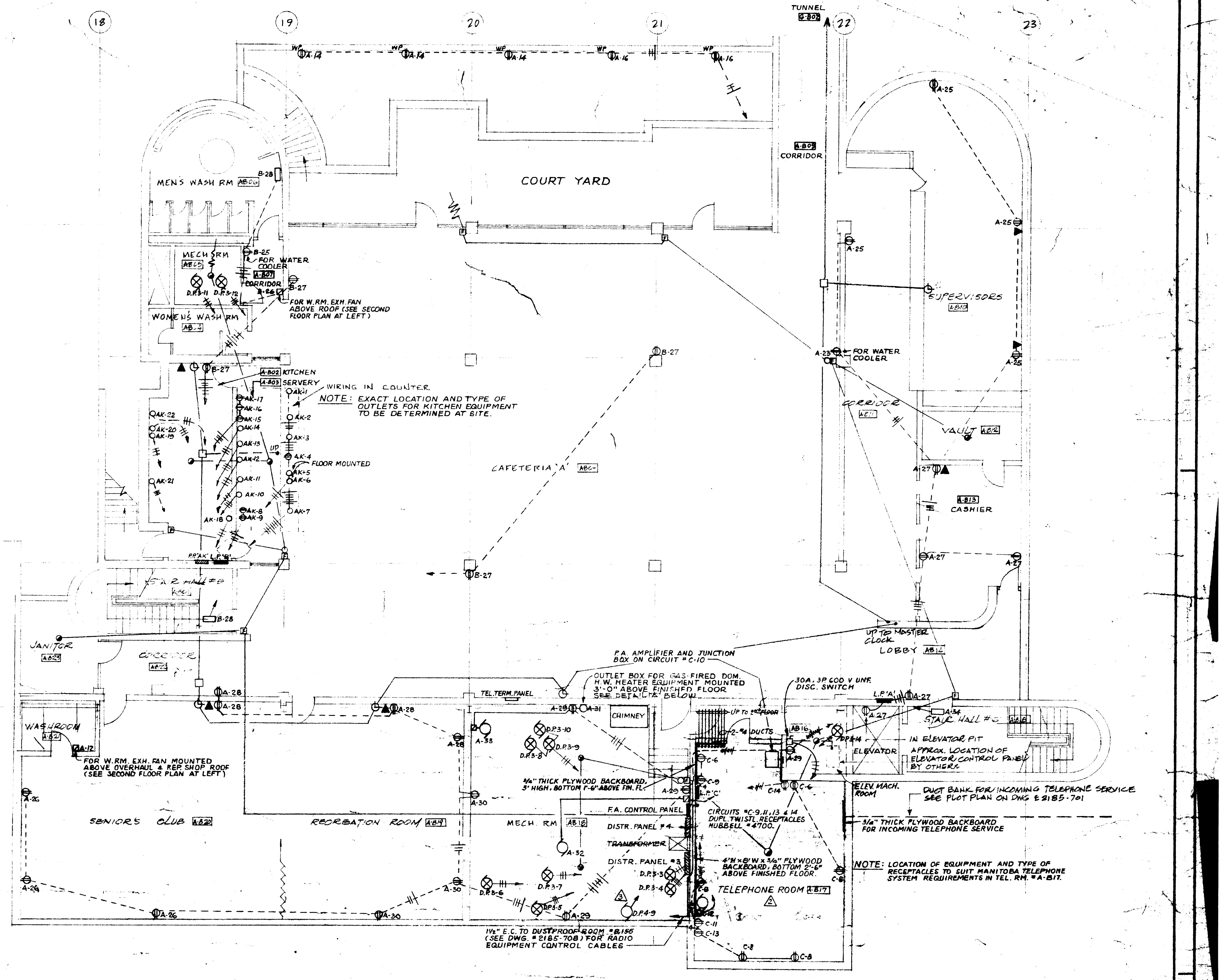
LICENSED TO PRACTICE
IN THE
PROVINCE OF MANITOBA
My Licence Expires: 10 Jan. 1968

APPROVED DEPUTY DIRECTOR OF STREETS AND TRANSIT	DRAWN BY R.L.	DATE 31 July 1967
	CHECKED L.G.J.	SCALE 1/8"=1'-0"
	FILE No.	DRAWING No. 2185-709 ELECTRICAL
	SHEET No.	

421 Osborne St.
address
Transit Storage
Shop Facilities
project no.
2185-710
sheet no.
Office Building Plans -
description
Power & Systems



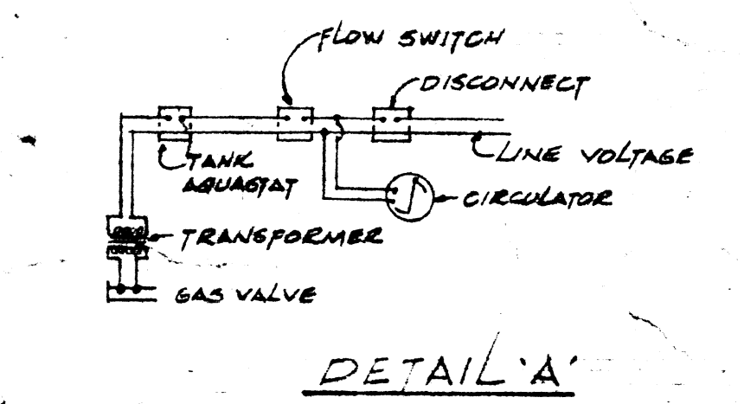
SECOND FLOOR



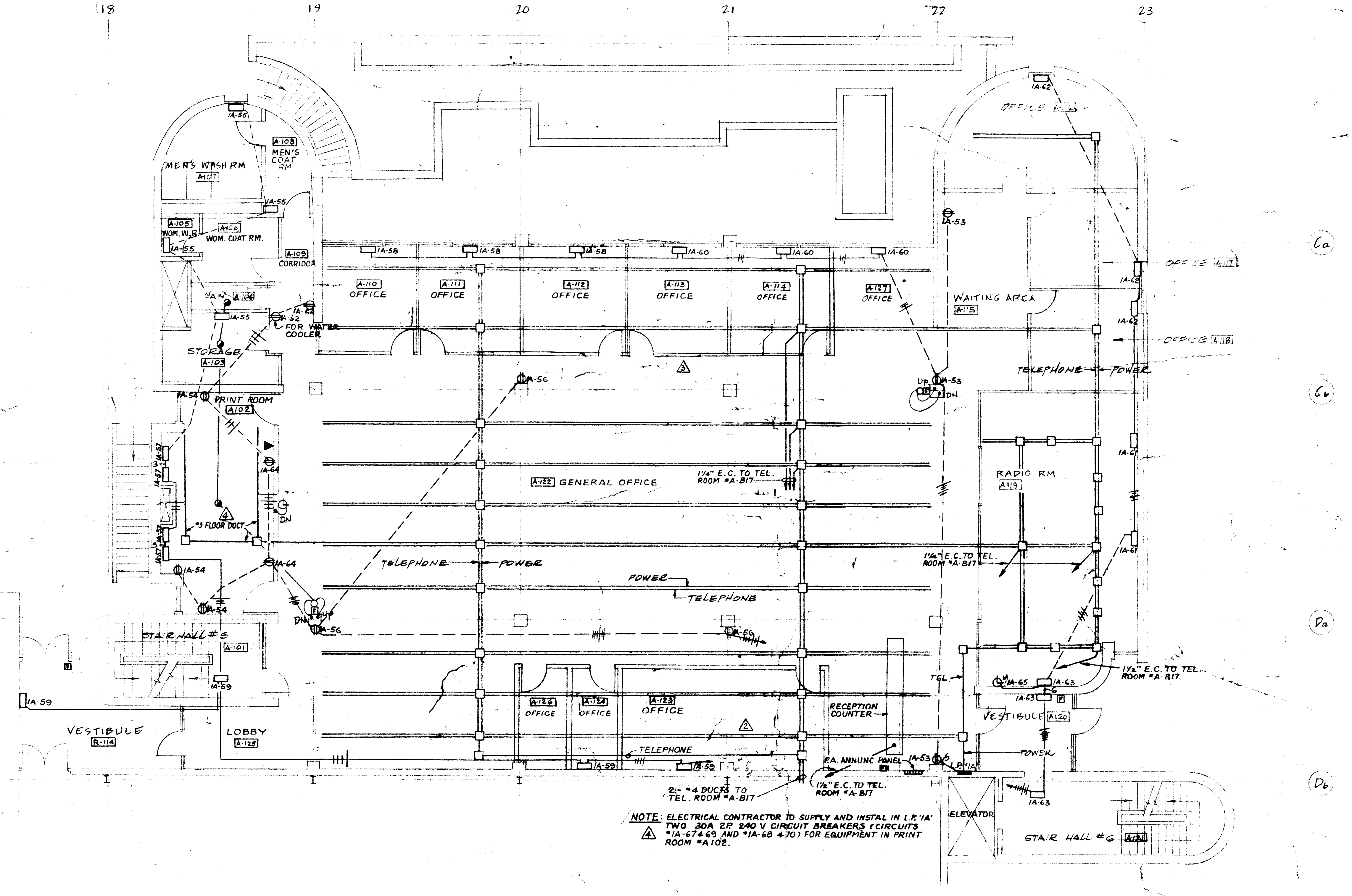
NOTE: EXACT LOCATION AND TYPE OF OUTLETS FOR KITCHEN EQUIPMENT TO BE DETERMINED AT SITE.

NOTE: LOCATION OF EQUIPMENT AND TYPE OF RECEPTACLES TO SUIT MANITOBA TELEPHONE SYSTEM REQUIREMENTS IN TEL. RM. #A-B17.

BASEMENT



DETAIL 'A'
WIRING DIAGRAM FOR HOT WATER HEATERS



NOTE: ELECTRICAL CONTRACTOR TO SUPPLY AND INSTAL IN L.P. '1A' TWO 30A 2P 240 V CIRCUIT BREAKERS (CIRCUITS #1A-67 & 69 AND #1A-68 & 70) FOR EQUIPMENT IN PRINT ROOM #A102.

MAIN FLOOR

NOTES:
1. ALL UNDERFLOOR DUCTS SHALL BE #4 UNLESS OTHERWISE NOTED. UNDERFLOOR DUCT JUNCTION BOXES TO SUIT DUCT REQUIREMENTS.

2185-710

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
NOV. 6, 69			AS BUILT	
APR. 7. 69.	7	4	#3 UNDERFLOOR DUCTS AND JUNCTION BOXES ADDED IN RM. #A102.	
MAY 21, 68	6	3	REVISED AS PER ARCHITECTURAL CHANGES, SUMP PUMP ADDED IN RM. #A-B18.	
MAY 9. 68.	5	2	TELEPHONE SYSTEM RACEWAYS AND TEL. RM. #A-B17 REVISED AS REQUIRED BY M.T.S.	
MAR 29/68	4		ISSUED FOR CONSTRUCTION	
14/2/68	3	1	GENERAL REVISIONS	
JAN. 19. 68	2		FOR TENDER.	
20/10/67	1	0	FOR APPROVAL.	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

OFFICE BUILDING PLANS - POWER & SYSTEMS

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

REGISTERED PROFESSIONAL ENGINEER
ELECTRICAL
L. G. JONES

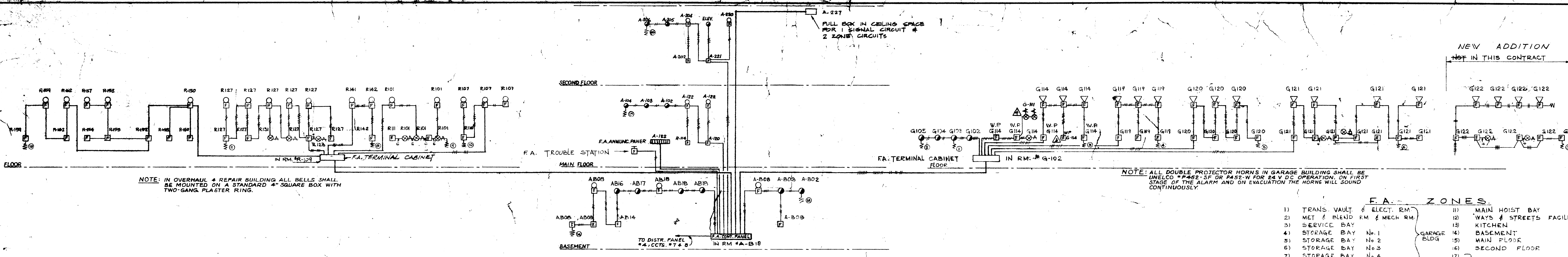
LICENSED TO PRACTICE
IN THE
PROVINCE OF MANITOBA
My Licence Expires: 10 Jan. 1968

APPROVED DEPUTY DIRECTOR OF STREETS AND TRANSIT	DRAWN BY R.M.	DATE 21 July 1967
	CHECKED L.G.J.	SCALE 1/8" = 1'-0"
	FILE No.	DRAWING No. 2185 - 710 ELECTRICAL
	SHEET No.	

421 OSBORNE ST. TRANSIT STORAGE SHOP FACILITIES
address

2185-711
project no. sheet no.

RISER DIAGRAMS
description



NOTE: IN OVERHAUL & REPAIR BUILDING ALL BELLS SHALL BE MOUNTED ON A STANDARD 4" SQUARE BOX WITH TWO-GANG PLASTER RING.

NOTE: ALL WIRING AND CONDUIT ACCORDING TO MANUFACTURER'S REQUIREMENTS.

NOTE: ALL DOUBLE PROJECTOR HORNS IN GARAGE BUILDING SHALL BE UNELCO #P452-SF OR P452-W FOR 24 V DC OPERATION. ON FIRST STAGE OF THE ALARM AND ON EVACUATION THE HORNS WILL SOUND CONTINUOUSLY.

OVERHAUL & REPAIR BUILDING

OFFICE BUILDING

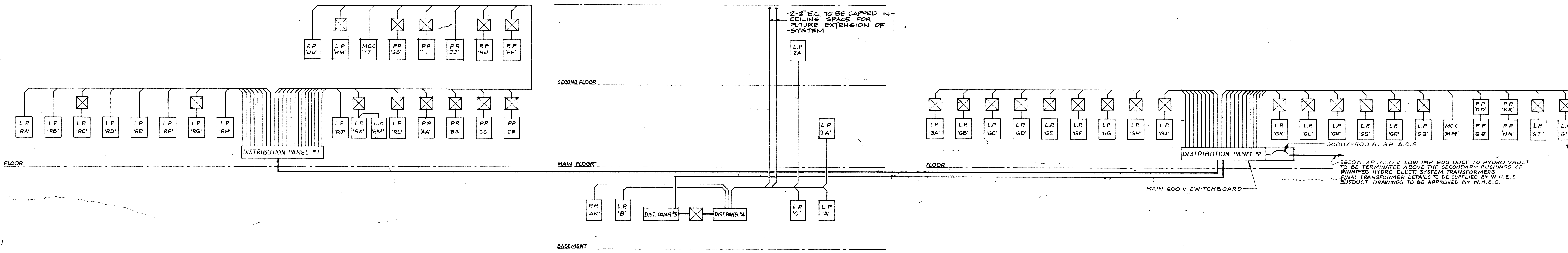
GARAGE BUILDING

F.A. ZONES.

1) TRANS. VAULT & ELECT. RM.
2) MET & BLEND RM & MECH RM.
3) SERVICE BAY
4) STORAGE BAY No. 1
5) STORAGE BAY No. 2
6) STORAGE BAY No. 3
7) STORAGE BAY No. 4
} GARAGE BLDG
8) CARPENTER SHOP
9) MAIN STORES
10) SHOP AREA
} OVERHAUL & REPAIR
11) MAIN HOIST BAY
12) WAYS & STREETS FACILITIES BLDG
} OVERHAUL & REPAIR
13) KITCHEN
14) BASEMENT
15) MAIN FLOOR
16) SECOND FLOOR
} OFFICE BLDG.
17)
18)
19)
20)
} SPACES FOR FUTURE

FIRE ALARM SYSTEM RISER DIAGRAM

N.T.S.



2500A, 3P, 600 V LOW IMP. BUS DUCT TO HYDRO VAULT TO BE TERMINATED ABOVE THE SECONDARY BUSHINGS OF WINNIPEG HYDRO ELECT. SYSTEM. TRANSFORMERS.
FINAL TRANSFORMER DETAILS TO BE SUPPLIED BY W.H.E.S.
BUSDUCT DRAWINGS TO BE APPROVED BY W.H.E.S.

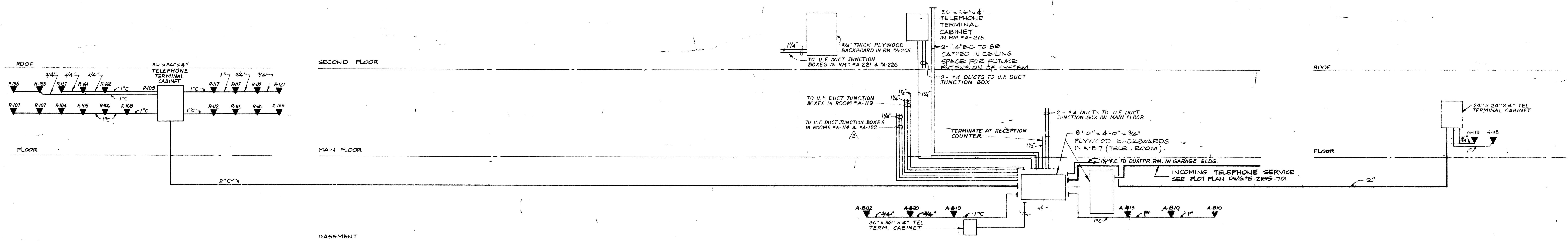
OVERHAUL & REPAIR BUILDING

OFFICE BUILDING

GARAGE BUILDING

MAIN ELECTRICAL RISER DIAGRAM (600V 3PH3W)

N.T.S.



NOTE: FOR TELEPHONE SYSTEM AND RADIO CONTROL WIRING PULL BOXES TO BE INSTALLED:
A) - ENTRANCE SERVICE - IN LENGTHS NOT EXCEEDING 100 FEET AND/OR TWO 90° RADIUS BENDS.
B) - DISTRIBUTION SERVICE - IN LENGTHS NOT EXCEEDING 50 FEET AND/OR TWO 90° RADIUS BENDS.
ALL INSTALLATION TO SUIT MANITOBA TELEPHONE SYSTEM REQUIREMENTS.

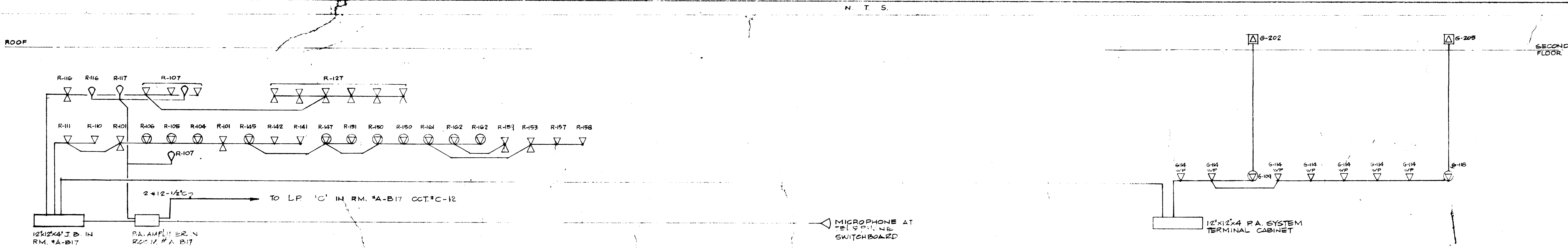
OVERHAUL & REPAIR BUILDING

OFFICE BUILDING

GARAGE BUILDING

TELEPHONE SYSTEM RACEWAY RISER DIAGRAM

N.T.S.



OVERHAUL & REPAIR BUILDING

GARAGE BUILDING

NOTE: ALL WIRING SHALL BE ACCORDING TO MANUFACTURER'S REQUIREMENTS.

P.A. SYSTEM RISER DIAGRAM

N.T.S.

2185-711

APPROVED

NUMBER TEN ARCHITECTURAL GROUP
ARCHITECTS & PLANNERS 210 - 175 HARGRAVE ST. WINNIPEG CANADA R3C 3R9 (204) 942-0981

A. D. MARGISON ASSOCIATES LTD.
CONSULTING PROFESSIONAL ENGINEERS
SUITE 302—1320 YONGE STREET
TORONTO, ONTARIO M4T 1X2

MANITOBA LICENCE REQD.

NOTES: 1. FOR CLOCK SYSTEM RISER DIAGRAM SEE DRAWING #2185-708.
2. FOR INTERCOM. SYSTEM RISER DIAGRAM FOR WAYS & STREETS FACILITIES BUILDING SEE DRAWING #2185-708.
3. FOR INTERCOM. SYSTEM RISER DIAGRAM FOR GARAGE BUILDING SEE DRAWING #2185-705.

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
MAR/79			REVISE WIRING OF FIREALARM SYSTEM - BAY #4, NEW ADD.	
MAY 9.77	9	5	GARAGE ADDITION - FOR TENDER	
NOV 6, '69	8		AS BUILT	
OCT. 18. 68	7	4	SPRINKLER SYSTEM FLOW SWITCHES AND GATE VALVES ADDED TO F.A. SYST. RISER DIAGRAM	
MAY 21. 68	6	3	F.A. STATION ADDED IN RM. #G-114.	
MAY 9. 68	5	2	TEL. SYST. RACEWAY RISER DIAGRAM REVISED AS REQUIRED BY M.T.S.	
MAR. 29/68	4		ISSUED FOR CONSTRUCTION	
14/2/68	3	1	GENERAL REVISIONS	
JAN. 19. 68	2		FOR TENDER.	
20/10/67	1	0	FOR APPROVAL.	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

RISER DIAGRAMS

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY P.T. R.M.
DATE 21 JULY 1967
CHECKED LGJ
SCALE N.T.S.
FILE No.
SHEET No.
DRAWING No. 2185-711
ELECTRICAL

421 OSBORNE ST.
address

TRANSIT STORAGE SHOP FACILITIES
project

2185-712
project no.

PANEL SCHEDULES I
description

P.P. 'AA' (IN CARPENTERS SHOP)
120/208V, 3PH, 4W.

1	20A 3P 'EA'	3 #12 - 1/2" C	SPACE
2	20A 3P 'EA'	3 #12 - 1/2" C	SHAPER
3	40A 3P 'EA'	3 #12 - 1/2" C	5HP PLANER
4	40A 1P 'EA'	3 # 8 - 3/4" C	DEWALT SAW
5	40A 2P 'EA'	2 #12 - 1/2" C	HOT WATER HEATER
6	20A 2P 'EA'	2 #12 - 1/2" C	JOINTER
7	15A 1P 'EA'	2 #12 - 1/2" C	TABLE SAW
8	20A 1P 'EA'	2 #12 - 1/2" C	PLUG
9	15A 1P 'EA'	2 #12 - 1/2" C	JIG SAW
10	40A 2P 'EA'	2-#8 3/4" C	SPACE
11	15A 1P 'EA'		BAND SAW
12	15A 1P 'EA'		COR-A-VAC SAW
13	3P 'EA'		SPACE
14	3P 'EA'		SPACE

P.P. 'BB' (IN WELDING SHOP)
120/208V. 3PH, 4W.

1	100A 3P 'EA'	3 #2 - 1 1/4" C	
2	70A 3P 'EA'	3 #2 - 1 1/4" C	
3	30A 3P 'EA'	3 #2 - 1 1/4" C	
4	70A 3P 'EA'	3 #2 - 1 1/4" C	
5	50A 3P 'EA'	3 #2 - 1 1/4" C	
6	15A 1P 'EA'	3 #2 - 1 1/4" C	POWER HOOKSAW
7	50A 3P 'EA'	3 #10 - 3/4" C	SAW
8	15A 1P 'EA'		FORGE BLOWER
9	50A 3P 'EA'	3 #10 - 3/4" C	7 1/2HP HYDRAULIC PRESS
10	20A 1P 'EA'	2 #8 - 3/4" C	FORGE BLOWER
11	30A 2P 'EA'	2 #12 - 1/2" C	DRILL PRESS
12	15A 1P 'EA'	2 #12 - 1/2" C	SPARE
13	A 1P 'EA'		SPACE
14	15A 3P 'EA'	3 #12 - 1/2" C	SPARE
15	A 3P 'EA'	3 #12 - 1/2" C	SPACE
16-20	3P 'EA'		SPACES

P.P. 'CC' (IN SHEET METAL SHOP)
120/208V, 3PH, 4W.

1	15A 3P 'EA'	3 #12 - 1/2" C	GRINDER
2	50A 2P 'EA'	3 #12 - 1/2" C	SPOT WELDER
3	70A 3P 'JA'	2 #2/0 - 2" C	MONSTER
4	20A 1P 'EA'	2 #6 - 1" C	WATER HEATER
5	1P 'EA'		SPACE
6	15A 1P 'EA'	2 #12 - 1 1/2" C	1/4 HP METAL ROLLER
7	20A 1P 'EA'	2 #12 - 1/2" C	BEAD MACHINE
8	2P 'EA'		SPACE
9	2P 'EA'		SPACE
10	1P 'EA'		SPACE
11	15A 1P 'EA'		GRINDER
12	P 'EA'		SPACE
13	15A 1P 'EA'		GRINDER
14	2P 'EA'		SPACE
15	200A 3P 'EA'		SPOT WELDER
16	1P 'EA'		SPACE

P.P. 'DD' (IN STORAGE BAY #1)
550V, 3PH, 3W.

1	15A 3P 'FA' WP	3 #12 - 1/2" C	30A. 3PH, 600V. UNF. DISC. SWITCHS 1 1/2 HP O/H DOOR MOTOR
2	15A 3P 'FA' WP	3 #12 - 1/2" C	"
3	15A 3P 'FA'	3 #12 - 1/2" C	"
4	15A 3P 'FA'	3 #12 - 1/2" C	"
5	15A 3P 'FA'	3 #12 - 1/2" C	"
6	15A 3P 'FA'	3 #12 - 1/2" C	"
7	15A 3P 'FA'	3 #12 - 1/2" C	"
8	15A 3P 'FA'	3 #12 - 1/2" C	"
9	15A 3P 'FA'	3 #12 - 1/2" C	"
10	15A 3P 'FA'	3 #12 - 1/2" C	"
11	15A 3P 'FA'	3 #12 - 1/2" C	"
12	40A 3P 'FA'	3 #10 - 3/4" C	15 HP MAKE-UP AIR UNIT
13	20A 3P 'FA'	3 #12 - 1/2" C	5HP & 1/2HP " "
14	15A 3P 'FA'	3 #12 - 1/2" C	3HP & 1/3HP " "
15	15A 3P 'FA'	3 #12 - 1/2" C	3HP & 1/3HP " "
16	20A 3P 'FA'	3 #12 - 1/2" C	5HP & 1/2HP " "
17	50A 3P 'FA'	3 #6 - 1" C	PP'QQ'
18	3P 'FA'		SPACE
19	3P 'FA'		SPACE
20	3P 'FA'		SPACE
21	3P 'FA'		SPACE
22	3P 'FA'		SPACE

P.P. 'EE' (IN AISLE OPPOSITE RADIATOR ROOM)
120/208V. 3PH. 4W

1	90A 3P 'EA'	2 #12 - 1/2" C	MICROSIPING MACHINE
2	15A 1P 'EA'	2 #12 - 1/2" C	PLUG
3	15A 1P 'EA'	2 #12 - 1/2" C	PLUG
4	20A 1P 'EA'	2 #12 - 1/2" C	PLUG
5	15A 1P 'EA'	2 #12 - 1/2" C	PLUG
6	20A 1P 'EA'	3 #8 - 3/4" C	SEWING MACHINE
7	15A 1P 'EA'	2 #12 - 1/2" C	SEWING MACHINE
8	15A 1P 'EA'	2 #12 - 1/2" C	BAND SAW
9	20A 2P 'EA'	2 #12 - 1/2" C	TIRE CHANGER
10	15A 1P 'EA'	2 #12 - 1/2" C	SEWING MACHINE
11	1P 'EA'		SPACE
12	15A 1P 'EA'		SEWING MACHINE
13	2P 'EA'		SPACE
14	15A 1P 'EA'		JIG SAW
15	1P 'EA'		SPACE
16	30A 2P 'EA'		SAW FILE

P.P. 'FF' (IN ELECTRICAL SHOP)
120/208V. 3PH. 4W.

1	20A 3P 'EA'	3 #12 - 1/2" C	GRINDER
2	100A 3P 'EA'	3 #6 - 1" C	15HP GENERATOR TEST
3	15A 2P 'EA'	3 #12 - 1/2" C	GLASS BEAD CLEANER
4	40A 3P 'EA'	3 #8 - 3/4" C	SPARE
5	15A 1P 'EA'	2 #12 - 1/2" C	PLUG
6	15A 1P 'EA'	2 #12 - 1/2" C	PLUG
7	20A 1P 'EA'	2 #12 - 1/2" C	1/2HP SPEEDO TESTER
8	15A 1P 'EA'	2 #12 - 1/2" C	PLUG
9	3P 'EA'		SPACE
10	15A 1P 'EA'		PLUG
11	1P 'EA'		SPACE
12	15A 1P 'EA'		DRILL PRESS

P.P. 'HH' (IN MACHINE SHOP)
120/208V. 3PH. 4W.

1	40A 3P 'EA'	3 #12 - 1/2" C	LATHE
2	40A 3P 'EA'	3 #12 - 1/2" C	BATTERY CHARGER
3	40A 3P 'EA'	3 #12 - 1/2" C	3 HP LATHE
4	30A 3P 'EA'	3 #12 - 1/2" C	5 HP LATHE
5	20A 3P 'EA'	3/4" E.C.	LATHE
6	30A 3P 'EA'	3 #12 - 1/2" C	GRINDER
7	15A 3P 'EA'	3 #12 - 1/2" C	LATHE
8	30A 2P 'EA'	2 #12 - 1/2" C	LATHE
9	15A 3P 'EA'	3 #12 - 1/2" C	5 HP LATHE
10	15A 3P 'EA'	3/4" E.C.	FOR FUTURE USE
11	A 3P 'EA'		SPARE
12	15A 1P 'EA'	2 #12 - 1/2" C	1/3 HP DRILL PRESS
13	15A 1P 'EA'	2 #12 - 1/2" C	FLOOR PLUG
14	15A 2P 'EA'		GRINDER
15	15A 1P 'EA'	2 #12 - 1/2" C	GRINDER
16	20A 1P 'EA'	2 #12 - 1/2" C	DRILL PRESS
17	15A 1P 'EA'	2 #12 - 1/2" C	1/4 HP DRILL PRESS
18	30A 1P 'EA'	2 #12 - 1/2" C	FLOOR PLUG
19	15A 1P 'EA'	2 #12 - 1/2" C	1/4 HP LATHE
20	15A 1P 'EA'	2 #12 - 1/2" C	HACK SAW
21	40A 1P 'EA'	2 #12 - 1/2" C	1 HP LATHE (FUTURE)
22	15A 1P 'EA'	3/4" E.C.	DRILL PRESS
23	15A 3P 'EA'	3/4" E.C.	FOR FUTURE USE
24	15A 3P 'EA'		MILLING MACHINE

P.P. 'JJ' (IN AISLE OPPOSITE RADIATOR ROOM)
550V, 3PH., 3W.

1	90A 3P 'FA'	3 #8 - 3/4" C	SHEAR
2	30A 3P 'FA'	3 #12 - 1/2" C	10 HP 12×6 HAMMER
3	30A 3P 'FA'	3 #12 - 1/2" C	10 HP GRINDER
4	50A 3P 'FA'	3 #10 - 3/4" C	LATHE
5	30A 3P 'FA'	3 #12 - 1/2" C	BUS HOIST
6	15A 3P 'FA'	3 #12 - 1/2" C	2 1/2, 2 & 1/3 HP RADIAL DRILL
7	30A 3P 'FA'	3 #12 - 1/2" C	BUS HOIST
8	A 3P 'FA'	3 #12 - 1/2" C	BUS HOIST
9	30A 3P 'FA'	3 #12 - 1/2" C	7 1/2 HP BUS HOIST
10	30A 3P 'FA'	3 #12 - 1/2" C	7 1/2 HP " "
11	30A 3P 'FA'	3 #12 - 1/2" C	7 1/2 HP " "
12	30A 3P 'FA'	3 #12 - 1/2" C	7 1/2 HP " "
13	15A 3P 'FA'	3 #12 - 1/2" C	DOOR
14	15A 3P 'FA'	3 #12 - 1/2" C	CRANE
15	15A 3P 'FA'	3 #12 - 1/2" C	CRANE
16	15A 3P 'FA'	3 #12 - 1/2" C	CRANE
17	30A 3P 'FA'	3 #12 - 1/2" C	BUS HOIST
18	15A 3P 'FA'	3 #12 - 1/2" C	2, 1/2 & 1/3 HP CRANE
19	15A 3P 'FA'	3 #12 - 1/2" C	GRINDER
20	15A 3P 'FA'	3 #12 - 1/2" C	DOOR
21	15A 3P 'FA'	3/4" E.C.	FOR FUTURE USE
22	15A 3P 'FA'	3/4" E.C.	FOR FUTURE USE
23-28	3P 'FA'		SPACES

P.P. 'KK' (IN STORAGE BAY #1)
550V, 3PH, 3W.

1	15A 3P 'FA' WP	3 #12 - 1/2" C	30A 3PH/600V. UNF. DISC. SWITCHS 1 1/2 HP O/H DOOR MOTOR
2	15A 3P 'FA' WP	3 #12 - 1/2" C	"
3	15A 3P 'FA'	3 #12 - 1/2" C	"
4	15A 3P 'FA'	3 #12 - 1/2" C	"
5	15A 3P 'FA'	3 #12 - 1/2" C	"
6	15A 3P 'FA'	3 #12 - 1/2" C	"
7	15A 3P 'FA'	3 #12 - 1/2" C	"
8	15A 3P 'FA'	3 #12 - 1/2" C	"
9	15A 3P 'FA'	3 #12 - 1/2" C	"
10	15A 3P 'FA'	3 #12 - 1/2" C	"
11	15A 3P 'FA'	3 #12 - 1/2" C	"
12	40A 3P 'FA'	3 #10 - 3/4" C	15 HP MAKE-UP AIR UNIT
13	20A 3P 'FA'	3 #12 - 1/2" C	5HP & 1/2HP " "
14	20A 3P 'FA'	3 #12 - 1/2" C	5HP & 1/3HP " "
15	20A 3P 'FA'	3 #12 - 1/2" C	5HP & 1/3HP " "
16	20A 3P 'FA'	3 #12 - 1/2" C	5HP & 1/2HP " "
17	20A 3P 'FA'	3 #12 - 1/2" C	5HP & 1/2HP " "
18	20A 3P 'FA'	3 #12 - 1/2" C	5HP & 1/2HP " "
19	70A 3P 'FA'	3 #4 - 1 1/4" C	PP'NN'
20	15A 3P. 'FA'	3 #12-1/2"C	30A. 3P. 600V UNF. DISC. SW. — 2 #12-1/2"C — 1.5 — 3 #12-1/2"C — 3/4 HP GASOLINE PUMP 1.5 KVA. 600-120/240V 1PH. 3W. DRY TYPE TRANSF.
21	3P 'FA'		SPACE
22	3P 'FA'		SPACE
23	3P 'FA'		SPACE
24	3P 'FA'		SPACE

P.P. 'LL' (IN ENGINE REBUILT SHOP)
120/208V. 3PH. 4W

1	20A 3P 'EA'	3 #12 - 1/2" C	COLIMESTER
2	20A 3P 'EA'		PRESS
3	20A 1P 'EA'		SPARE
4	20A 2P 'EA'	2 #12 - 1/2" C	SPARE
5	20A 1P 'EA'	2 #12 - 1/2" C	DRILL PRESS
6	15A 1P 'EA'	2 #12 - 1/2" C	PLUG
7	15A 1P 'EA'	2 #12 - 1/2" C	1/4HP BORING MACHINE
8	15A 1P 'EA'	2 #12 - 1/2" C	GRINDER
9	15A 1P 'EA'	2 #12 - 1/2" C	LATHE
10	15A 1P 'EA'		HONING MACHINE
11	15A 1P 'EA'	2 #12 - 1/2" C	VALVE GRINDER
12	15A 3P 'EA'		SURFACE MASTER
13	15A 1P 'EA'		SPACE
14	1P 'EA'		SPACE
15	1P 'EA'		SPACE
16	1P 'EA'		SPACE

P.P. 'NN' (IN STORAGE BAY #3)
550V. 3PH. 3W.

1	15A 3P 'FA'	3 #12 - 1/2" C	30A, 3PH, 600V. UNF. DISC. SWITCHES 1 1/2 HP O/H DOOR MOTOR	
2	15A 3P 'FA'	3 #12 - 1/2" C	"	
3	15A 3P 'FA'	3 #12 - 1/2" C	"	
4	15A 3P 'FA'	3 #12 - 1/2" C	"	
5	15A 3P 'FA'	3 #12 - 1/2" C	"	
6	15A 3P 'FA'	3 #12 - 1/2" C	"	
7	15A 3P 'FA'	3 #12 - 1/2" C	"	N.I.C.
8	15A 3P 'FA'	3 #12 - 1/2" C	"	N.I.C.
9	15A 3P 'FA'	3 #12 - 1/2" C	"	N.I.C.
10	15A 3P 'FA'	3 #12 - 1/2" C	"	N.I.C.
11	15A 3P 'FA'	3 #12 - 1/2" C	"	N.I.C.
12	15A 3P 'FA'	3 #12 - 1/2" C	"	N.I.C.
13	20A 3P 'FA'	3 #12 - 1/2" C	5HP & 1/3HP MAKE-UP AIR UNIT	
14	20A 3P 'FA'	3 #12 - 1/2" C	" "	
15	20A 3P 'FA'	3 #12 - 1/2" C	" "	N.I.C.
16	20A 3P 'FA'	3 #12 - 1/2" C	" "	N.I.C.
17	20A 3P 'FA'	3 #12 - 1/2" C	5HP & 1/2HP "	
18	20A 3P 'FA'	3 #12 - 1/2" C	" "	N.I.C.
19	20A 3P 'FA'	3 #12 - 1/2" C	" "	N.I.C.
20	20A 3P 'FA'	3 #12 - 1/2" C	5HP & 1/3HP "	
21	3P 'FA'		SPACE	
22	3P 'FA'		SPACE	
23	3P 'FA'		SPACE	
24	3P 'FA'		SPACE	

GARAGE ADDITION

P.P. 'QQ' (IN STORAGE BAY #3)
550V. 3PH. 3W.

1	15A 3P 'FA'	3 #12 - 1/2" C	30A. 3PH. 600V. UNF. DISC. SWITCH 1 1/2 HP O/H DOOR MOTOR'	
2	15A 3P 'FA'	3 #12 - 1/2" C	"	
3	15A 3P 'FA'	3 #12 - 1/2" C	"	
4	15A 3P 'FA'	3 #12 - 1/2" C	"	
5	15A 3P 'FA'	3 #12 - 1/2" C	"	
6	15A 3P 'FA'	3 #12 - 1/2" C	"	
7	15A 3P 'FA'	3 #12 - 1/2" C	"	N.I.C.
8	15A 3P 'FA'	3 #12 - 1/2" C	"	N.I.C.
9	15A 3P 'FA'	3 #12 - 1/2" C	"	N.I.C.
10	15A 3P 'FA'	3 #12 - 1/2" C	"	N.I.C.
11	15A 3P 'FA'	3 #12 - 1/2" C	"	N.I.C.
12	15A 3P 'FA'	3 #12 - 1/2" C	"	N.I.C.
13	20A 3P 'FA'	3 #12 - 1/2" C	5HP & 1/2HP MAKE-UP AIR UNIT	
14	20A 3P 'FA'	3 #12 - 1/2" C	"	N.I.C.
15	20A 3P 'FA'	3 #12 - 1/2" C	"	N.I.C.
16	20A 3P 'FA'	3 #12 - 1/2" C	"	N.I.C.
17	3P 'FA'		SPACE	
18	3P 'FA'		SPACE	
19	3P 'FA'		SPACE	
20	3P 'FA'		SPACE	

GARAGE ADDITION

P.P. 'SS' (IN CORRIDOR #R-146)
120/208V. 3PH. 4W.

1	70A 3P 'EA'	3 #4 - 1 1/4" C	20 KW HEATER
2	50A 3P 'EA'	3 #6 - 1" C	15 KW "
3	50A 3P 'EA'	3 #6 - 1" C	15 KW "
4	30A 3P 'EA'	3 #10 - 3/4" C	6 KW "
5	30A 3P 'EA'	3 #10 - 3/4" C	6 KW "
6	20A 2P 'EA'	2 #12 - 1/2" C	3 KW "
7	30A 2P 'EA'	2 #10 - 3/4" C	4 KW "
8	30A 2P 'EA'	2 #10 - 3/4" C	4 KW "
9	30A 2P 'EA'	2 #10 - 3/4" C	4 KW "
10	30A 2P 'EA'	2 #10 - 3/4" C	4 KW "
11	30A 2P 'EA'	2 #10 - 3/4" C	4 KW "
12	30A 2P 'EA'	2 #10 - 3/4" C	4 KW "
13	20A 2P 'EA'	2 #12 - 1/2" C	3 KW "
14	20A 2P 'EA'	2 #12 - 1/2" C	3 KW "
15	20A 2P 'EA'	2 #12 - 1/2" C	3 KW "
16	20A 2P 'EA'	2 #12 - 1/2" C	3 KW "
17	20A 2P 'EA'	2 #12 - 1/2" C	3 KW "
18	20A 2P 'EA'	2 #12 - 1/2" C	3 KW "
19	20A 2P 'EA'	2 #12 - 1/2" C	3 KW "
20	20A 2P 'EA'	2 #12 - 1/2" C	3 KW "
21	20A 2P 'EA'	2 #12 - 1/2" C	3 KW "
22	20A 2P 'EA'	2 #12 - 1/2" C	3 KW "
23	100A 3P FA	4 #2 - 1 1/2" C	PANEL
24-28	3P 'EA'		SPACES.

LIGHTING PANEL SCHEDULE

PANEL	LOCATION	MOUNTING		VOLTAGE		15A, 1P	OTHER BREAKERS			NO. 1P SPACES (OTHERS NOTED)	TOTAL 1 POLES	REMARKS
		SURF.	FLUSH	120/208	600		15A 2P	20A 1P	20A 2P			
'GA'	GARAGE	✓		✓		24	1			4	30	
'GB'	"	✓		✓		27	1	1	1(20A 3P)	4	36	
'GC'	"	✓		✓		28	2	1	1(20A 3P)	6	42	
'GD'	"	✓		✓		18	1			4	24	
'GE'	"	✓		✓		18	1			4	24	
'GF'	"	✓		✓		22	2			4	30	
'GG'	"	✓		✓		24	2			2	30	
'GH'	"	✓		✓		24	2			2	30	
'GJ'	"	✓		✓		12	1			4	18	
'GK'	"	✓		✓		10				2	12	
'GL'	"	✓		✓		20				4	24	OPERATED BY TIME SWITCH
'GM'	"	✓		✓		20				4	24	" " " "
'GQ'	"		✓	✓		31	1(30A 2P)	1	1(70A 3P)	6	36	
'GR'	"	✓		✓		40	1(15A, 2P) 1(30A, 2P)	1	1(70A 3P)		48	DOUBLE STACKED
'GS'	"	✓		✓		48					48	DOUBLE STACKED
'RA'	OVERHAUL & REPAIR	✓			✓		20			4(2P)	24	
'RB'	"	✓			✓		20			4(2P)	24	
'RC'	"	✓		✓		46			2		48	DOUBLE STACKED
'RD'	"	✓			✓		14			4(2P)	18	
'RE'	"	✓			✓		20			4(2P)	24	
'RF'	"	✓			✓		14			4(2P)	18	
'RG'	"	✓		✓		42			2	4	48	DOUBLE STACKED
'RH'	"	✓			✓		20			4(2P)	24	
'RJ'	WAYS & STREETS FACILITIES BLDG.	✓			✓		14			4(2P)	18	
'RK'	"	✓		✓		51	2	1-30A, 3P	1(40A 2P)		60	DOUBLE STACKED
'RL'	OVERHAUL & REPAIR	✓		✓		42				6	48	" "
'RM'	"	✓		✓		36					36	
'A'	ADMINISTRATION			✓		42					42	
'B'	"			✓		32				4	36	
'C'	"			✓		14			2	6	24	
1A	"		✓	✓		72				12	84	DOUBLE STACKED
2A	"		✓	✓		48				12	60	" "
'RKA'	WAYS & STREETS FASCILITIES BLDG.	✓		✓		8				4	12	OPERATED BY TIME SWITCH
'GT'	IN GARAGE, MECH. RM.	✓		✓		60					60	DOUBLE STACKED
'GU'	IN GARAGE, ELECT. RM. G-102	✓		✓		16				2	18	

AS B[illegible]T DRAWING UPDATE - BAY #4

NUMBER TEN ARCHITECTURAL GROUP
ARCHITECTS & PLANNERS 210-175 HARGRAVE ST. WINNIPEG CANADA R3C 3R9 (204) 942-0981

2185 - 712

APPROVED

A. D. MARGISON ASSOCIATES LTD.
CONSULTING PROFESSIONAL ENGINEERS
SUITE 302—1220 YONGE STREET
TORONTO, ONTARIO M4T 1X2

MANITOBA LICENCE PENDING

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
MAY 9,77	12	14	GARAGE ADDITION - FOR TENDER	
NOV 6, 69	11		AS BUILT	
JUL. 30-69		13	REVISED AS PER OWNERS EQUIPMENT RELOCATIONS & DELETIONS	
JUL. 17.69		12	ADDED 20A 2P BRKS TO. PANEL RC, & RG	
JUN. 10.69		11	REVISED PP 'SS'	
FEB. 17, 1969.	10	7	CIRCUITS #FF-9, 11 AND 12 ADDED TO POWER PANEL 'FF'.	
DEC. 2, 68	9	6	CIRCUITS #AA-4, #CC-13 AND #EE-13 REVISED.	
NOV 14, 68.	8	5	CIRCUIT #KK-20 REVISED.	
OCT. 18. 68.	7	4	3P. 15A BREAKERS AND EMPTY CONDUITS ADDED ON CCTS. #HH-5, 10, 22, 23, #JJ-21 & 22.	
OCT. 2. 68.	6	3	'RK' PANEL SCHEDULE REVISED.	
MAY 9, 68.	5	2	CIRCUIT #DD-12 AND L.P. 'GR' & 'C' REVISED.	
MAR. 29/68	4		ISSUED FOR CONSTRUCTION	
14/2/68	3	1	GENERAL REVISIONS	
JAN. 19. 68	2		FOR TENDER.	
20/10/67	1	0	FOR APPROVAL.	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

PANEL SCHEDULES I

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY P. T.
CHECKED L.G.J.
FILE No.
SHEET No.
DATE 21 JULY 1967
SCALE N. T. S.
DRAWING No. 2185-712
ELECTRICAL

421 OSBORNE ST.
address
TRANSIT STORAGE SHOP FACILITIES
2185-713
project no.
PANEL SCHEDULES II
description

MOTOR CONTROL CENTRE 'MM'

550V. 3PH, 3W. (IN STORAGE BAY #3)

No.	Breaker	Feeder	Load
1	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP ROOF VENT
2	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
3	15A 3P 'FA'	3 # 12-1/2" C	1 HP " "
4	15A 3P 'FA'	3 # 12-1/2" C	2 HP " "
5	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
6	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
7	15A 3P 'FA'	3 # 12-1/2" C	1 HP " "
8	15A 3P 'FA'	3 # 12-1/2" C	2 HP " "
9	15A 3P 'FA'	3 # 12-1/2" C	1 HP " "
10	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
11	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
12	15A 3P 'FA'	3 # 12-1/2" C	1 HP " "
13	15A 3P 'FA'	3 # 12-1/2" C	2 HP " "
14	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
15	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
16	15A 3P 'FA'	3 # 12-1/2" C	1 HP " "
17	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " " N.I.C.
18	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " " N.I.C.
19	15A 3P 'FA'	3 # 12-1/2" C	1 HP " " N.I.C.
20	15A 3P 'FA'	3 # 12-1/2" C	2 HP " " N.I.C.
21	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " " N.I.C.
22	15A 3P 'FA'	3 # 12-1/2" C	1 HP " " N.I.C.
23	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " " N.I.C.
24	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
25	15A 3P 'FA'	3 # 12-1/2" C	1 HP " "
26	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
27	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
28	15A 3P 'FA'	3 # 12-1/2" C	1 HP " "
29	15A 3P 'FA'	3 # 12-1/2 C	1/2 HP " "
30	15A 3P 'FA'	3 # 12-1/2" C	2 HP " "
31	15A 3P 'FA'	3 # 12-1/2" C	1 HP " "
32	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
33	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
34	15A 3P 'FA'	3 # 12-1/2" C	1 HP " "
35	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
36	15A 3P 'FA'	3 # 12-1/2 C	2 HP " "
37	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
38	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
39	15A 3P 'FA'	3 # 12-1/2" C	1 HP " "
40	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
41	15A 3P 'FA'	3 # 12-1/2" C	2 HP " "
42	15A 3P 'FA'	3 # 12-1/2" C	1 HP " "
43	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
44	15A 3P 'FA	3 # 12-1/2" C	1/2 HP " "
45	15A 3P 'FA	3 # 12-1/2" C	1 HP " "
46	15A 3P 'FA'	3 # 12-1/2" C	2 HP " "
47	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
48	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
49	15A 3P 'FA'	3 # 12-1/2" C	1 HP " "
50	15A 3P 'FA'	3 # 12-1/2 C	1/2 HP " "
51	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
52	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " " N.I.C.
53	15A 3P 'FA'	3 # 12-1/2" C	1 HP " " N.I.C.
54	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " " N.I.C.
55	15A 3P 'FA'	3 # 12-1/2" C	2 HP " " N.I.C.
56	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " " N.I.C.
57	15A 3P 'FA'	3 # 12-1/2" C	1 HP " " N.I.C
58	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " " N.I.C.
59	15A 3P 'FA'	3 # 12-1/2" C	2 HP " " N.I.C.
60	15A 3P 'FA'	3 # 12-1/2" C	1 HP " " N.I.C.
61	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " " N.I.C.
62	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " " N.I.C.
63	15A 3P 'FA'	3 # 12-1/2" C	1 HP " " N.I.C.
64	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " " N.I.C.
65	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " " N.I.C.
66	15A 3P 'FA'	3 # 12-1/2" C	2 HP " " N.I.C.
67	15A 3P 'FA'	3 # 12-1/2" C	1 HP " " N.I.C.
68	15A 3P 'FA'	3 # 12-1/2" C	3 HP " "
69	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
70	15A 3P 'FA'	3 # 12-1/2" C	1 HP " "
71	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
72	15A 3P 'FA'	3 # 12-1/2" C	1 HP " "
	3P 'FA'		SPACES

GARAGE ADDITION (circuits 17–23)

GARAGE ADDITION IN CONTRACT (circuits 52–67)

MOTOR CONTROL CENTRE 'TT'

550V. 3PH. 3W. (IN OVERHAUL & REPAIR SHOP)

No.	Breaker	Feeder	Load
1	15A 3P 'FA'	3 # 12-1/2" C	3 HP ROOF VENT
2	15A 3P 'FA'	3 # 12-1/2" C	2 HP " "
3	15A 3P 'FA'	3 # 12-1/2" C	2 HP " "
4	15A 3P 'FA'	3 # 12-1/2" C	2 HP " "
5	15A 3P 'FA'	3 # 12-1/2" C	3 HP " "
6	15A 3P 'FA'	3 # 12-1/2" C	3/4 HP " "
7	15A 3P 'FA'	3 # 12-1/2" C	5 HP " "
8	15A 3P 'FA'	3 # 12-1/2" C	5 HP " "
9	15A 3P 'FA'	3 # 12-1/2" C	5 HP " "
10	15A 3P 'FA'	3 # 12-1/2" C	1 HP " "
11	15A 3P 'FA'	3 # 12-1/2" C	5 HP " "
12	30A 3P 'FA'	3 # 12-1/2" C	7 1/2 HP WATER PUMP
13	30A 3P 'FA'	3 # 12-1/2" C	7 1/2 HP "
14	30A 3P 'FA'	3 # 12-1/2" C	7 1/2 HP "
15	30A 3P 'FA'	3 # 12-1/2" C	7 1/2 HP "
16	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP ROOF VENT
17	30A 3P 'FA'	3 # 12-1/2" C	7 1/2 HP " "
18	30A 3P 'FA'	3 # 12-1/2" C	7 1/2 HP " "
19	30A 3P 'FA'	3 # 12-1/2" C	7 1/2 HP " "
20	30A 3P 'FA'	3 # 12-1/2" C	7 1/2 HP " "
21	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
22	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
23	15A 3P 'FA'	3 # 12-1/2" C	1/2 HP " "
24	15A 3P 'FA	3 # 12-1/2" C	1/2 HP " "
25	15A 3P 'FA'	3 # 12-1/2" C	1 HP " "
	3P 'FA'		SPACES

MOTOR CONTROL CENTRE 'VV'

550V 3PH. 3W (IN MECHANICAL RM. #G-105)

Rev.	No.	Breaker	Feeder	Load	Note
△2	1	250A 3P 'LA'	3 # 2/0 - 2" C	200A 3P 600V UNF. DISC. SW. BUS WASHING EQUIPMENT	(BREAKER ONLY)
△2	2	30A 3P 'FA'	3 # 12 - 1/2" C	EXP. 30A 3P 600V UNF. DISC. SW. 10 HP AIR COMPRESSOR	(" ")
△2	3	30A 3P 'FA'	3 # 12 - 1/2" C	EXP. 7 1/2 HP UNLOADING COMPRESSOR	(" ")
△2	4	15A 3P 'FA'	3 # 12 - 1/2" C	5 HP FUEL PUMP	
△2	5	15A 3P 'FA'	3 # 12 - 1/2" C	5 HP " "	
△2	6	15A 3P 'FA'	3 # 12 - 1/2" C	5 HP " "	
△2	7	15A 3P 'FA'	3 # 12 - 1/2" C	EXP. 2 HP TRANSFER PUMP	(BREAKER ONLY)
	8	70A 3P 'FA'	3 # 8 - 3/4" C	30 HP AIR COMPRESSOR	
△2	9	30A 3P 'FA'	3 # 10 - 3/4" C	25 KW HEATER	(BREAKER ONLY)
		3P 'FA'		SPACES	

P.P. 'UU'

550V. 3PH. 3W. (IN OVERHAUL & REPAIR SHOP)

Rev.	No.	Breaker	Feeder	Load
	1	90A 3P 'FA'	3 # 8 - 3/4" C	30 HP MAKE-UP AIR UNIT
	2	90A 3P 'FA'	3 # 8 - 3/4" C	30 HP "
	3	50A 3P 'FA'	3 # 10 - 3/4" C	20 HP "
	4	50A 3P 'FA'	3 # 10 - 3/4" C	20 HP "
	5	15A 3P 'FA'	3 # 12 - 1/2" C	1/2 HP "
△5 △3	6	15A 3P 'FA'	3 # 12 - 1/2" C	1/2 HP EXHAUST FAN
△3	7	15A 3P 'FA'	3 # 12 - 1/2" C	SPARE
△3	8	15A 3P 'FA'	3 # 12 - 1/2" C	"
	9	15A 3P 'FA'	3 # 12 - 1/2" C	2 HP MAKE-UP AIR UNIT
	10	15A 3P 'FA'	3 # 12 - 1/2" C	2 HP & 1/3 HP "
	11	15A 3P 'FA'	3 # 12 - 1/2" C	3 HP & 1/3 HP "
	12	15A 3P 'FA'	3 # 12 - 1/2" C	30A, 3PH, 600V, UNF. DISC. SWITCHES 1 1/2 HP OVERHEAD DOOR MOTOR
	13	15A 3P 'FA'	3 # 12 - 1/2" C	" "
	14	15A 3P 'FA'	3 # 12 - 1/2" C	" "
	15	15A 3P 'FA'	3 # 12 - 1/2" C	" "
	16	15A 3P 'FA'	3 # 12 - 1/2" C	" "
	17	15A 3P 'FA'	3 # 12 - 1/2" C	" "
	18	15A 3P 'FA'	3 # 12 - 1/2" C	" "
	19	15A 3P 'FA'	3 # 12 - 1/2" C	2 HP MAKE-UP AIR UNIT
△6	20	15A 3P 'FA'	3 # 12 - 1/2" C	DUST COLLECTOR
	21	15A 3P 'FA'	3 # 12 - 1/2" C	30A 3P 600V UNF. DISC. SW. 2 HP, 1/2 HP & 1/3 HP CRANE
	22	30A 3P 'FA'	3 # 12 - 1/2" C	FAN
	23	30A 3P 'FA'	3 # 12 - 1/2" C	7 1/2 HP BUS HOIST
	24	30A 3P 'FA'	3 # 12 - 1/2" C	7 1/2 HP " "
	25	30A 3P 'FA'	3 # 12 - 1/2" C	7 1/2 HP " "
	26	30A 3P 'FA'	3 # 12 - 1/2" C	7 1/2 HP " "
	27	30A 3P 'FA'	3 # 12 - 1/2" C	7 1/2 HP " "
△6 △4	28	30A 3P 'FA'	3 # 12 - 1/2" C	7 1/2 HP " "
	29-34	3P 'FA'		SPACE

DISTRIBUTION PANEL #1

550V. 3PH. 3W. (IN ELECTRICAL ROOM #R-109)

3PH 600-120/208V TRANSFORMERS MOUNTED ABOVE RESP. LIGHTING PANELS

Breaker	Feeder	Transformer	Secondary feeder	Load
100A 3P 'FA'	3 # 2 - 1 1/4" C			L.P. 'RA'
100A 3P 'FA'	3 # 2 - 1 1/4" C			L.P. 'RB'
70A 3P 'FA'	3 # 4 - 1 1/4" C	45	4 # 1/0 - 2" C	L.P. 'RC'
40A 3P 'FA'	3 # 8 - 3/4" C			L.P. 'RD'
100A 3P 'FA'	3 # 2 - 1 1/4" C			L.P. 'RE'
70A 3P 'FA'	3 # 4 - 1 1/4" C			L.P. 'RF'
70A 3P 'FA'	3 # 4 - 1 1/4" C	45	4 # 1/0 - 2" C	L.P. 'RG'
100A 3P 'FA'	3 # 2 - 1 1/4" C			L.P. 'RH'
70A 3P 'FA'	3 # 4 - 1 1/4" C			L.P. 'RJ'
70A 3P 'FA'	3 # 4 - 1 1/4" C	45	4 # 1/0 - 2" C 120V, 3P, 40A TIME SWITCH, TORK #7300Z	L.P. 'RK' L.P. 'RKA'
70A 3P 'FA'	3 # 4 - 1 1/4" C	45	4 # 1/0 - 2" C	L.P. 'RL'
40A 3P 'FA'	3 # 8 - 3/4" C	30	4 # 2 - 2" C	P.P. 'AA'
150A 3P 'JA'	3 # 1/0 - 2" C	112 1/2	2x(4#2/0 - 2 1/2" C)	P.P. 'BB'
150A 3P 'JA'	3 # 1/0 - 2" C	112 1/2	2x(4#2/0 - 2 1/2" C)	P.P. 'CC'
40A 3P 'FA'	3 # 8 - 3/4" C	30	4 # 2 - 2" C	P.P. 'EE'
70A 3P 'FA'	3 # 4 - 1 1/4" C	45	4 # 1/0 - 2" C	P.P. 'FF'
70A 3P 'FA'	3 # 4 - 1 1/4" C	45	4 # 1/0 - 2" C	P.P. 'HH'
225A 3P 'JA'	3 # 4/0 - 2 1/2" C			P.P. 'JJ'
20A 3P 'FA'	3 # 10 - 3/4" C	15	4 # 4 - 1 1/2" C	P.P. 'LL'
200A 3P 'JA'	3 # 3/0 - 2" C	150	2x(4#4/0 - 3" C)	P.P. 'SS'
125A 3P 'JA'	3 # 1 - 1 1/2" C			MOTOR CONTROL CENTRE 'TT'
70A 3P 'FA'	3 # 4 - 1 1/4" C	45	4 # 1/0 - 2" C	L.P. 'RM'
225A 3P 'JA'	3 # 4/0 - 2 1/2" C			P.P. 'UU'
8 - 3P 'JA'				SPACES

DISTRIBUTION PANEL #3

550 V. 3 PH., 3 W. (IN MECH. RM. #A-B18)

Rev.	No.	Breaker	Feeder	Load
	1	15A 3P 'FA'	3 # 12 - 1/2" C	1 1/2 HP COOLING TOWER FAN
	2	15A 3P 'FA'	3 # 12 - 1/2" C	1 1/2 HP " " "
	3	15A 3P 'FA'	3 # 12 - 1/2" C	2-2 HP SUMP PUMP
	4	15A 3P 'FA'		SPARE
	5	225A 3P 'JA'	3 # 3/0 - 2" C	150HP CHILLER
	6	30A 3P 'FA'	3 # 12 - 1/2" C	7 1/2 HP CIRC. PUMP
	7	30A 3P 'FA'	3 # 12 - 1/2" C	7 1/2 HP " "
	8	30A 3P 'FA'	3 # 12 - 1/2" C	10 HP A/C UNIT
	9	15A 3P 'FA'	3 # 12 - 1/2" C	2 HP RETURN AIR FAN
	10	15A 3P 'FA'	3 # 12 - 1/2" C	3/4 HP CIRC. PUMP
	11	15A 3P 'FA'	3 # 12 - 1/2" C	3 HP A/C UNIT
	12	15A 3P 'FA'	3 # 12 - 1/2" C	1/2 HP CIRC. PUMP
△7	13	15A 3P 'FA'	3 # 12 - 1/2" C	2 HP KITCHEN EXH. FAN
	14	30A 3P 'FA'	3 # 10 - 3/4" C	10 HP ELEVATOR
	15	350A 3P 'LA'	2x(3 # 2/0 - 2" C)	300 — 3x(4 # 300MCM - 3" C) D.P. #4 600V Δ - 120/208V Y, 3 PH., 4 W. TRANSFORMER
	16-24	3P 'JA'		SPACES

POWER PANEL 'AK'

120/208 V, 3 PH., 4 W. (IN KITCHEN #A-B02)

No.	Breaker	Feeder	Load
1	15A 1P 'EA'	2 # 12 - 1/2" C	CASH REGISTER
2	15A 1P 'EA'	2 # 12 - 1/2" C	1/3 HP DRINK DISPENSER
3	20A 1P 'EA'	2 # 12 - 1/2" C	1.6 KW COFFEE WARMER
4	20A 1P 'EA'	2 # 12 - 1/2" C	1.6 KW CUP LOWERATOR
5	20A 1P 'EA'	2 # 12 - 1/2" C	2KW HOT FOOD UNIT
6	20A 1P 'EA'	2 # 12 - 1/2" C	2KW " " "
7	15A 1P 'EA'	2 # 12 - 1/2" C	1/3 HP COLD PAN UNIT COMPRESSOR
8	15A 1P 'EA'	2 # 12 - 1/2" C	1/3 HP SALAD " "
9	15A 1P 'EA'	2 # 12 - 1/2" C	1/6 HP " " BLOWER
10	15A 3P 'EA'	3 # 12 - 1/2" C	2.5 KW TOASTER
11	70A 3P 'EA'	3 # 4 - 1 1/4" C	16 KW GRIDDLE
12	40A 3P 'EA'	3 # 8 - 3/4" C	12 KW FRYER
13	20A 3P 'EA'	3 # 12 - 1/2" C	5.2 KW HOT PLATE
14	20A 3P 'EA'	3 # 12 - 1/2" C	6 KW COFFEE MAKER
15	15A 1P 'EA'	2 # 12 - 1/2" C	1/4 HP MULTI-MIXER
16	15A 1P 'EA'	2 # 12 - 1/2" C	1/6 HP MILK DISPENSER
17	15A 1P 'EA'	2 # 12 - 1/2" C	1/4 HP ICE CREAM
18	70A 3P 'EA'	3 # 4 - 1 1/4" C	21.5 KW RANGE
19	15A 3P 'EA'	3 # 12 - 1/2" C	1 HP DISHWASHER
20	20A 3P 'EA'	3 # 12 - 1/2" C	5 KW HEATER
21	30A 3P 'EA'	3 # 10 - 3/4" C	9 KW BOOSTER
22	15A 3P 'EA'	3 # 12 - 1/2" C	1 1/2 HP WASTE DISPOSER
23-30	3P 'EA'		SPACES

DISTRIBUTION PANEL #4

120/208 V, 3 PH, 4 W (IN MECH. RM. #A-B18)

Rev.	No.	Breaker	Feeder	Load
	1	150A 3P 'JA'	4 # 1/0 - 2" C	L.P. 'A'
	2	125A 3P 'JA'	4 # 1 - 2" C	L.P. 'B'
	3	70A 3P 'JA'	4 # 4 - 1 1/2" C	L.P. 'C'
	4	225A 3P 'JA'	4 # 4/0 - 3" C	L.P. '1A'
	5	200A 3P 'JA'	4 # 3/0 - 2 1/2" C	L.P. '2A'
	6	225A 3P 'JA'	4 # 4/0 - 3" C	P.P. 'AK'
	7	20A 1P 'EA'	2 # 12 - 1/2" C	F.A. SYSTEM
	8	20A 1P 'EA'	2 # 12 - 1/2" C	F.A. SYSTEM
△2	9	15A 2P 'EA'	2 # 12 - 1/2" C	1/3 HP SUMP PUMP
	10-16	3P 'JA'		SPACES

DISTRIBUTION PANEL #2 (IN MAIN 600V SWITCHBOARD)

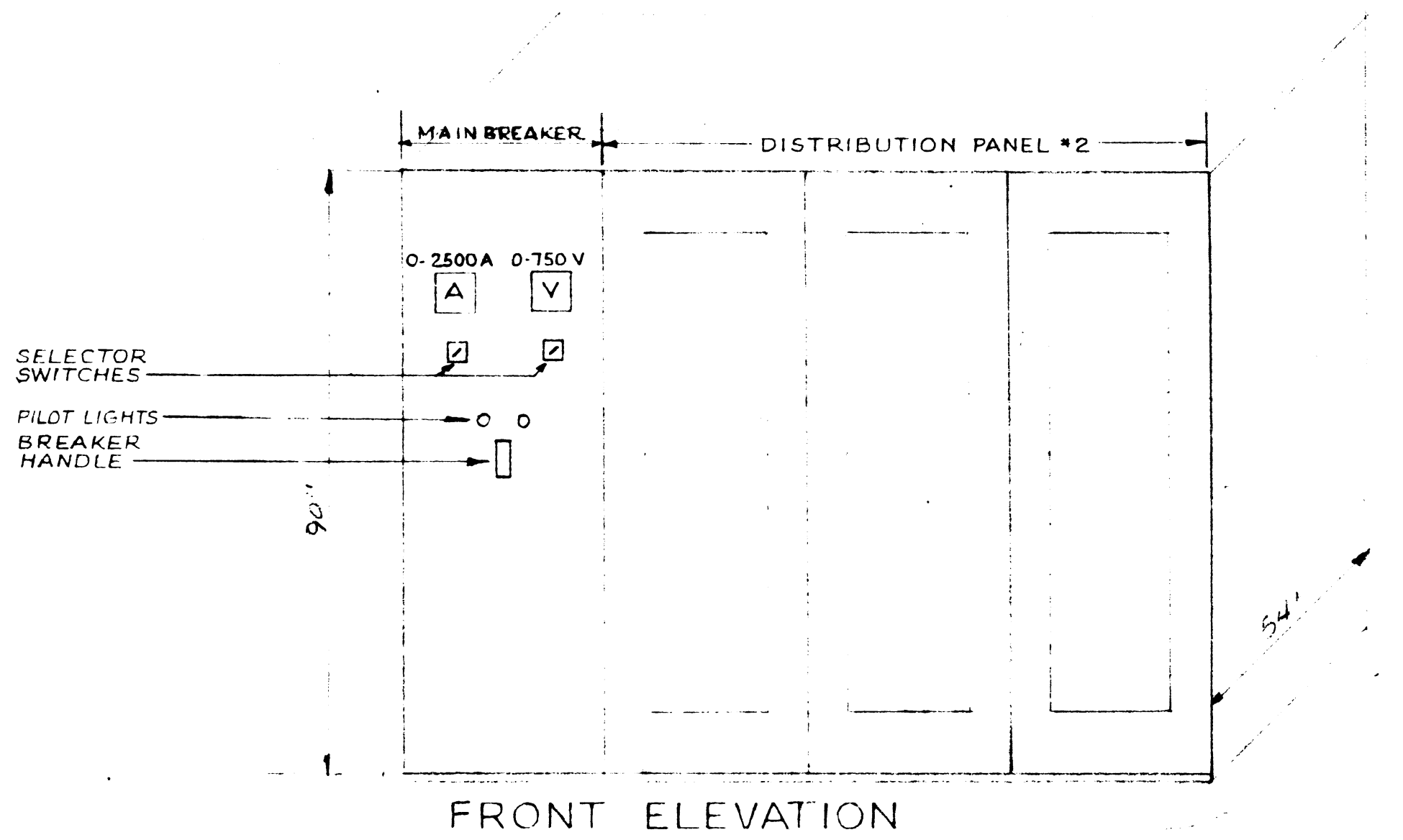
550V. 3PH. 3W. (IN ELECTRICAL ROOM #G-102)

3PH. 600-120/208V TRANSFORMERS MOUNTED ABOVE RESP. LIGHTING PANELS.

Breaker	Feeder	Transformer	Secondary feeder	Load
40A 3P 'FA'	3 # 8 - 3/4" C	30	4 # 2 - 2" C	L.P. 'GA'
40A 3P 'FA'	3 # 8 - 3/4" C	30	4 # 2 - 2" C	L.P. 'GB'
70A 3P 'FA'	3 # 4 - 1 1/4" C	45	4 # 1/0 - 2" C	L.P. 'GC'
40A 3P 'FA'	3 # 8 - 3/4" C	30	4 # 2 - 2" C	L.P. 'GD'
40A 3P 'FA'	3 # 8 - 3/4" C	30	4 # 2 - 2" C	L.P. 'GE'
40A 3P 'FA'	3 # 8 - 3/4" C	30	4 # 2 - 2" C	L.P. 'GF'
40A 3P 'FA'	3 # 8 - 3/4" C	30	4 # 2 - 2" C	L.P. 'GG'
40A 3P 'FA'	3 # 8 - 3/4" C	30	4 # 2 - 2" C	L.P. 'GH'
20A 3P 'FA'	3 # 10 - 3/4" C	15	4 # 6 - 1 1/4" C	L.P. 'GJ'
20A 3P 'FA'	3 # 10 - 3/4" C	15	4 # 6 - 1 1/4" C	L.P. 'GK'
40A 3P 'FA'	3 # 8 - 3/4" C	30	4 # 2 - 2" C	L.P. 'GL'
40A 3P 'FA'	3 # 8 - 3/4" C	30	4 # 2 - 2" C	L.P. 'GM'
70A 3P 'FA'	3 # 4 - 1 1/4" C	45	4 # 1/0 - 2" C	L.P. 'GQ'
70A 3P 'FA'	3 # 4 - 1 1/4" C	45	4 # 1/0 - 2" C	L.P. 'GR'
125A 3P 'JA'	3 # 1 - 1 1/2" C	P.P. 'DD'	30A 3P FA 3 # 8 - 1" C	P.P. 'QQ'
150A 3P 'JA'	3 # 1/0 - 2" C	P.P. 'KK'	70A 3P FA' 3 # 4 - 1 1/4" C	P.P. 'NN'
90A 3P 'FA'	3 # 2 - 1 1/4" C			MOTOR CONTROL CENTRE 'MM'
70A 3P 'FA'	3 # 4 - 1 1/4" C	45	4 # 1/0 - 2" C	L.P. 'GS'
100A 3P 'FA'	3 # 2 - 1 1/4" C	75	4 # 250 MCM - 3" C	L.P. 'GT'
20A 3P 'FA'	3 # 12 - 3/4" C	[illegible]	4 # 6 - 1 1/4" C	L.P. 'GU'
300A 3P 'LA'	3 # 350 MCM - 3" C			MOTOR CONTROL CENTRE 'VV'
1600/1600 A, 3P, A.C.B. MANUALLY OPERATED	1600 A, 3P, 600 V LOW IMP. BUS DUCT			DISTRIBUTION PANEL #1
600 A 3P 'MA'	600A, 3P, 600 V LOW IMP. BUS DUCT			DISTRIBUTION PANEL #3
10 - 3P 'JA'				SPACES

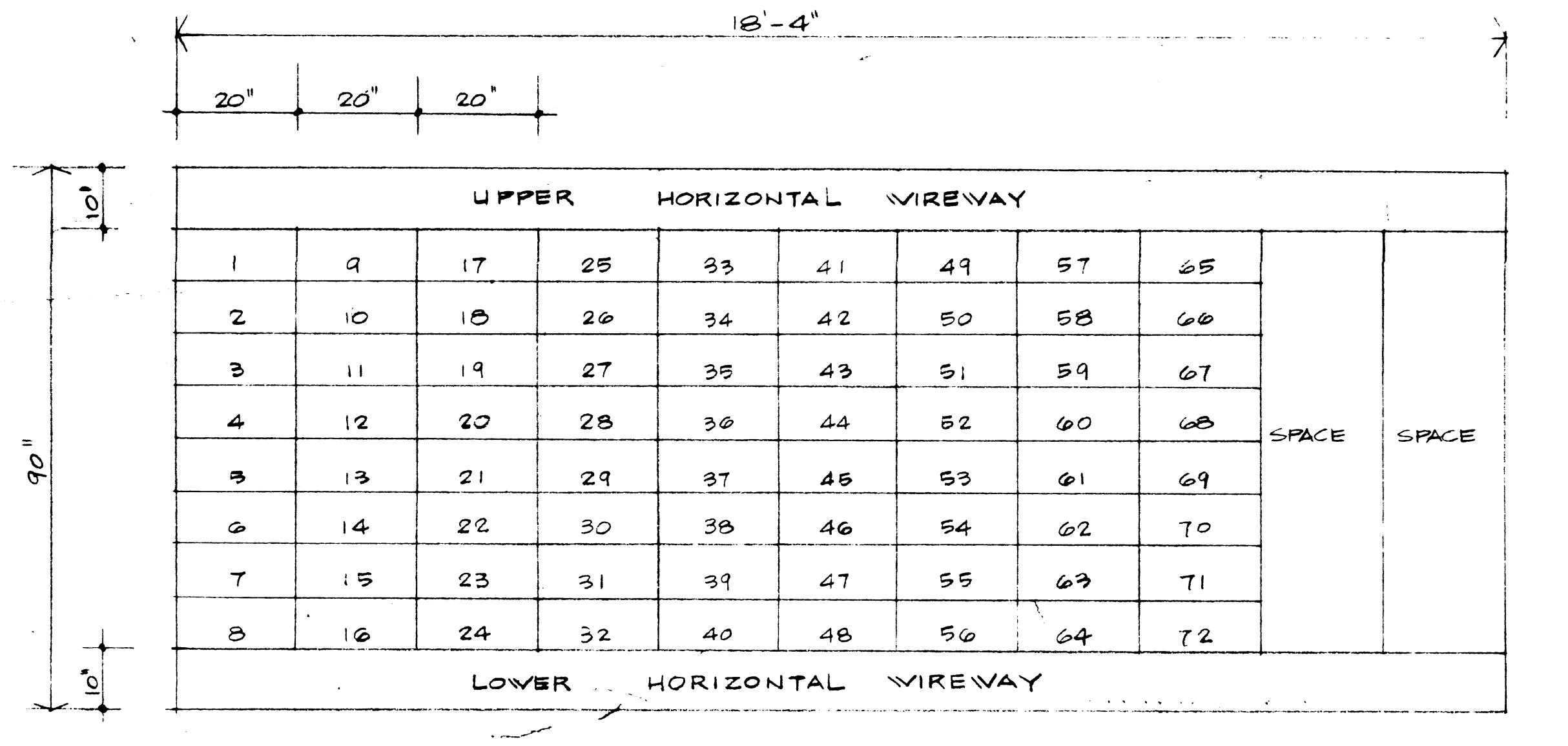
120V, 3P, 80 A CONTACTOR - ALLEN BRADLEY TYPE 'ML', TIME SWITCH - TORK #1837ZSK MOMENTARY CONTACT (L.P. 'GL' and L.P. 'GM')

AS BUILT DRAWING UPDATE BAY #



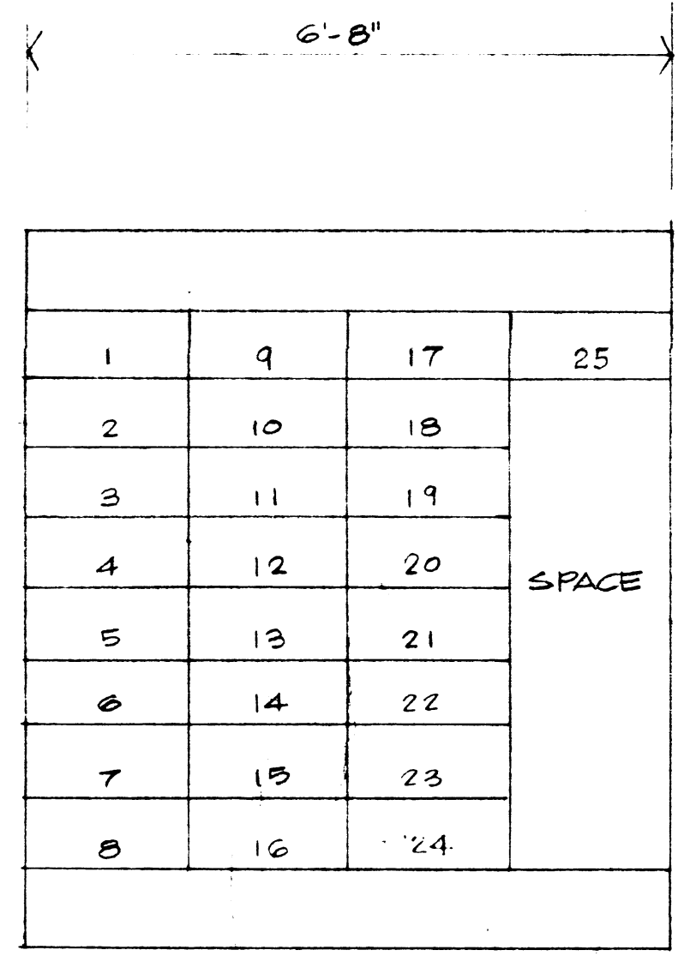
FRONT ELEVATION
MAIN 600 V SWITCHBOARD

2185-713



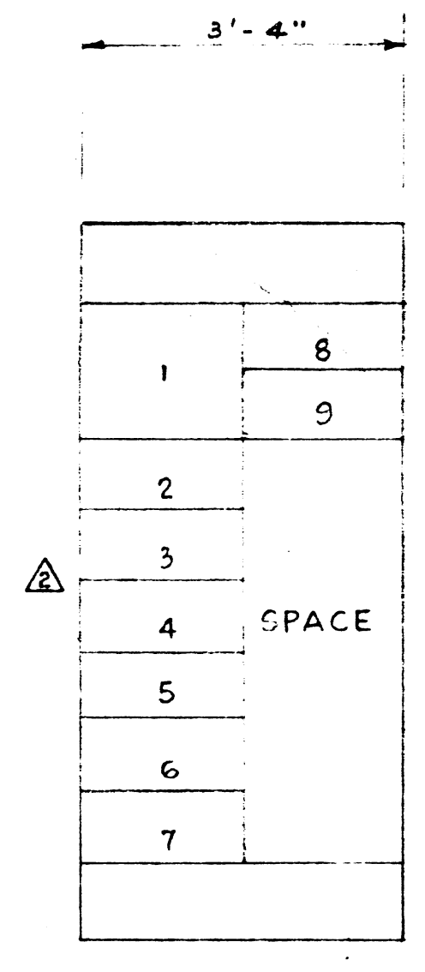
1	9	17	25	33	41	49	57	65	SPACE	SPACE
2	10	18	26	34	42	50	58	66		
3	11	19	27	35	43	51	59	67		
4	12	20	28	36	44	52	60	68		
5	13	21	29	37	45	53	61	69		
6	14	22	30	38	46	54	62	70		
7	15	23	31	39	47	55	63	71		
8	16	24	32	40	48	56	64	72		

FRONT ELEVATION
MOTOR CONTROL CENTRE 'MM'
(N. T. S.)



1	9	17	25
2	10	18	SPACE
3	11	19	
4	12	20	
5	13	21	
6	14	22	
7	15	23	
8	16	24	

FRONT ELEVATION
M.C.C. 'TT'
(N. T. S.)



FRONT ELEV.
M.C.C. 'VV'
(N.T.S.)

NUMBER TEN ARCHITECTURAL GROUP
ARCHITECTS & PLANNERS 210 - 175 HARGRAVE ST. WINNIPEG CANADA R3C 3R9 (204) 942-0981

APPROVED

A. D. MARGISON ASSOCIATES LTD.
CONSULTING PROFESSIONAL ENGINEERS
SUITE 302—1320 YONGE STREET
TORONTO, ONTARIO M4T 1X2

MANITOBA LICENCE PEND.

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
MAY 9.77	12	8	GARAGE ADDITION - FOR TENDER	
NOV 6.69	11		AS BUILT	
APR. 7. 69.	10	△7	CIRCUIT #DP3-13 MOTOR HP REVISED.	
MARCH 12. 69.	9	△6	CIRCUITS #UU-20 AND #UU-28 REVISED.	
FEB. 26. 69	8	△5	1/2 HP EXHAUST FAN ADDED ON CIRCUIT #UU-6.	
FEB. 17. 1969.	7	△4	CIRCUIT # UU-28 ADDED.	
SEPT. 18. 68.	6	△3	MAKE-UP AIR UNITS ON CIRCUITS #UU-6, 7 & 8 DELETED.	
	5	△2	MOTOR CONTROL CENTRE 'VV' REVISED, CIRCUIT #DP4-9 ADDED.	
MAR. 29 '68	4		ISSUED FOR CONSTRUCTION	
14/2/68	3	1	GENERAL REVISIONS	
JAN. 19. 68	2		FOR TENDER.	
20/10/67	1	0	FOR APPROVAL.	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

PANEL SCHEDULES II

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY	P. T.
CHECKED	L.G.U.
FILE No.	
SHEET No.	
DATE	21 JULY 1967
SCALE	N.T.S.
DRAWING No.	2185-713 ELECTRICAL

MANITOBA HYDRO
INTEROFFICE MEMORANDUM

FROM David Dudar C.E.T.
Technical Assistant - Protection
Distribution Planning & Protection
Distribution Engineering - Winnipeg Dept.
820 Taylor Ave. (1), Winnipeg, MB

TO Brian Adamyk
Energy Services Advisor
Major Accounts Department
360 Portage Ave. (6), Winnipeg, MB

DATE 2010 11 26

SUBJECT **UTILITY INFORMATION REQUIRED FOR CITY OF WINNIPEG TRANSIT, 421 OSBORNE AVE**

Customer Information

Name:	City of Winnipeg Transit
Address:	421 Osborne Ave

Source Information

Station:	Jessie
Feeder:	22U81

KBraid 2010 11 26
K. J.
BRAID
Member
22289

347/600V Supply Transformer Information

kVA:	1500
Secondary Voltage:	347/600V
Connection:	Delta - Grounded Wye
Minimum Impedance:	4.0%
Primary Protection[1]:	Westinghouse RBA RDE 400, 125E

Fault Levels at Supply Transformer[2, 3]

Switching Configuration	Voltage (kV)	LLL (Amps)	LG (Amps)	R1 (pu)	X1 (pu)	R0 (pu)	X0 (pu)
Normal System Operation[4]	12	9055	8369	0.1087	0.4996	0.5667	0.4635
Fully Networked	12	9166	8430	0.1075	0.4935	0.5667	0.4635

Impedances are per unit on a 100MVA base

Notes

1. Manitoba Hydro sources replacement fuses from various manufacturers, therefore the fuse stated above is only representative of the fuse installed
2. These values are reflective of the normal and expected maximum available fault levels at the customer location, depending on the configuration of the supply, and can be used for arc flash hazard calculation.
3. These values are valid for the system configuration at the time of this study. These fault levels and impedances can change in the future as a result of changes to the Manitoba Hydro system, including feeder reconfiguration or re-conductoring, increasing the size of substation transformers and from new or re-conductored sub transmission lines. While these changes are infrequent in nature, they are not uncommon and Manitoba Hydro does not communicate changes in fault level or impedance information to customers unless a new request is initiated.
4. The Normal switching configuration is intended for overcurrent protection coordination studies, power quality studies, harmonic assessment and mitigation reports, or power factor correction studies only. The normal fault level information is not to be used for equipment rating purposes.

David Dudar C.E.T.

APEGM
Certificate of Authorization
Manitoba Hydro
No. 38 Date: November 26, 2010

POWER QUALITY BENCHMARK

City of Winnipeg Transit Department
421 Osborne St.
Winnipeg, Manitoba
Premise # 6399318
City Centre CSC

Prepared By: Marianela de los Rios Londono, IEEQ Student
Customer Engineering Services
Industrial & Commercial Solutions

Reviewed By: G. A. Keena, C.E.T.
Customer Engineering Services
Industrial & Commercial Solutions

APEGM
Certificate of Authorization
Manitoba Hydro
No. 38 Date: Sept 17, 2015

PROVINCE OF MANITOBA
Sept 17, 2015
M. J.
KIZUIK
REGISTERED PROFESSIONAL ENGINEER

August 25, 2015

Manitoba Hydro
POWER SMART

TABLE OF CONTENTS

1 SUMMARY

All electrical measurements were found to be within acceptable limits during the monitoring period.

The energy profile indicates that there is potential for savings related to demand reduction.

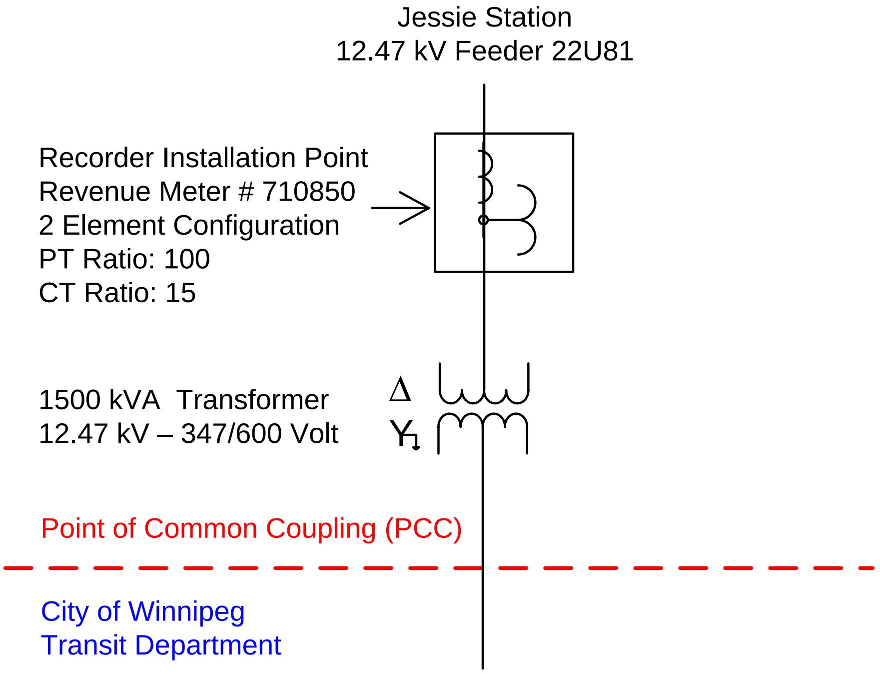
2 INTRODUCTION

The purpose of a Power Quality Benchmark is to ensure that both Manitoba Hydro’s electrical supply and the customer’s facility are operating within acceptable power quality limits at the Point of Common Coupling (PCC). The PCC is defined as the point on Manitoba Hydro’s system that is electrically nearest to the customer’s installation. For the purposes of this benchmark, the PCC is located at City of Winnipeg Transit Department’s Revenue Meter # 710850.

A Power Quality Benchmark can be used as a diagnostic review of a facility’s power quality at the PCC. Monitoring and benchmarking power quality characteristics can enhance a facility’s predictive maintenance program by identifying power quality issues that can result in lost production, adverse interaction or equipment damage within the facility. In addition, a benchmark is a comparative tool that can be used to assess electrical system characteristics before and after large facility modifications.

To collect information for this benchmark a Dranetz PX5 Power Quality Recorder was installed at the PCC as shown in Figure 1. The electrical supply was monitored from July 2, 2015 at 11:00 to July 8, 2015 at 09:25. The analysis given in this report is valid only for the stated monitoring period.

Figure 1
Simplified Single Line Diagram



3 OBSERVATIONS

This section provides the relevant electrical operating limits as they apply to City of Winnipeg Transit Department. It also provides a graphical summary of the data collected at the PCC during the monitoring period from July 2, 2015 at 11:00 to July 8, 2015 at 09:25. In each subsection the measurement being evaluated, the applicable limit, and the measured values are stated. Note that the applicable limits are taken from Manitoba Hydro's Planning Criteria, CSA Standard CAN3-C235-83, and Power Quality Specification PQS2000-01.

The event on July 4th was utility in origin. The data has been excluded from Table 6 – Voltage Flicker Limits.

3.1 Voltage Variation

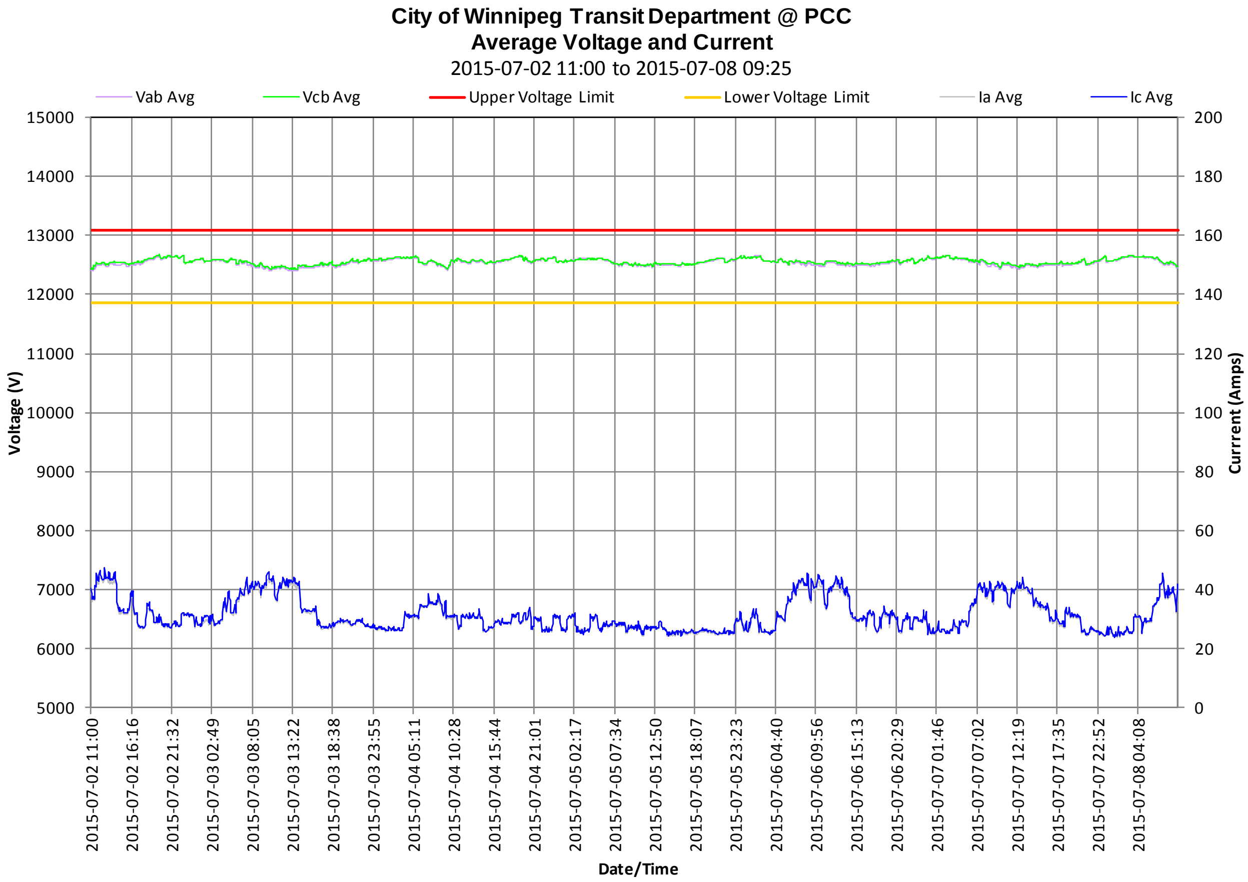
Average steady state voltage was found to be within acceptable limits 100% of the time during the monitoring period as required by Manitoba Hydro's Planning Criteria which has adopted CSA Standard CAN3-C235-83. The average steady state voltage range and upper and lower limits are provided in Table 1 below.

Table 1 - Voltage Variation Limits

Indices	Lower Limit	Measured Value	Upper Limit	Comments
Average Steady State Voltage Variation	11847 V	12392 V to 12675 V	13094 V	Within Manitoba Hydro's Planning Criteria

Figure 2 below shows the average steady state voltages and the upper and lower average steady state voltage limits. Figure 2 also shows the average current values (in amps).

Figure 2

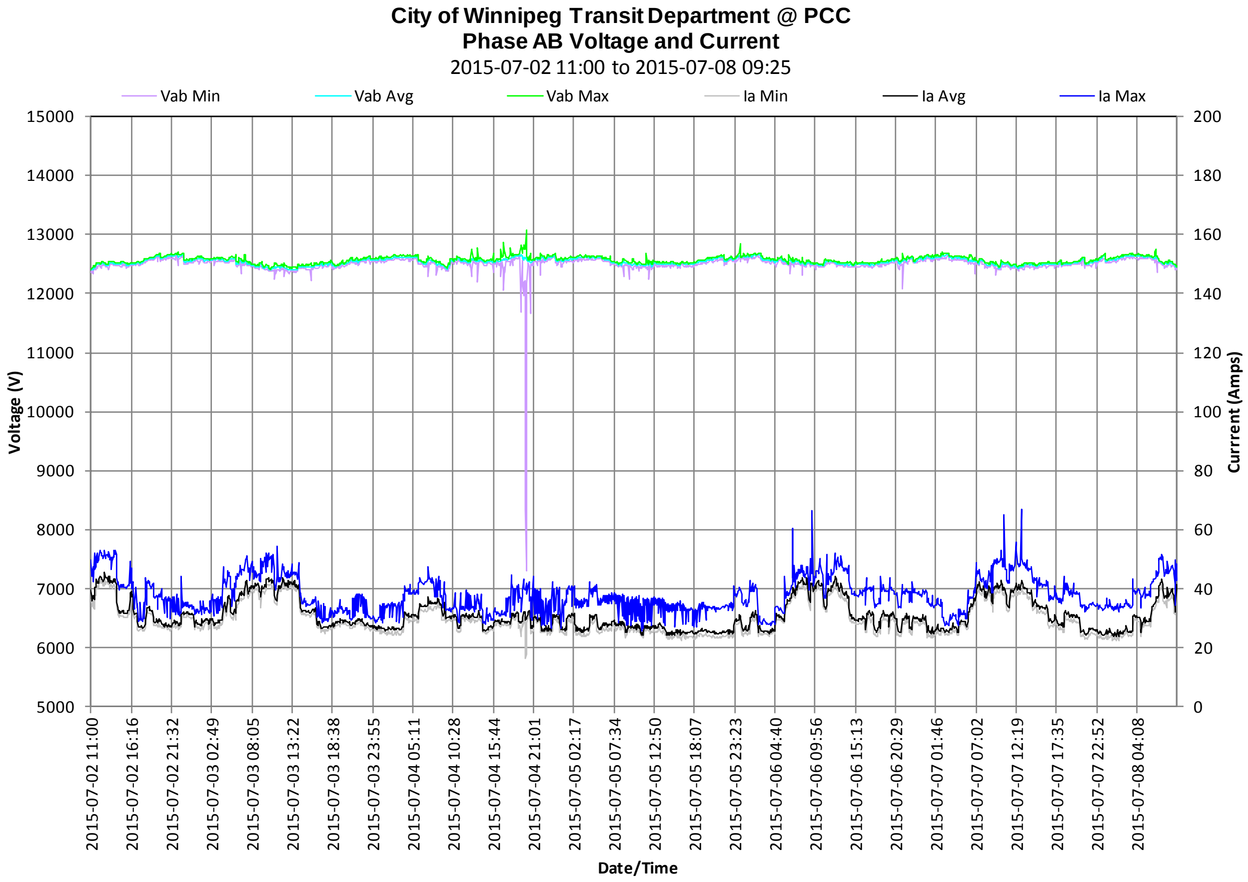


Average Voltage – AB			**Average Voltage – CB**		
Min	12392	11:00 Jul 02, 15	Min	12419	09:45 Jul 04, 15
Avg	**12541**		**Avg**	**12556**	
Max	12667	23:05 Jul 02, 15	Max	12675	20:00 Jul 02, 15
Average Current – A			**Average Current – C**		
Min	23.8	01:05 Jul 08, 15	Min	23.8	01:05 Jul 08, 15
Avg	**31.2**		**Avg**	**31.7**	
Max	45.7	12:45 Jul 02, 15	Max	47.5	12:45 Jul 02, 15

Figure 3 below shows the minimum, maximum and average values for phase AB voltage and phase A current. The graph for phases BC voltage and phase C current is available in Figure 4 on page 8.

The event on July 4th was utility in origin.

Figure 3



City of Winnipeg Transit Department @ PCC
Phase AB Voltage and Current
2015-07-02 11:00 to 2015-07-08 09:25

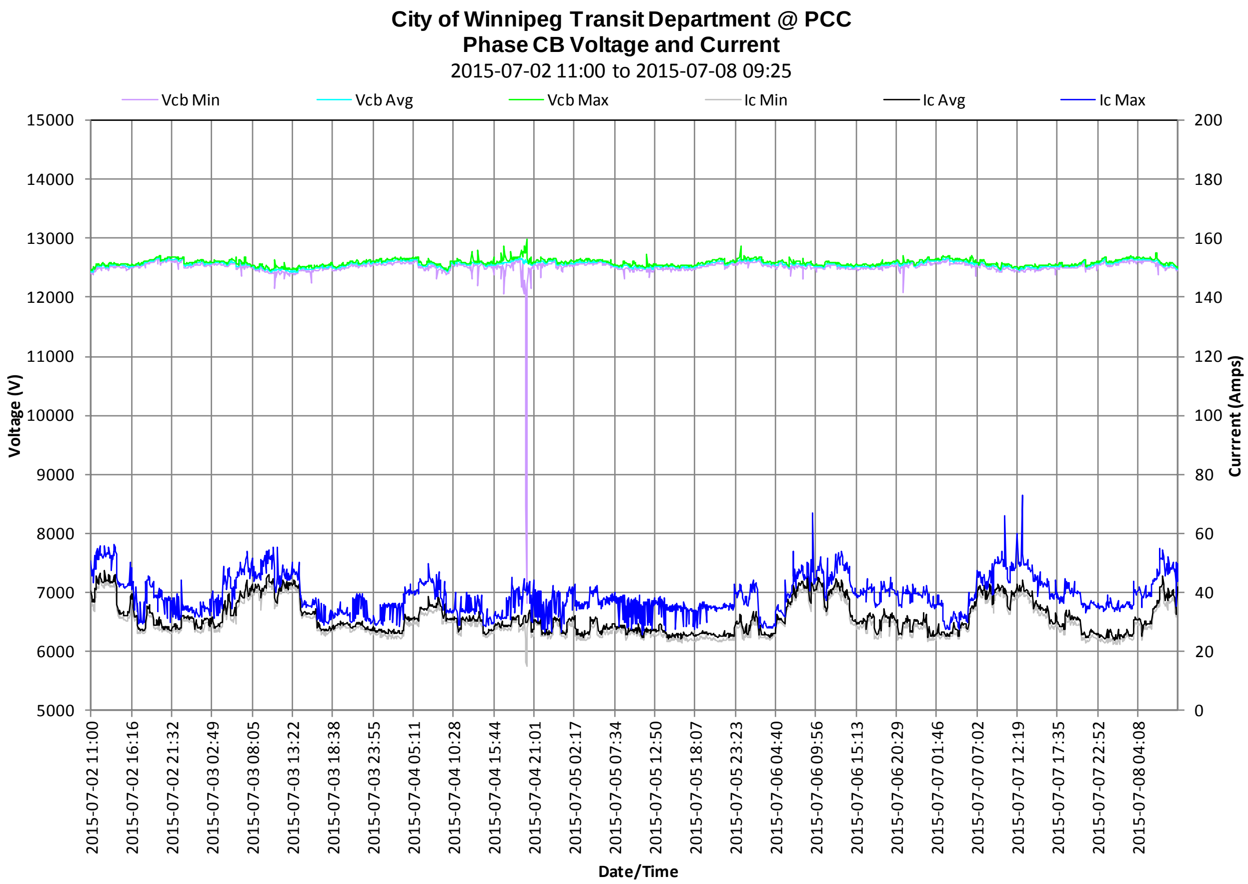
Voltage – AB

Min	7305	20:05 Jul 04, 15
Avg	**12541**	
Max	13076	20:05 Jul 04, 15

Current – A

Min	16.3	20:00 Jul 04, 15
Avg	**31.2**	
Max	67.0	13:00 Jul 07, 15

Figure 4



Voltage – CB		
Min	6824	20:05 Jul 04, 15
Avg	**12556**	
Max	12990	20:05 Jul 04, 15
Current – C		
Min	15.2	20:05 Jul 04, 15
Avg	**31.7**	
Max	72.9	13:00 Jul 07, 15

3.2 Voltage Unbalance

Voltage unbalance was not evaluated as the monitoring information collected was from a 2 element revenue metering system which only provides voltage and current information from two phases.

3.3 Voltage Harmonics

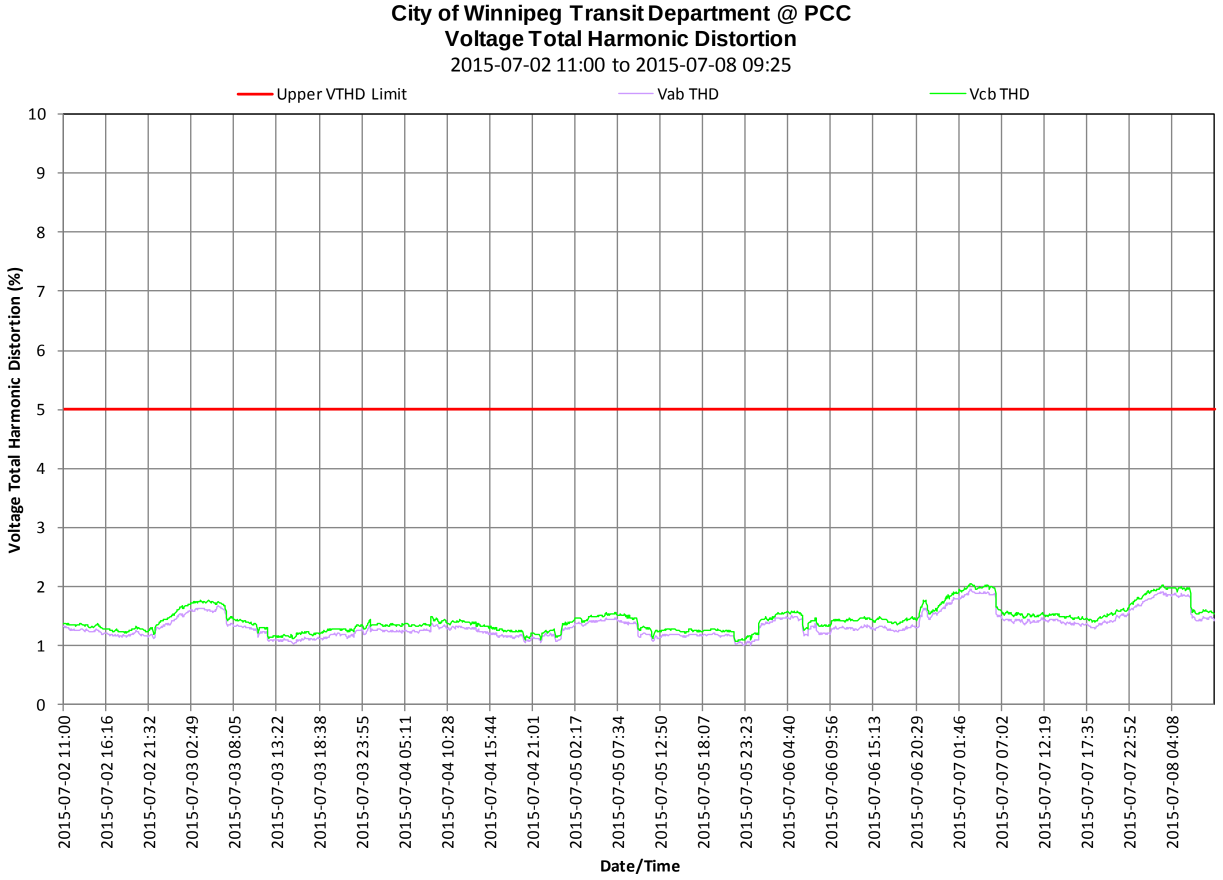
Voltage total harmonic distortion (THD) was within acceptable limits 100% of the time during the monitoring period as required by Manitoba Hydro’s Power Quality Specification PQS2000-01. The average voltage THD and average voltage THD upper limit are provided in the Table 2 below.

Table 2 - Voltage Total Harmonic Distortion Limits

Indices	Measured Value	Upper Limit	Comments
Voltage Total Harmonic Distortion	2.1 %	5 %	Within PQS2000-01 Section 2.4.2 limit

Figure 5 below shows the average voltage THD and the upper voltage THD limit.

Figure 5



	Voltage THD – AB			Voltage THD – CB	
Min	1.0	23:15 Jul 05, 15	Min	1.1	22:05 Jul 05, 15
Avg	**1.3**		**Avg**	**1.4**	
Max	1.9	03:20 Jul 07, 15	Max	2.1	03:20 Jul 07, 15

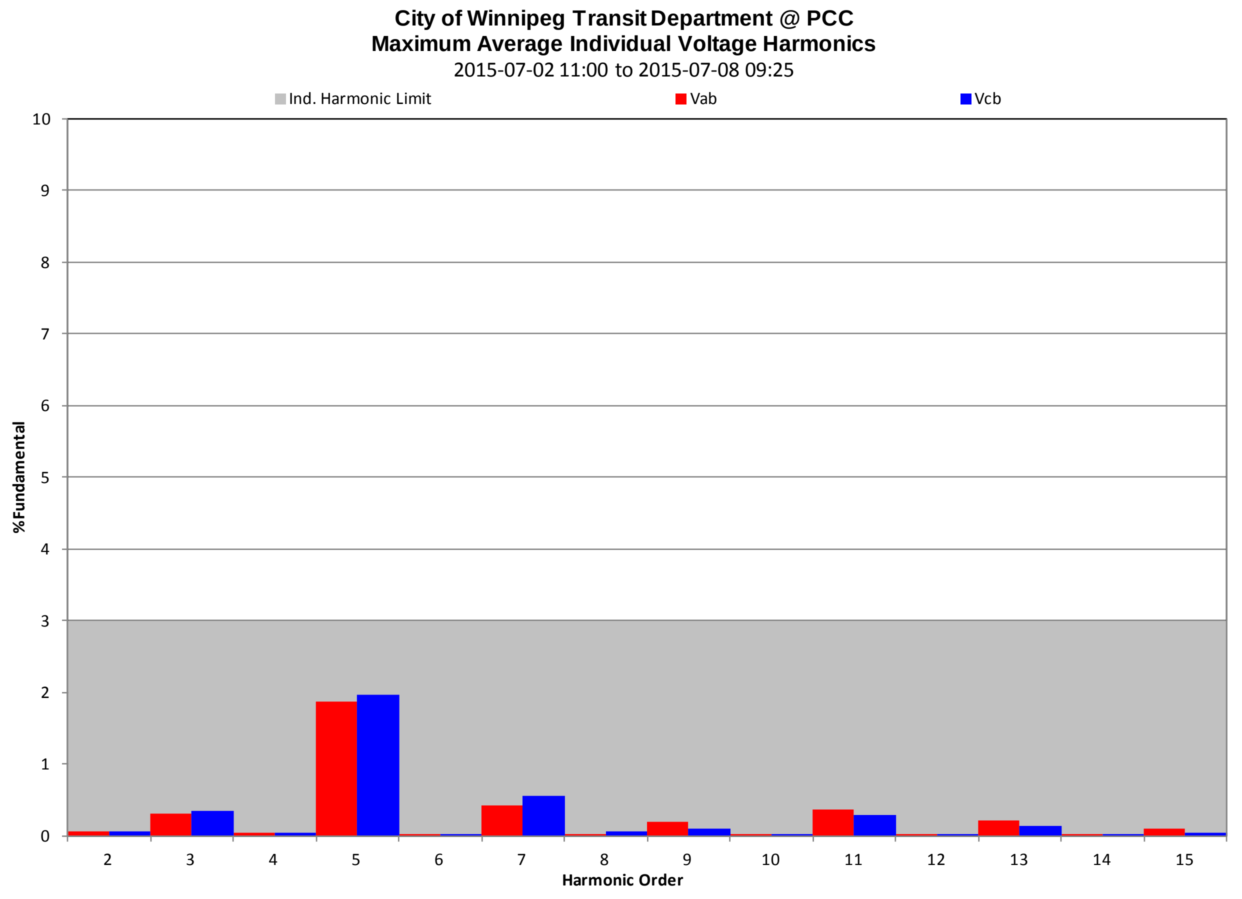
Individual maximum average voltage harmonics were within acceptable limits 100% of the time during the monitoring period as required by Manitoba Hydro's Power Quality Specification PQS2000-01. The individual voltage harmonics and applicable limit are provided in Table 3 below.

Table 3 - Maximum Average Individual Voltage Harmonic Limits

Phase	Harmonic Range	Largest Harmonic	Magnitude (% Fundamental)	Upper Limit	Comments
AB	h≥2	5	1.9 %	3 %	Within PQS2000-01 Section 2.4.2 limit
CB	h≥2	5	2.0 %	3 %	Within PQS2000-01 Section 2.4.2 limit

Figure 6 below shows the individual maximum average voltage harmonics and individual maximum average voltage harmonic limit.

Figure 6



3.4 Current Harmonics

Current total demand distortion (TDD) was within acceptable limits at least 95% of the time during the monitoring period as required by Manitoba Hydro's Power Quality Specification PQS2000-01.

The limit for current TDD is determined based on the ratio of symmetrical short circuit level to City of Winnipeg Transit Department's transformer rating.

The transformer rating and the symmetrical short circuit level are below for City of Winnipeg Transit Department at 12.47 kV:

Short Circuit level at Transformer Primary *	9117	A	I_{SC}
Manitoba Hydro Transformer Rating - 1500 kVA	69	A	I_L
I_{SC}/I_L =	**132**		

* NOTE: The identified fault current (I_{SC}) is not to be used for equipment sizing, harmonic mitigation or arc flash calculations. It is only to be used to establish current total demand distortion limits.

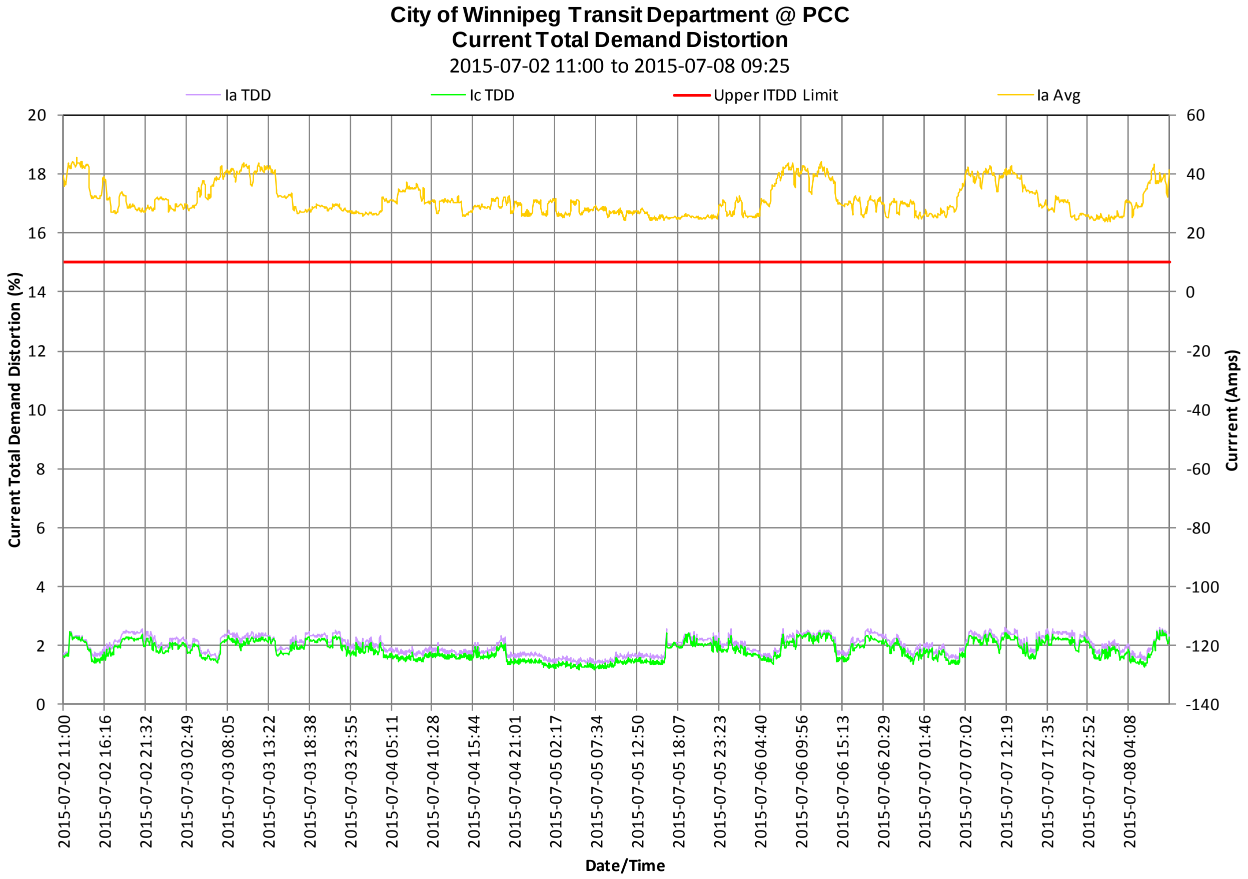
The current TDD and applicable limit based on the ratio of I_{SC} to I_L are provided in Table 4 below. Note that City of Winnipeg Transit Department should operate their facility such that their TDD remains below the limit specified at least 95% of the time.

Table 4 - Current Total Demand Distortion Limits

Indices	Measured Value	Upper Limit	Comments
Current Total Demand Distortion	2.5 %	15 %	Within PQS2000-01 Section 2.4.3 limit

Figure 7 on page 13 shows the average current TDD and upper current TDD limit.

Figure 7



	Current TDD – A			**Current TDD – C**	
Min	1.4	05:20 Jul 05, 15	Min	1.2	07:25 Jul 05, 15
Avg	**2.0**		**Avg**	**1.8**	
Max	2.6	12:15 Jul 07, 15	Max	2.5	08:10 Jul 08, 15
95%	2.5*		95%	2.3*	

*Measurements were less than or equal to value for 95% of the monitoring period.

Individual current harmonics were within acceptable limits at least 95% of the time during the monitoring period as required by Manitoba Hydro's Power Quality Specification PQS2000-01. The individual current harmonics and limits for each range of harmonics are provided in Table 5 below.

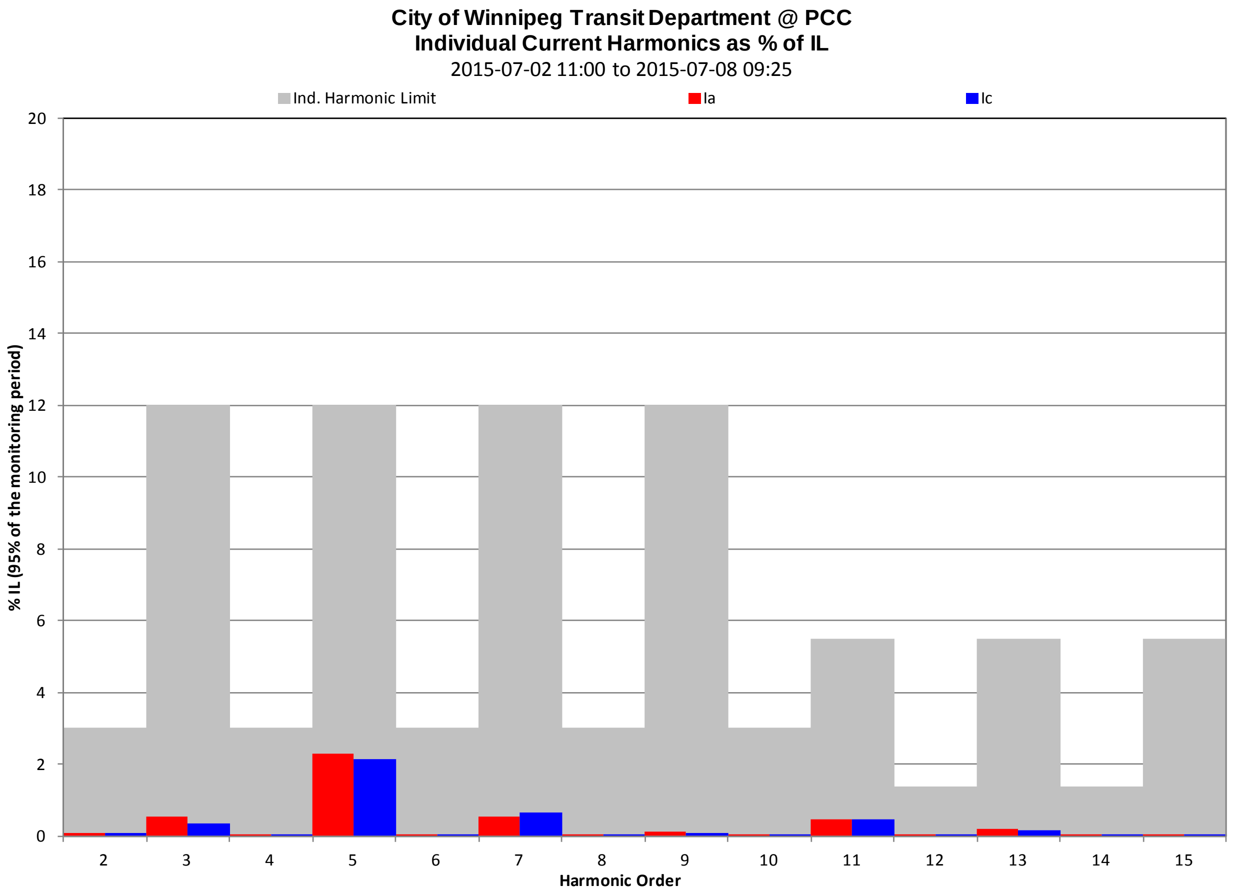
Table 5 - Individual Current Harmonic Limits

Phase	Harmonic Range	Largest Harmonic	Magnitude (% I_L)	Upper Limit*	Comments
A	h<11 11≤h<17	5 11	2.3 % 0.5 %	12.0 % 5.5 %	Within PQS2000-01 Section 2.4.3 limit
C	h<11 11≤h<17	5 11	2.1 % 0.5 %	12.0 % 5.5 %	Within PQS2000-01 Section 2.4.3 limit

*Note that the limit for even harmonics is 25% that of the limit for odd harmonics.

Figure 8 below shows the individual current harmonics and the upper individual current harmonic limits.

Figure 8



3.5 Voltage Flicker

Short Term Flicker (PST) and Long Term Flicker (PLT) were found to be within acceptable limits at least 99% of the time during the monitoring period as required by Manitoba Hydro's Power Quality Specification PQS2000-01. The PST and PLT and their limits are provided in Table 6 below.

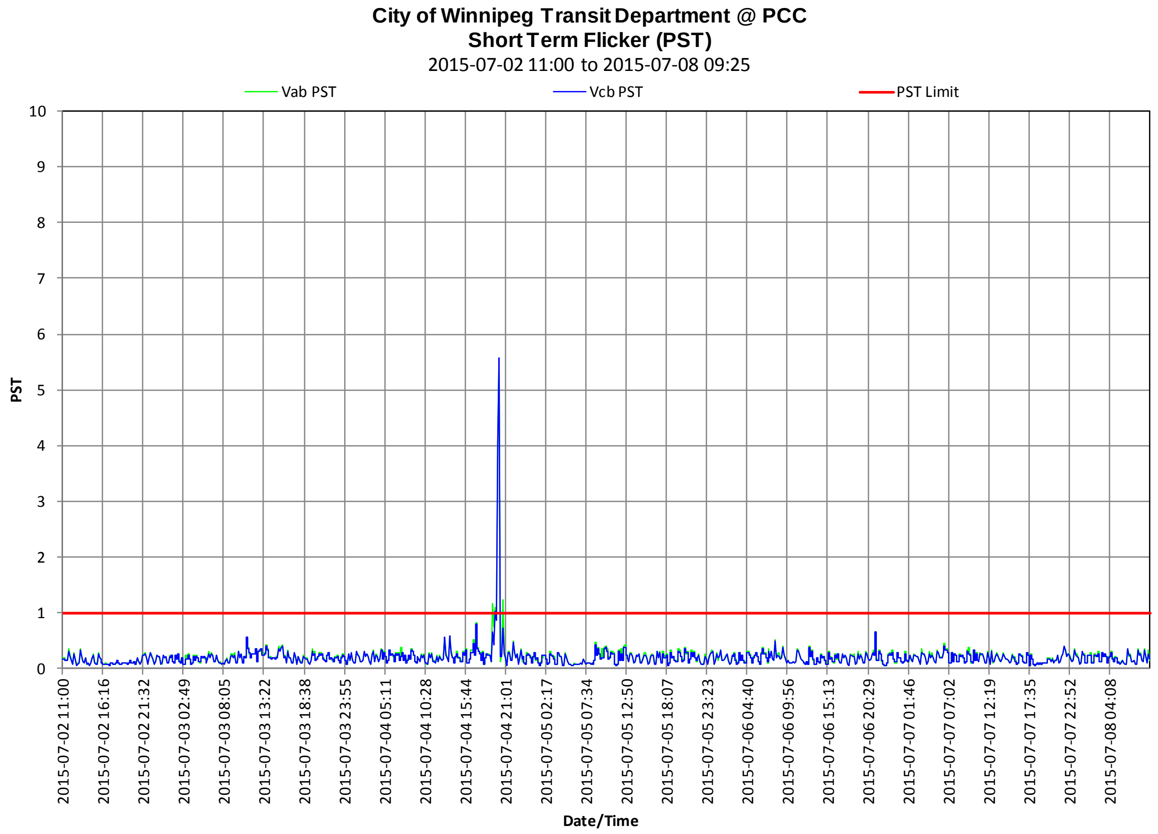
The event on July 4th was utility in origin. The 99% values exclude this event data.

Table 6 - Voltage Flicker Limits

Indices	Measured Value	Upper Limit	Comments
Short Term Flicker (PST) - 99th Percentile	0.57	1.0	Within PQS2000-01 Section 3.3.1 limit
Long Term Flicker (PLT) - 99th Percentile	0.42	0.8	Within PQS2000-01 Section 3.3.1 limit

Figure 9 below shows the PST and its upper limit. Figure 10 on page 16 shows the PLT and its upper limit.

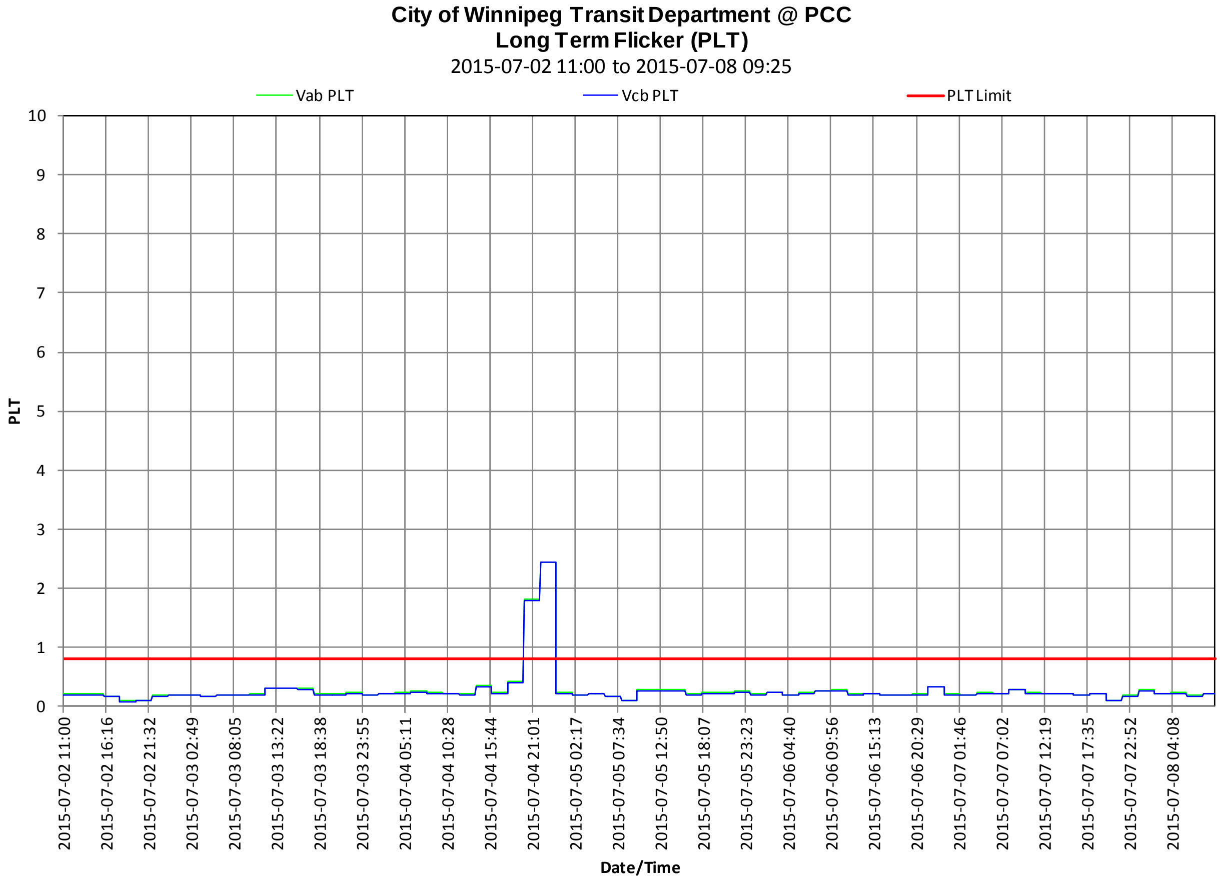
Figure 9



PST – AB			**PST – CB**		
Min	0.06	05:50 Jul 05, 15	Min	0.06	22:50 Jul 06, 15
Avg	**0.21**		**Avg**	**0.20**	
Max	5.57	20:10 Jul 04, 15	Max	5.57	20:10 Jul 04, 15
99%	0.57*		99%	0.56*	

*Measurements were less than or equal to value for 99% of the monitoring period.

Figure 10



PLT – AB			**PLT – CB**		
Min	0.09	18:00 Jul 02, 15	Min	0.09	18:00 Jul 02, 15
Avg	**0.28**		**Avg**	**0.27**	
Max	2.44	22:00 Jul 04, 15	Max	2.43	22:00 Jul 04, 15
99%	0.42*		99%	0.41*	

*Measurements were less than or equal to value for 99% of the monitoring period.

4 POWER DATA

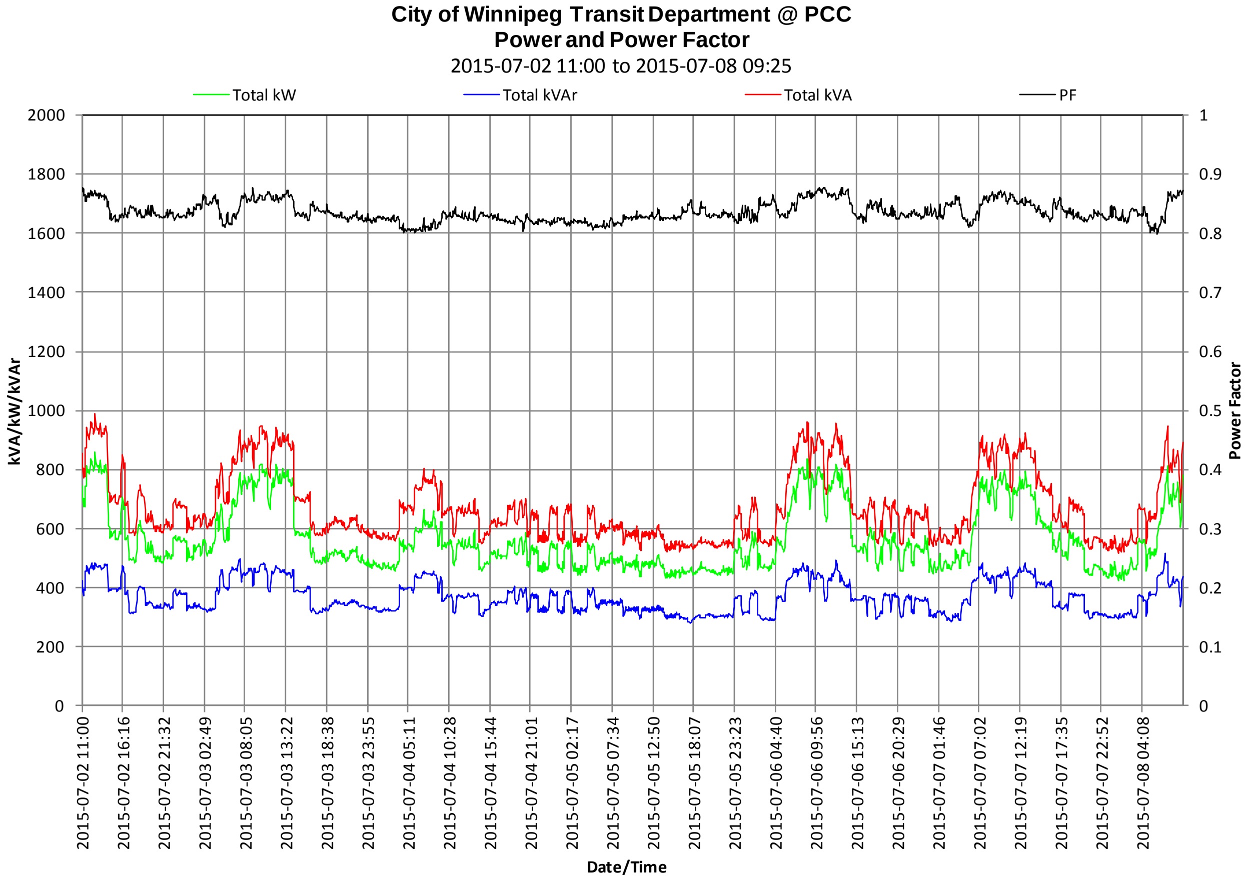
This section provides the power data recorded at City of Winnipeg Transit Department.

4.1 Power and Power Factor

The peak demand recorded during the monitoring period was 987 kVA with a lagging power factor of 0.87. This peak occurred on July 2, 2015 at 12:45. The highest peak demand recorded in the last 12 month period was 1229 kVA recorded in March 2015.

Figure 11 below shows the power data recorded during the monitoring period. This data is not evaluated against any limit, but is provided for City of Winnipeg Transit Department's interest.

Figure 11



Total kW			**Total kVAr**		
Min	422	01:05 Jul 08, 15	Min	282	17:45 Jul 05, 15
Avg	**565**		**Avg**	**369**	
Max	860	12:45 Jul 02, 15	Max	515	07:05 Jul 08, 15
Total kVA			**Power Factor**		
Min	514	01:05 Jul 08, 15	Min	0.80	06:05 Jul 08, 15
Avg	**675**		**Avg**	**0.84**	
Max	987	12:45 Jul 02, 15	Max	0.88	09:05 Jul 03, 15
Monitoring Period Peak Demand					
Peak Demand	987	July 2, 2015 at 12:45	PF	0.87	

4.2 Power Factor Correction

This section provides background information on power factor correction and identifies typical demand savings. These are estimated savings, which could be realized by reducing the demand (kVA) requirements of the City of Winnipeg Transit Department facility.

Opportunities exist to reduce the demand portion of the electrical bill and the details regarding the estimated savings associated with a variety of different capacitor sizes are outlined in the power factor optimization provided in Table 7 on page 19.

As an example, if a 300 kVAR capacitor was installed, the approximate annual savings for the past year would have been $12,277 before taxes and the power factor would be approximately 0.977.

Note that this table is provided for informational purposes only. The savings contained in the table are not guaranteed and are only estimates based on the measurements taken in this benchmark.

Table 7

Power Factor Optimization

City of Winnipeg Transit Department

421 Osborne St. Winnipeg, City Centre District

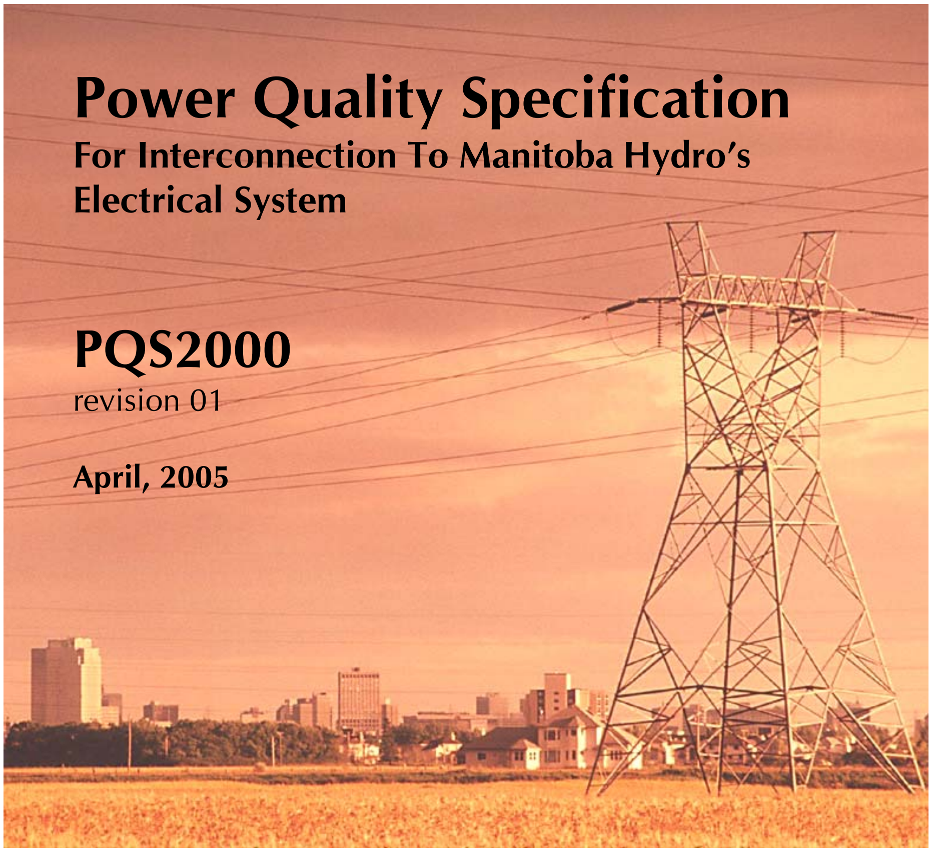
Premise: 6399318

DEMAND	987	kVA (Measured)
P.F.	0.87	Measured
kW	859	Calculated
kVAR	487	Calculated
Demand Rate	9.45	MH Demand Charge General Service Medium. Before taxes.

Capacitor Size (kVAr)	50	150	250	300	400
New Power Factor	0.891	0.931	0.964	0.977	0.995
Avg Demand kVA	987	987	987	987	987
KVA reduced	24	65	96	108	124
NEW KVA	963	922	891	879	863
ANNUAL SAVINGS	$2,684	$7,335	$10,920	$12,277	$14,056

Capacitors	**$/kVAr**	**Simple Payback Period - Years**				
CAPITAL COST	$20.0	0.37	0.41	0.46	0.49	0.57
	$30.0	0.56	0.61	0.69	0.73	0.85
	$40.0	0.75	0.82	0.92	0.98	1.14
	$50.0	0.93	1.02	1.14	1.22	1.42
	$60.0	1.12	1.23	1.37	1.47	1.71
	$70.0	1.30	1.43	1.60	1.71	1.99
	$80.0	1.49	1.64	1.83	1.95	2.28
	$90.0	1.68	1.84	2.06	2.20	2.56
	$100.0	1.86	2.05	2.29	2.44	2.85
	$110.0	2.05	2.25	2.52	2.69	3.13
	$120.0	2.24	2.45	2.75	2.93	3.41
	$130.0	2.42	2.66	2.98	3.18	3.70
	Notes:	1. Assumes operation is similar for 12 months				

APPENDIX A   Power Quality Specification PQS2000-01



Power Quality Specification

For Interconnection To Manitoba Hydro's Electrical System

PQS2000

revision 01

April, 2005

Table of Contents

1.0 General Information

1.1 Legislative Authority

Section 15(5) of The Manitoba Hydro Act authorizes Manitoba Hydro to set, coordinate and enforce standards for the security, reliability and quality control of the transmission and distribution lines, of any person whose lines are interconnected with the transmission and distribution lines of Manitoba Hydro. Pursuant to section 10 of Regulation 186/90 – Electric Power Terms and Conditions of Supply, Manitoba Hydro is authorized to determine the voltage, frequency, phasing and other characteristics of power, the determination of which is final and binding on the user. Pursuant to this legislative authority, Manitoba Hydro has established the following Power Quality Specification.

1.2 Authors

The primary authors of this document are:

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System Planning Dept.
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It was written in collaboration with, and is maintained by, the Manitoba Hydro Power Quality Committee which includes representation from the following departments:

Service Quality
Business Engineering Services Department
System Planning Department
System Performance Department
Electrical Distribution Planning & Design Department

1.3 Revisions

Revision Date	Major Changes
01 – January 2005	▪ added Flicker criteria ▪ revised harmonic burst criteria ▪ revised the section related to mitigation responsibilities ▪ created a General Information section
00 – November 2000	Document created, addressed harmonics only

note:

Manitoba Hydro will review this document periodically and make revisions necessary to reflect changing system conditions and industry practices. When revisions are made, Manitoba Hydro will distribute the revised document to all regular recipients as soon as practically possible and make copies available upon request, however, it is the customer’s responsibility to ensure it has the latest version of this document.

1.4 Mitigation Of Power Quality Problems

When Limits Are Exceeded:

It is Manitoba Hydro intent to plan and design its system so power quality levels are within the limits specified in this document.

In emergency situations, it may be necessary for Manitoba Hydro to make temporary changes to its system which may adversely affect power quality levels. Under these circumstances, distortion and/or flicker levels at the PCC may be temporarily exceeded.

The Manitoba Hydro service contract deals with concerns when limits are exceeded and covers responsibilities for mitigation of power quality interference issues.

Manitoba Hydro may perform a post installation Power Quality analysis for comparison with the original benchmark. If power quality limits are exceeded, Manitoba Hydro will assist the customer in determining the cause of the problem only.

1.5 Definitions

The following definitions are specific to Manitoba Hydro and may differ from those used by IEEE and other Industry Standards:

Flicker: flicker is the impact a voltage fluctuation has on the luminous intensity of lamps and fluorescent tubes such that they are perceived to ‘flicker’ when viewed by the human eye. The level at which it becomes irritating is a function of both the magnitude of the voltage change and how often it occurs.

Flicker is quantified using the following:

Pst: the short-term flicker index, a unit of flicker level as defined in IEC Standard 61000-4-15 based on a 10 minute period. P_{st} is obtained by direct measurement using the IEC “flicker meter”, calculated analytically, or obtained through computer simulation. In North America, a P_{st} of 1.0 (one) corresponds to the ‘threshold of flicker irritation’ for rectangular (step) voltage changes applied to a 120V incandescent lamp.

Plt: the long-term flicker index. P_{lt} is calculated using 12 consecutive (120 minutes) P_{st} samples and is given by:

$$P_{lt} = \sqrt[3]{\frac{1}{12} \cdot \sum_{j=1}^{12} P_{st_j}{}^{3}}$$

Emission Level: the maximum allowable P_{st} contribution available to a customer connecting a load assuming there is zero background flicker.

Planning Level: this is the maximum P_{st} and P_{lt} level used by the utility for planning purposes and is used to control the cumulative impact of all fluctuating loads connected to the system.

Flicker Curve: a graph that plots voltage fluctuations vs. frequency of occurrence. The points on the curve are based on laboratory experiments that applied a periodic voltage fluctuation to a light bulb and determined the levels at which the flicker becomes irritating to the human eye. Most published flicker curves are based on rectangular modulation of the 60 Hz AC voltage waveform.

Flicker meter: an instrument used to measure the severity of flicker and determine the level in terms of P_{st} and P_{lt}. The specifications for a flicker meter are outlined in IEC Standard 61000-4-15.

Point Of Common Coupling (PCC): the location on the Manitoba Hydro system electrically nearest to the customer installation. It is where access for Power Quality measurement is obtained and other customers are, or can be, connected. It can be located on either the primary or secondary side of a supply transformer depending on whether multiple customers are supplied from the transformer.

Power Quality Assessment and Mitigation Report: a technical report supplied to Manitoba Hydro by the customer which includes the following:

- detailed description of equipment being installed including all nameplate data, single-line diagrams, etc.
- projected impact new equipment will have on harmonic and flicker levels
- projected levels of interference with communication circuits
- description of measures that will be taken to mitigate harmonic levels exceeding the limits specified in this document
- description of measures that will be taken to mitigate flicker levels exceeding the limits specified in this document
- calculations and/or computer simulation that verifies corrective measures will work

Power Quality Benchmark: measurements taken at the PCC which include voltage and current levels, voltage and current total harmonic distortion trending, power usage and power factor. Usually performed before new non-linear loads are installed in order to establish baseline characteristics of the system and allow for future comparisons.

Total Harmonic Distortion (THD): total harmonic distortion is defined as:

$$THD = \frac{\sqrt{\sum_{h=2}^{50} V_h^2}}{V_1} \times 100\%$$

where:

V_h = magnitude of individual harmonic components at frequency '*h*'
h = harmonic frequency (of 60Hz) which can be integer or non-integer (interharmonic)
V_1 = the magnitude of the nominal fundamental frequency voltage

Total Demand Distortion (TDD): total demand distortion is defined as:

$$TDD = \frac{\sqrt{\sum_{h=2}^{50} I_h^2}}{I_L} \times 100\%$$

where:

Ih = magnitude of individual harmonic components
h = harmonic frequency of (60Hz) which can be integer or non-integer (interharmonic)
I_L = maximum annual demand load current (fundamental frequency component) at PCC

Voltage Variation: a change in the magnitude of the RMS voltage level. Voltage variations are generally of three types:

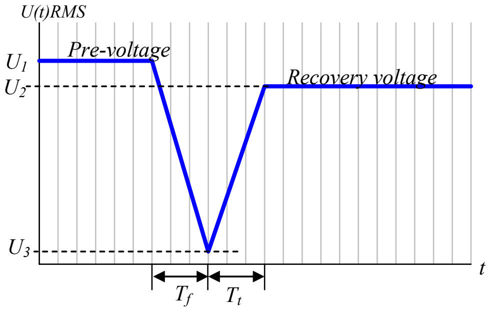
i) **Voltage Sag**: a voltage variation in which the magnitude of the RMS voltage drops to a level below nominal, then returns to nominal. The voltage magnitude is typically between 0.1 and 0.9 *per-unit* (PU), and lasts anywhere from 0.5 cycles to 1 minute. A variation that is under 0.5 cycles is called a *'transient*', and anything over 1 minute is considered an *'under voltage*'.

ii) **Voltage Swell**: a voltage variation in which the magnitude of the RMS voltage increases to a level above nominal, then returns to nominal. The voltage magnitude is typically between 1.1 and 1.8 PU, and lasts anywhere from 0.5 cycles to 1 minute.

iii) **Voltage Fluctuation**: a series of voltage changes or a continuous variation on the RMS voltage magnitude. Fluctuations are typically small voltage variations, (but not necessarily), ranging anywhere between 0.9 and 1.1 PU in magnitude.

Voltage fluctuations can be one of two types:

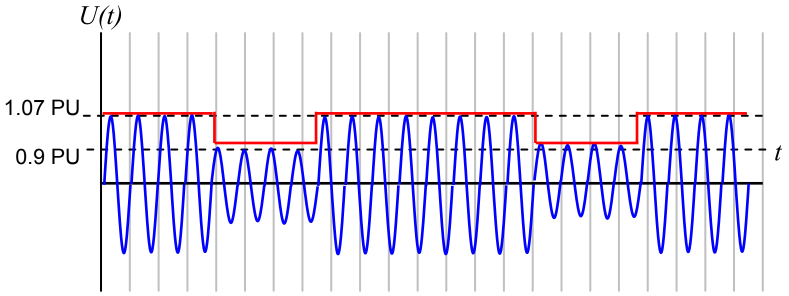
Dynamic (aperiodic) Fluctuations are caused by the starting and stopping of large inductive loads. Starting a motor or energizing a transformer are good examples. The RMS voltage drops, then recovers to a steady-state level that is less than the pre-voltage. One dynamic fluctuation produces 2 voltage changes.



T_f = front time
T_t = tail time

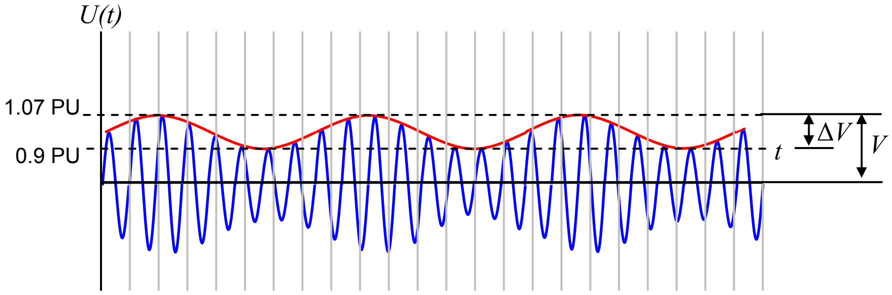
Cyclic (periodic) Fluctuations are part of the normal, continuous operation of the load. The RMS voltage magnitude varies between two values resulting in amplitude modulation of the AC sine wave envelope.

Periodic voltage fluctuation that results in rectangular modulation of the 60 Hz waveform.
e.g.: wood running through a sawmill

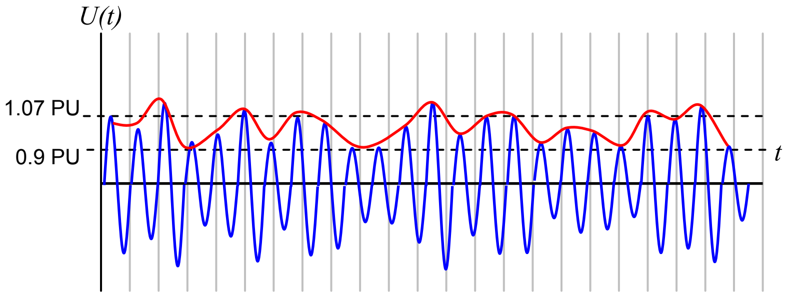


Periodic voltage fluctuation that results in sinusoidal modulation of the 60 Hz waveform. The %voltage fluctuation is calculated using:

$$\frac{\Delta V}{V} \cdot 100$$



Periodic voltage fluctuation that results in random modulation of the 60 Hz waveform.
e.g.: arc furnace during its melting cycle



2.0 Waveform Distortion

2.1 Introduction

If a load draws a sinusoidal current when it is connected to a sinusoidal voltage supply, it is called a 'linear' load. When the load draws a non-sinusoidal (distorted) current, the load is called 'non-linear'. When non-linear currents are allowed to flow through the linear elements in a utility electrical system, the resulting voltage drops are non-sinusoidal. If allowed to accumulate, they can degrade the quality of the utility supply voltage. One way to control utility voltage quality is to limit the amount of waveform distortion produced by individual non-linear loads.

2.1.1 Purpose

The purpose of this section is to establish responsibilities and to specify limits for harmonic and interharmonic distortion created by non-linear loads connecting to the Manitoba Hydro electrical system.

2.2 General Requirements

It is Manitoba Hydro's responsibility to provide and maintain a voltage supply within harmonic limits as specified in this document. Based on engineering information provided by Manitoba Hydro, it is the customer's responsibility to ensure its load does not increase harmonic levels on the Manitoba Hydro system beyond limits specified herein and does not impact other customers' electrical services. This section describes, in detail, the flow of information between Manitoba Hydro and the customer.

2.2.1 Customers Affected By This Document

All new or existing customers whose load may exceed acceptable harmonic levels or who may be affecting nearby customers are impacted by this document. This is typical of:

- customers adding large non-linear loads to the Manitoba Hydro system
- customers who have or who are considering installing power factor correction capacitors

2.2.2 Information Supplied By The Customer

Whenever customers propose connecting equipment (as defined in 2.2.1) to the Manitoba Hydro system, or whenever existing customers may be exceeding harmonic limits, Manitoba Hydro requires all relevant information pertaining to the connected loads, including:

i) single-line diagram of the installation
ii) all non-harmonic producing loads
iii) all harmonic producing loads and their harmonic spectrums
iv) transformer ratings and impedance
v) cable impedance that should be included for harmonic analysis
vi) power factor correction capacitor and filter information, if applicable

note: For 66kV and greater interconnections, refer to Manitoba Hydro's "Transmission System Interconnection Requirements" document for more details regarding other information that may be required.

2.2.3 Basis For a Power Quality Benchmark

Upon reviewing the information supplied in 2.2.2, Manitoba Hydro, at its discretion, will perform a Power Quality Benchmark measurement at the PCC. The basis for doing so will be determined using existing data and by the extent to which the Manitoba Hydro system will be impacted.

Whenever a Power Quality Benchmark measurement is performed, the following information will be supplied to the customer[1]:

system data:
i) normal short circuit MVA level at the PCC
ii) supply transformer nameplate information (when applicable)
iii) impedance spectrum at the PCC (when applicable)

measured data:
iv) voltage and current levels
v) total harmonic distortion, (voltage and current), at the PCC
vi) power usage and power factor

[1] Where a technical representative is acting on behalf of the customer, this information will be provided to the customer only, unless the customer has provided written consent for Manitoba Hydro to provide the information to such representative.

2.2.4 Power Quality Assessment and Mitigation Report

Upon receiving the Power Quality Benchmark information, the customer must provide Manitoba Hydro with a Power Quality Assessment and Mitigation Report. This report must include information outlined in Section 2.2.2 and demonstrate that the harmonic limits specified in section 2.4 are met. Service connection will not be granted until the report is received and reviewed by Manitoba Hydro.

2.3 Harmonic Measurement

Harmonics and interharmonics up to the 50th shall be included in all calculations.

2.3.1 Measurement Period

When performing a Power Quality Benchmark, Manitoba Hydro shall normally perform measurements at the customer PCC for one week (168 hour period) during typical production load levels. The effect of a shorter production cycle and seasonal variation of loads will be considered in determining when a benchmark is performed. Manitoba Hydro reserves the right to choose the date/time and duration of the benchmark measurements.

2.3.2 Analysis Period

The maximum allowable level of total demand distortion (TDD) is determined with reference to the customer's I_{SC}/I_L ratio and Table 2.4.3 of this document. Actual TDD is based on data obtained during the measurement period. All customer facilities are expected to be at or below the maximum allowable TDD 95% of the time during all normal operating cycles. For shorter periods, during start ups or other transient conditions, the limits may be exceeded by up to 50% (1.5x the design limit). The TDD must be less than 1.5x the design limit 99% of the time during all normal operating cycles, with no occurances exceeding 2.0x the design limit.

2.3.3 Equipment

Power harmonic analyzers must be capable of performing power quality measurements and harmonic calculations from n=1 to 50. They shall have a minimum sampling rate of 128 samples/cycle, (8kHz), with a resolution of at least once every 15 minutes.

2.4 Limits For Design Purposes

The criteria in this section shall be applied to design studies and equipment specifications.

2.4.1 Voltage Unbalance

The customer’s design shall account for unbalance in the voltage supply using Table 2.4.1, where unbalance is defined as the ratio of negative sequence voltage to positive sequence voltage, or alternatively,

$$\%unbalance = \frac{Highest\ deviation\ from\ the\ average\ voltage\ of\ the\ 3\ phases}{Average\ voltage\ of\ the\ 3\ phases}$$

Table 2.4.1 - Voltage Unbalance Limits

Voltage Level	**Rural**	**Urban**
25kV and less	5.0%	4.0%
greater than 25kV	2.0%	

2.4.2 System Voltage Distortion

Manitoba Hydro shall normally limit the voltage distortion levels at the PCC to a maximum of the following values:

Table 2.4.2 - Maximum System Voltage Distortion @PCC

Bus Voltage at PCC (V_{bus})	**Individual harmonic or interharmonic voltage distortion (%)**	**Total Voltage Distortion THD (%)**
69kV and less	3.0	5.0
138kV ≥ V_{bus} > 69kV	1.5	2.5
V_{bus} > 138kV	1.0	1.5

These values represent distortion levels based on the cumulative effect of all customers connected to the same point on the supply.

2.4.3 Customer Current Distortion

As part of the Harmonic Assessment and Mitigation Report, the customer shall demonstrate that current distortion limits at the PCC will not exceed the limits as specified in this document. The values are summarized in Table 2.4.3.

Table 2.4.3 – Current Distortion Limits
Maximum Harmonic Current Distortion In Percent of I_{Load}
Individual Harmonic Order (Odd Harmonics)

$V_{bus} \leq 69kV$						
I_{sc}/I_L	<11	$11 \leq h < 17$	$17 \leq h < 23$	$23 \leq h < 35$	$35 \leq h$	TDD
<20*	4.0	2.0	1.5	0.6	0.3	**5.0**
20 - 49	7.0	3.5	2.5	1.0	0.5	**8.0**
50 - 99	10.0	4.5	4.0	1.5	0.7	**12.0**
100 - 1000	12.0	5.5	5.0	2.0	1.0	**15.0**
>1000	15.0	7.0	6.0	2.5	1.4	**20.0**
$69kV < V_{bus} \leq 138kV$						
I_{sc}/I_L	<11	$11 \leq h < 17$	$17 \leq h < 23$	$23 \leq h < 35$	$35 \leq h$	TDD
<20*	2.0	1.0	0.75	0.3	0.15	**2.5**
20 - 49	3.5	1.75	1.25	0.5	0.25	**4.0**
50 - 99	5.0	2.25	2.0	0.75	0.35	**6.0**
100 -1000	6.0	2.75	2.5	1.0	0.5	**7.5**
>1000	7.5	3.5	3.0	1.25	0.7	**10.0**
$V_{bus} > 138kV$						
I_{sc}/I_L	<11	$11 \leq h < 17$	$17 \leq h < 23$	$23 \leq h < 35$	$35 \leq h$	TDD
<50*	2.0	1.0	0.75	0.3	0.15	**2.5**
≥50	3.0	1.5	1.15	0.45	0.22	**3.75**

- Harmonics and interharmonics up to $h = 50$ shall be included in all design calculations
- Even harmonics are limited to 25% of the odd harmonics listed above
- Current distortions that result in a DC offset, e.g., half-wave converters, are not allowed
- Duration of harmonic levels is outlined in section 2.3.2

*All power generation equipment is limited to these values of current distortion, regardless of actual I_{SC}/I_L or voltage level

where:

I_{SC} = short-circuit current for normal system conditions that result in minimum short circuit capacity at the PCC, considering all supply alternatives
I_L = maximum annual demand load current (fundamental frequency component) at PCC

2.4.4 Customer Voltage Distortion

The customer shall design its installation and specify equipment such that the steady state voltage distortion (VTHD) contribution due to the installation complies with Table 2.4.4 below.

Table 2.4.4 - Maximum Customer Voltage Distortion Design Limits

Bus Voltage at PCC (V_{bus})	Individual harmonic or interharmonic voltage distortion (%)	Total Voltage Distortion THD (%)
69kV and less	2.0	3.5
$138kV \geq V_{bus} > 69kV$	1.0	1.5
$V_{bus} > 138kV$	1.0	1.0

Table 2.4.4 ensures that total bus voltage distortion levels do not exceed levels specified in Table 2.4.2 particularly in the case of parallel resonance.

2.4.5 System Frequency

Calculations and design shall consider a fundamental frequency range of:

Table 2.4.5 – Frequency

Continuous	60 ± 0.2 Hz
≤ 30 seconds	58 Hz to 63.5 Hz

2.5 Limits of Interference With Communication Circuits

2.5.1 Power Line Interference on Telephone Lines

Communication circuits most susceptible to power line interference are low frequency, analog telephone circuits. The interference is a function of separation between the power circuit and the telephone line, the parallel distance, and the plant susceptibility and interference potential of the power line.

The interference potential of the power line can be estimated using the I·T product described by;

$$I \cdot T = I_{RMS} \times TIF$$

however, the complexity of the problem makes it extremely difficult to accurately calculate the interference level with all 3 factors included. As a result, this guideline relies on measurements to check compliance.

2.5.2 Design Limits

The maximum balanced and residual Inductive Influence (I·T) levels shall be as follows:

Table 2.5.1 – Maximum I*T Limits @PCC

Balanced I·T	Residual I ·T
6000	100

Power line influenced noise can be measured at the telephone plant. Using special instruments, “noise to ground” can be measured in dBrnc, (decibel C-message weighted). Measurements of noise to ground (Ng) ≤ 80 dBnrc will generally not cause telephone interference.

2.5.3 Communication Interference

Manitoba Hydro strives to keep the balanced I·T product harmonic interference level below 6000 on any one line that may cause induction into communication circuits. For any particular application, Manitoba Hydro is prepared, if necessary, to discuss the allowable I·T as specified in section 2.5 with the understanding that any required interference mitigation directly resulting is the responsibility of the customer.

After it has demonstrated that its plant meets minimum standards for integrity and susceptibility, the communication company, with Manitoba Hydro’s cooperation, is responsible for demonstrating the violation of telephone interference limits and identifying (when applicable) the customer suspected of causing interference problems.

3.0 Flicker

3.1 Introduction

Electrical equipment that is switched or switches as part of its normal operation, may cause voltage fluctuations. From a utility's perspective, there are 2 issues that raise concern:

- the risk of the voltage magnitude being outside accepted tolerances
- 'flicker' effect from light sources as a result of the fluctuation

Section 3.0 explains the flicker requirements of loads connecting to the Manitoba Hydro system.

3.1.1 Manitoba Hydro's Flicker Philosophy

Manitoba Hydro plans and designs its system primarily;

- to meet steady-state load demand (KVA) requirements
- to ensure steady-state voltage levels are within CSA Standards
- to maintain reliability levels that are as good or better than industry averages

For economic reasons, Manitoba Hydro does not plan or design its network to carry the starting current requirements of individual loads. As a result, voltage fluctuations introduced by these loads may cause visible flicker depending on the size of the load, the impedance of the system at that point, and the frequency of the fluctuations.

Manitoba Hydro's responsibility is to ensure that overall flicker levels are kept within acceptable levels by placing limits on voltage fluctuations introduced at the customer's point of common coupling. Based on engineering information provided by Manitoba Hydro, it is the customer's responsibility to ensure its load does not introduce voltage fluctuations beyond limits specified in this document.

3.1.2 Purpose

Section 3.0 establishes a uniform practice pertaining to voltage fluctuations and their impact on the Manitoba Hydro electrical system and other customers. This creates equity among customers in different parts of the Province, clarifies responsibilities of both the customer and Manitoba Hydro, and protects the overall integrity of the Manitoba Hydro system.

3.1.3 Scope

Section 3.0 establishes responsibilities for and specifies limits of voltage fluctuations introduced at the point of common coupling between the Manitoba Hydro electrical system and its customers. It covers the following voltage ranges:

HV System	> 25 kV
MV System	1000 V - 25 kV
LV System	<1000 V

This is a technical document and does not address other policy or contractual requirements associated with interconnection to the Manitoba Hydro system.

3.2 General Information

3.2.1 Customers Affected By This Section

All new or existing customers whose load introduces voltage fluctuations, or who may be affecting nearby customers are impacted by this document. This is typical of:

- customers adding large non-linear loads to the Manitoba Hydro system
- customers who have or who are considering installing large motors (typically 15hp or greater for 3 phase, and 5hp or greater for 1 phase)

3.2.2 Information Supplied By The Customer

Whenever customers propose connecting equipment (as defined in section 3.2.1) to the Manitoba Hydro system, or whenever existing customers are introducing voltage fluctuations that cause other customers to complain, Manitoba Hydro requires all relevant information pertaining to the connected load(s).

General information is documented in the Electric Service Application form. Additional information specific to flicker producing loads includes;

- the load starting request form
- maximum %voltage fluctuation and expected rate of fluctuation during steady state operation

3.2.3 Information Supplied To The Customer

For motors and other large loads, Manitoba Hydro will provide load starting calculations and starting restriction(s).

In the case of load that produce periodic fluctuations during steady state operation, Manitoba Hydro shall provide;

- a background flicker measurement
- the short circuit MVA at the PCC

3.2.4 Power Quality Assessment and Mitigation Report

After the exchange of information, the customer shall provide Manitoba Hydro with a Power Quality Assessment and Mitigation Report that includes the expected flicker emission levels of the new load.

Manitoba Hydro, at its discretion, may perform a post installation flicker measurement to ensure that planning levels have not been exceeded by the addition of the new load(s). The results of the measurement shall be provided to the customer. They can also be provided to a consultant working on behalf of the customer, if the customer provides written consent for Manitoba Hydro to provide the results to such consultant.

3.3 Limits For Controlling Flicker Levels

Manitoba Hydro strives to maintain a cumulative background flicker (planning) level of **P_{ST} < 1.0** and **P_{LT} < 0.8**, 99% of the time**,** throughout its system. To achieve this, flicker emission limits have been established for individual loads connecting at various PCC voltages.

3.3.1 Limits For Flicker Levels

The customer shall design its equipment such that its flicker emission levels do not exceed the limits in table 3.3.1. The calculations shall assume there is no background flicker.

Table 3.3.1 – Customer Emission Limits[1]

PCC Voltage	P_{ST}	P_{LT}
LV (<1000 V)	1.0	0.8
MV (1000 V – 25 kV)	0.9	0.7
HV (>25 kV)	0.8	0.6

[1] at or below these limits, 99% of the time, based on a 7 day benchmark measurement or other representative load cycle 1 day or greater

3.3.2 Limits For Voltage Fluctuations

This section contains limits for voltage fluctuations introduced by individual loads. By establishing limits on individual voltage fluctuations, Manitoba Hydro can ensure customers meet the emission limits in table 3.3.1.

3.3.2.1 Automatic Acceptance

Generally speaking, if the rate of voltage fluctuation is known, the first step in evaluating the disturbance level of a new load is to relate the maximum apparent power (S_{max}) of the load to the short-circuit power (S_{sc}) available at the PCC:

$$\Delta V\% = \frac{S_{\max}}{S_{sc}} \cdot 100$$

- S_{max} should include the maximum power seen during starting
- for induction motors, S_{max} is typically 6X to 8X rated horsepower
- for induction furnaces, S_{max} is typically 2X to 4X rated KVA

Table 3.3.2 – Limits For Relative Power Variations[1]

Changes per minute	ΔV
< 10	0.4%
10 to 200	0.2%
> 200	0.1%

[1] Taken from IEC 1000-3-7 Table 4

Loads having *%ΔV* values at or below the levels specified in Table 3.3.2 are considered acceptable and **further flicker analysis is not required**. For values above the limits, sections 3.3.2.2 and 3.3.2.3 apply.

3.3.2.2 Limits For Dynamic Fluctuations

Dynamic voltage fluctuations are usually caused by the starting and stopping of motors. However, energization of other loads including transformers and capacitors may also cause brief voltage fluctuations. The primary reason for limiting dynamic fluctuations is to ensure proper operation of the load itself. The second reason is flicker. Although a single motor alone may not generate flicker complaints, the cumulative effect of several motors starting randomly on a distribution feeder can.

Using the information supplied by the customer in section 3.2.2, Manitoba Hydro first determines the ability of the system to supply the energy necessary to start and operate the proposed load(s). Using computer simulation of the supply circuit, the cumulative %voltage drop is calculated from the station to the customer PCC.

Based on the results of the simulation, Manitoba Hydro limits starting and operation of the load(s) to the values shown in table 3.3.3.

Table 3.3.3 - Load Starting Restrictions

Voltage Change @PCC	Restriction
<2.0%	no restriction
2.0 – 2.4%	twice per hour
2.5 – 2.9%	once per hour
3.0 – 3.4%	once every 2 hours
3.5 – 3.9%	once every 4 hours
4.0 – 4.9%	once per day
5.0 – 7.0%	not allowed[5]
>7%	not allowed[5]

Notes:

1. In some applications, a motor may cause voltage fluctuations during its steady state operation (jogging, jamming) and starting restrictions alone may not be sufficient. For these situations, section 3.3.2.3 applies.
2. For induction motors, Manitoba Hydro assumes a 6X locked rotor current.
3. Computer simulation is used to determine the maximum voltage fluctuation.
4. The table assumes **one start produces 2 voltage changes**.
5. Will be reviewed on a ‘case by case’ basis, and may be allowed in certain situations, (eg. a once-per-year transformer energization)

3.3.2.3 Limits For Periodic Fluctuations

When voltage fluctuations are produced by the normal, steady-state operation of a load (or loads), they are called 'periodic fluctuations'. Periodic fluctuations usually (but not necessarily) occur at frequencies greater than 1.0 changes/minute. Loads displaying this characteristic are typical of, but not limited to:

- arc furnaces
- welders
- motor jogging
- saw mills

Manitoba Hydro requires that individual loads do not introduce periodic fluctuations, at their PCC, above the curves shown in figure 3.3.1 below.

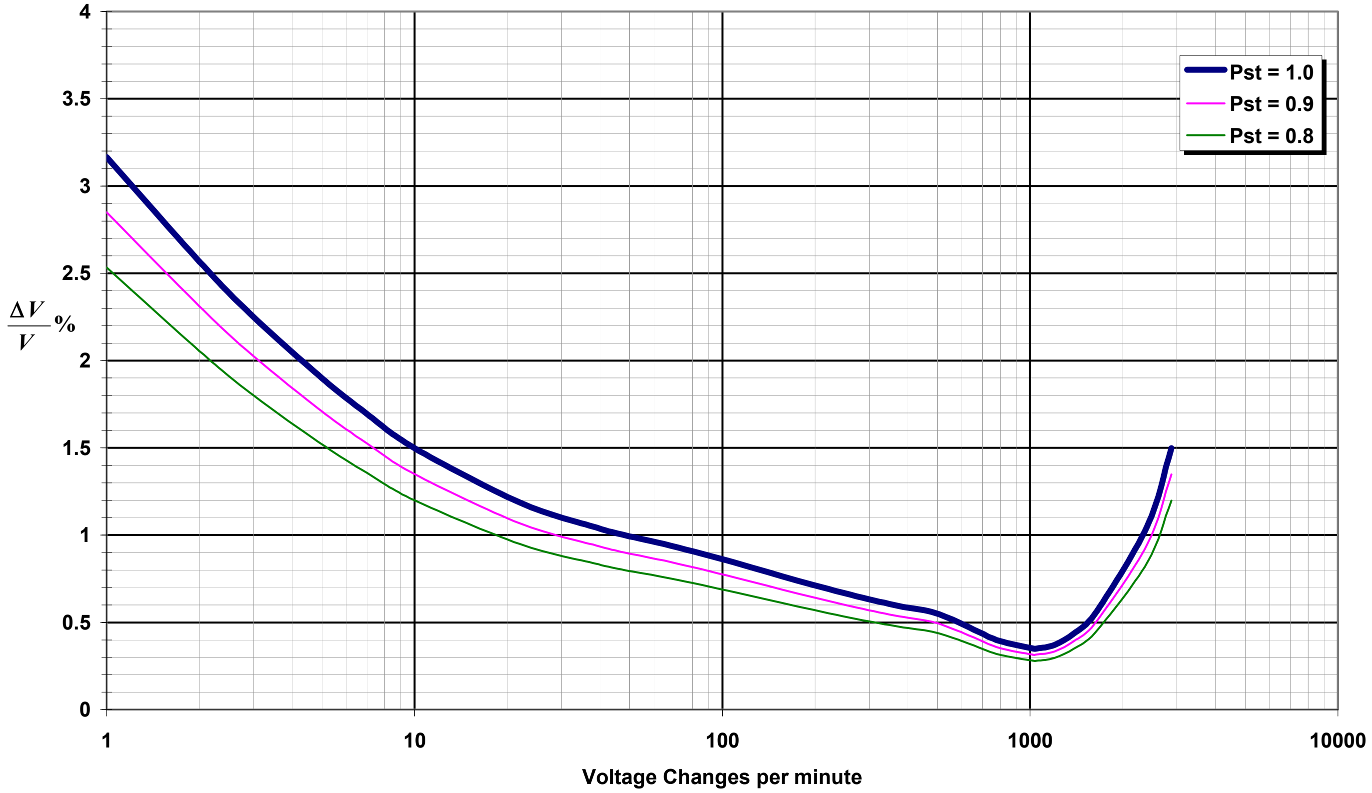


Figure 3.3.1 – CAN/CSA E1000-2-2-97 Flicker Curve For Periodic Voltage Fluctuations.

Notes:

1. The values were obtained experimentally through rectangular modulation of the 60 Hz AC waveform.
2. The human eye is most sensitive to fluctuations occuring at 8Hz, or 16 voltage changes per second. To convert the horizontal scale to fluctuations/sec. (Hz), divide by 120.
3. To meet the limits table 3.3.1, the %ΔV/V must fall on or below the corresponding P_{ST} curve, at the projected fluctuation rate. For loads with varying fluctuation rates (eg. arc furnace) %ΔV/V should be checked against a representative range of fluctuation rates.
4. See Appendix 2 for an enlarged version of the upper frequency range.

3.4 Application

3.4.1 Customers With Multiple Flicker Producing Loads

In some cases, customers may have more than one flicker producing load. The cumulative impact at the PCC is determined as follows:

For dynamic fluctuations:

- Starting restrictions in Table 3.3.3 have been conservatively selected to account for multiple voltage fluctuations
- For customers connecting multiple motors at PCC voltages 25kV and less, the %voltage fluctuation is calculated based on the largest motor. Motors cannot be started simultaneously.
- For multiple motors connected at PCC voltages greater than 24kV, cumulative flicker is calculated using the methods described in IEC standard 1000-3-7.

For periodic fluctuations:

- The cumulative effect of operating 2 or more arc furnaces, for example, will be evaluated using the methods described in IEC standard 1000-3-7 regardless of the system voltage.

3.4.2 Predicting P_{ST} Levels

For loads that produce periodic flicker, the P_{ST} emission level of an individual load can be predicted using a 2 step process.

Step 1: determine the %change in voltage fluctuation and fluctuation frequency

This requires the short circuit level and in-depth knowledge of the load and its operating characteristics. In some cases, applying the appropriate shape factor (see IEC 1000-3-7) may also be necessary. For arc furnaces, the fluctuation frequency is not constant and multiple frequencies will have to be examined.

Step 2: determine the P_{ST} level

Due to the linear relationship between the P_{ST} level and the flicker curve, the P_{ST} can be determined directly from the flicker curve in figure 3.3.1. For example, if the %ΔV/V = 0.7% with a frequency of 40 changes/minute, the expected P_{ST} level is 0.66.

Note: Manitoba Hydro will supply the short circuit level at the PCC. The customer is expected to provide the projected voltage fluctuation and fluctuation frequency (rate)

Several flicker levels can be added together using the following formula:

$$Total\ P_{ST} = \sqrt[3]{\sum_i {P_{ST_i}}^3}$$

3.4.3 Measuring Voltage Fluctuations and Flicker Levels

Background flicker levels and voltage fluctuations shall be measured by:

- capturing the inrush current and voltage sag event at the customer's PCC using a power quality device capable of capturing high speed events.
- measuring the overall flicker level (P_{ST} and P_{LT}) over a representative measurement period.

The flicker level shall be measured using a power quality device that meets the requirements of the IEC flickermeter standard 61000-4-15. A graph of the cumulative frequency vs. P_{LT} shall be at or below the limits in Table 3.3.1, 99% of the time.

Using the RMS waveform from the voltage sag event, the maximum voltage change for dynamic fluctuations shall be calculated by subtracting the minimum RMS voltage from the steady-state pre-voltage:

$$\%\text{voltage change} = \frac{U_1 - U_2}{U_1} \times 100\%$$

where U_1 and U_2 are shown in figure 3.4.1.

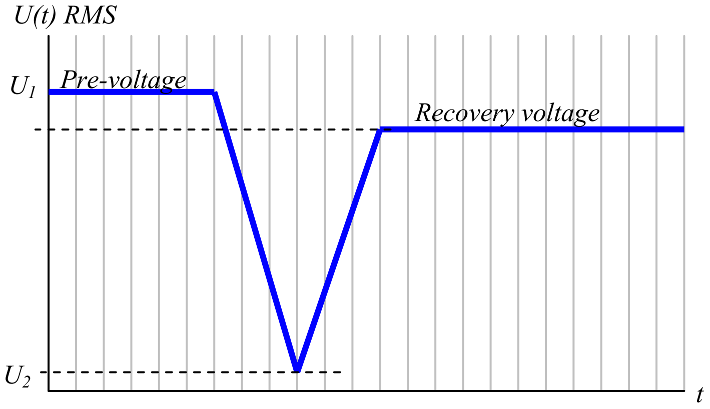


Figure 3.4.1 – RMS voltage profile of a dynamic voltage fluctuation.

The data from a flicker measurement shall be evaluated using a cumulative frequency method. This is explained in Appendix 3.

Appendix 1 – Bibliography

IEEE Std. 519: "IEEE Recommended Practices and Requirements for Harmonic Control in Electric Power Systems", 1992

IEEE P519A/D6: "Guide For Applying Harmonic Limits on Power Systems", January, 1999. (This guide is still in draft)

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CSA-C22.3 No.3: "Inductive Coordination", 1954 and No. 3.1: "Inductive Coordination Handbook", 1974. (This standard is currently under review)

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IEC 61000-4-15 (1997), "Testing and measurement techniques—Section 15: Flickermeter—Functional and design specifications," Geneva, 1997

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CAN/CSA-E1000-2-2-97: "Part 2: Environment Section 2: Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems" Sept. 1997

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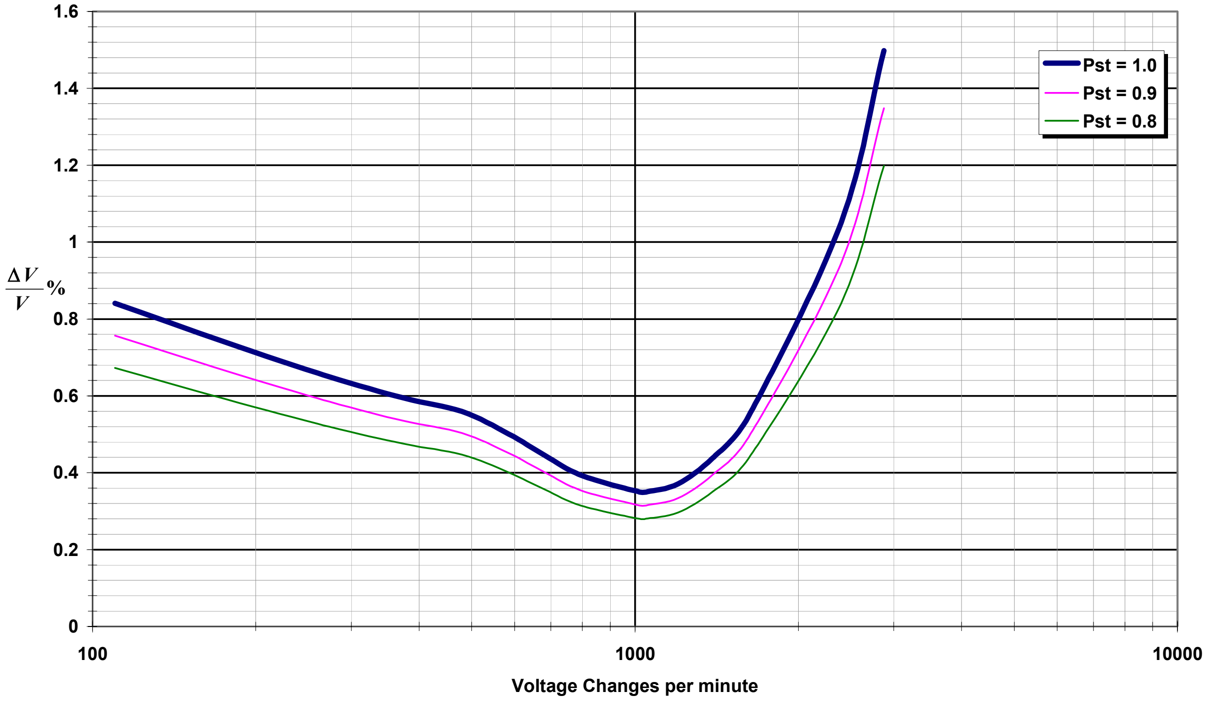
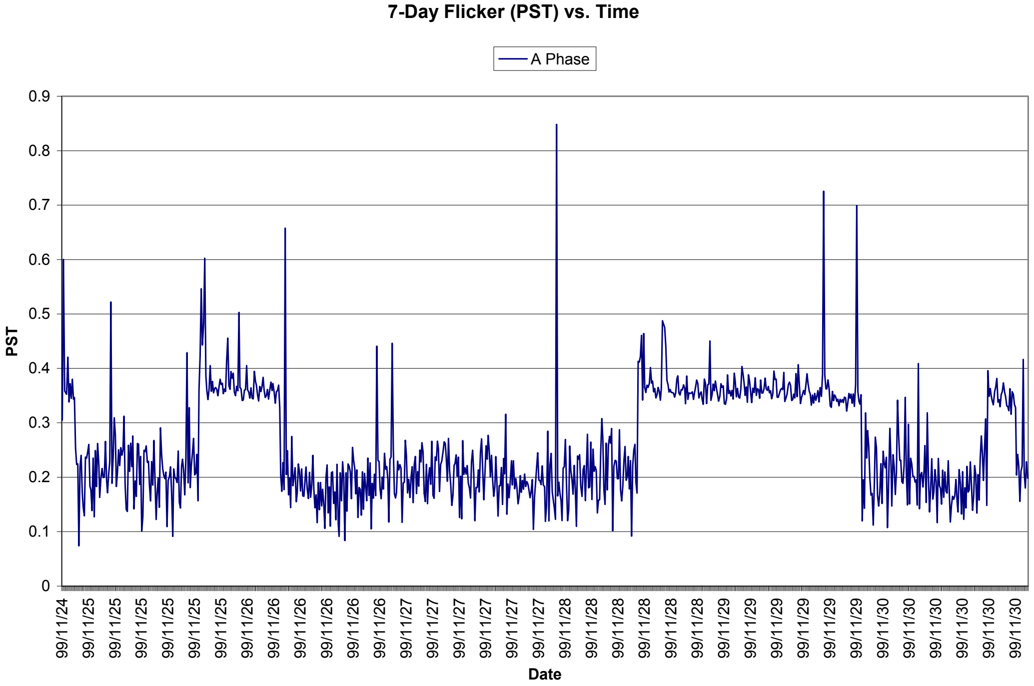
Note:
CSA = Canadian Standards Association
CEA = Canadian Electrical Association
IEEE = Institute of Electrical and Electronics Engineers
IEC = International Electrotechnical Commission

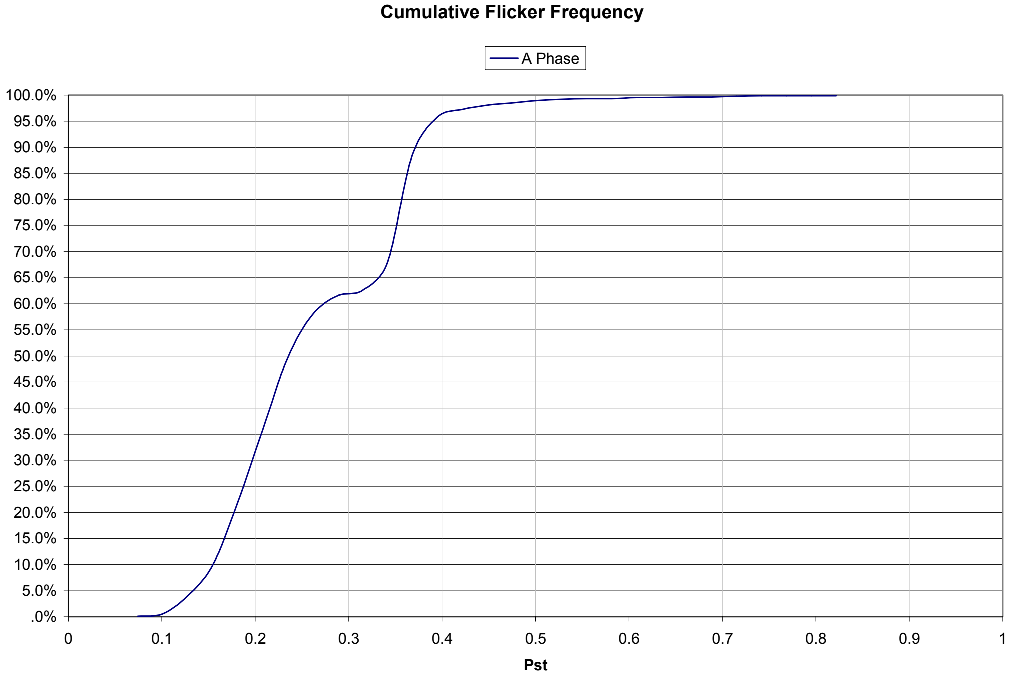
Appendix 2 – CAN/CSA E1000-2-2-97 Flicker Curve For Periodic Voltage Fluctuations (100 – 3000 changes/min.)



Appendix 3 – Cumulative Frequency Analysis

The flicker data collected during a 7-day benchmark measurement is sometimes difficult to analyze (see top graph below). As a result, it is best analyzed by plotting the PST values in a cumulative frequency graph. From this graph, the number of PST values above or below a particular threshold can be determined. (see bottom graph below)





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April 20, 2015

City of Winnipeg
Transit Department
421 Osborne Street
Winnipeg, MB. R3L 2A2

Via: e-mail

Attention: Mr. Adolfo Laufer, P. Eng.
Facilities Maintenance Project Engineer

Reference: **Electrical Load Study – 421 Osborne Street**
Winnipeg Transit Bus Garage Facility

Dear Sir:

Dillon Consulting Limited (Dillon) is pleased to submit our final report to Winnipeg Transit (Transit) for the electrical load study at the Winnipeg Transit Bus Garage located at 421 Osborne Street, Winnipeg.

Background

Winnipeg Transit has embarked on a number of projects within this facility over the years and is planning a number of new projects involving the need to add additional load to the electrical distribution system. Transit is concerned on the overall capacity and availability of the electrical distribution system with these new projects coming on line. In addition, Transit is concerned with the reliability of the main distribution equipment due its age and lack of available spare parts.

Dillon was retained by Transit to perform an electrical load study at this facility to determine the present electrical loading of the main distribution and associated sub-distributions. This should enable Transit to determine the capability to add additional electrical load to the present system.

Investigation and Data Gathering

Our report is based on electrical load data information recorded on site by Schneider Electric Service Department. Their monitoring equipment was installed on site during the period of March 12, 2015 to March 24, 2015. Data from the load monitoring for this period is included in Appendix A. In addition, Transit provided utility billing data for the past 12 months. These bills along with the recorded data show that the peak load values appear to occur during the winter months. Therefore, the peak value shown as 1048 amps appears to accurately represent the true peak.

Load monitoring equipment was connected on the electrical distribution equipment to record the load data information at the following distribution points:

- Main distribution circuit breaker
- Distribution 1 main circuit breaker (Overhaul and Repair Building)
- Distribution 3 main circuit breaker (Garage Building)
- Motor Control Centre VV (MCC-VV) main circuit breaker

The monitoring equipment recorded a wide range of data which may be of interest to Transit. However, for the purpose of this report, the focus will be on the electrical loading information and the availability to add additional load where required. Therefore, we will highlight the following data points:

- Current average (Amps)
- Voltage per phase (Volts)

These data points should provide the necessary information Transit requires to determine if the additional proposed loads can be connected to the existing electrical distribution system.

Results

The average and peak values for the monitoring data points noted above are summarized in the table below at each of the distribution points. In addition, this table also shows the actual current rating, in Amps, of the distributions as follows:

	Main Distribution	Distribution 1	Distribution 3	MCC-VV
Current (Amps) Peak	1048	664	126	126
Voltage L-L Average (Volts)	600	600	600	600
Current Full Load Rating (Amps) Actual Nameplate	2500	1600	600	300
Available Capacity based on full load allowable rating based on 80% rule (Amps)	952	616	354	114

Summary

Based on the above tabulated and calculated information along with the data recorded and included as Appendix A, the available capacity on each of the Distribution points is as follows:

Main Distribution *	952 A
Distribution 1	616 A
Distribution 3	354 A
MCC-VV	114 A

*Note: Distributions 1, 3 and MCC-VV are sub-fed from the Main Distribution, so any load increases on Distributions 1, 3 and MCC-VV will impact the total on the Main Distribution.

In addition to the load study, Transit also requested an evaluation of the existing main distribution switchboard. Schneider Electric provided their review of this equipment and their response is included in Appendix B.

In summary, Schneider Electric advises that this equipment appears to not have been serviced in some time and will likely not be supported by the manufacturer for replacement parts. Spare parts will also become hard to source in case any modifications would be required.

As discussed with Transit, there have already been some issues with the existing equipment whereby circuit breakers were not functioning properly causing problems with the operation of the facility.

We would recommend a staged replacement of this switchboard with new equipment of adequate capacity for future growth over the next 25 years. We would be pleased to discuss this further with Transit to come up with a suitable plan for this changeover to minimize disruption to Transit's operation and within their budgets established. A separate engineering proposal would be required to carry out this work.

We thank you for the opportunity to provide these services to Transit, and look forward to a successful implementation of the proposed work plans.

Please contact the undersigned at (204)453-2301 or bfeuer@dillon.ca should there be any questions or comments regarding this report.

Sincerely,

DILLON CONSULTING LIMITED

Brian Feuer, P. Eng.
Partner

BF/km

Encl: Appendix A – Monitoring data (on CD)
Appendix B – Condition report

Our file: 15-1692

C:\projectwise\working directory\active\40km\dms62938\Rpt - Electrical Load Study_151692.doc

APPENDIX A

Monitoring Data
(Refer to CD)

APPENDIX B

Condition Report

Schneider Electric
Schneider Canada Services

FIELD SITE VISIT

CUSTOMER: Dillon Consulting Limited **SITE**: Osborne Bus Garage

ATTENTION: Brian Feuer **DATE**: March 12, 2015

REASON FOR VISIT: Equipment Review and collection of Power Monitoring Data

OBSERVATION: Data for the following loads were collected from Noon March 12 to Noon March 23:

Main Distribution (Westinghouse 3000A)
Distribution #1 (1600A)
Distribution #3 (600A)
MCC VV (200A)

CONCLUSION: The main switch gear is 1960 vintage. All the breakers are obsolete. The main Air circuit breaker has no signs of being serviced in recent years. Once it has been serviced a better idea of it's condition can be made. If a number of new breakers are to be added. The customer may want to upgrading the complete board by retrofilling. The existing switchgear structure and wires stay and all the obsolete breakers are replaced with new breakers and mounting system. This allows for more new breakers to be added in the future.
With a quick look at the Power Monitoring data. The Main service is lightly loaded (20 to 30%) with the peak load happening between 6:30 and 7:00 AM at around 35%. The power factor is running between 85 and 90%. (penalty $ when below 90) But the cost may make the pay back to long. Harmonics are OK.

Dean Wiersema

Solutions Sales Representative:
(204) 631-0685
dean.wiersema@schneider-electric.com

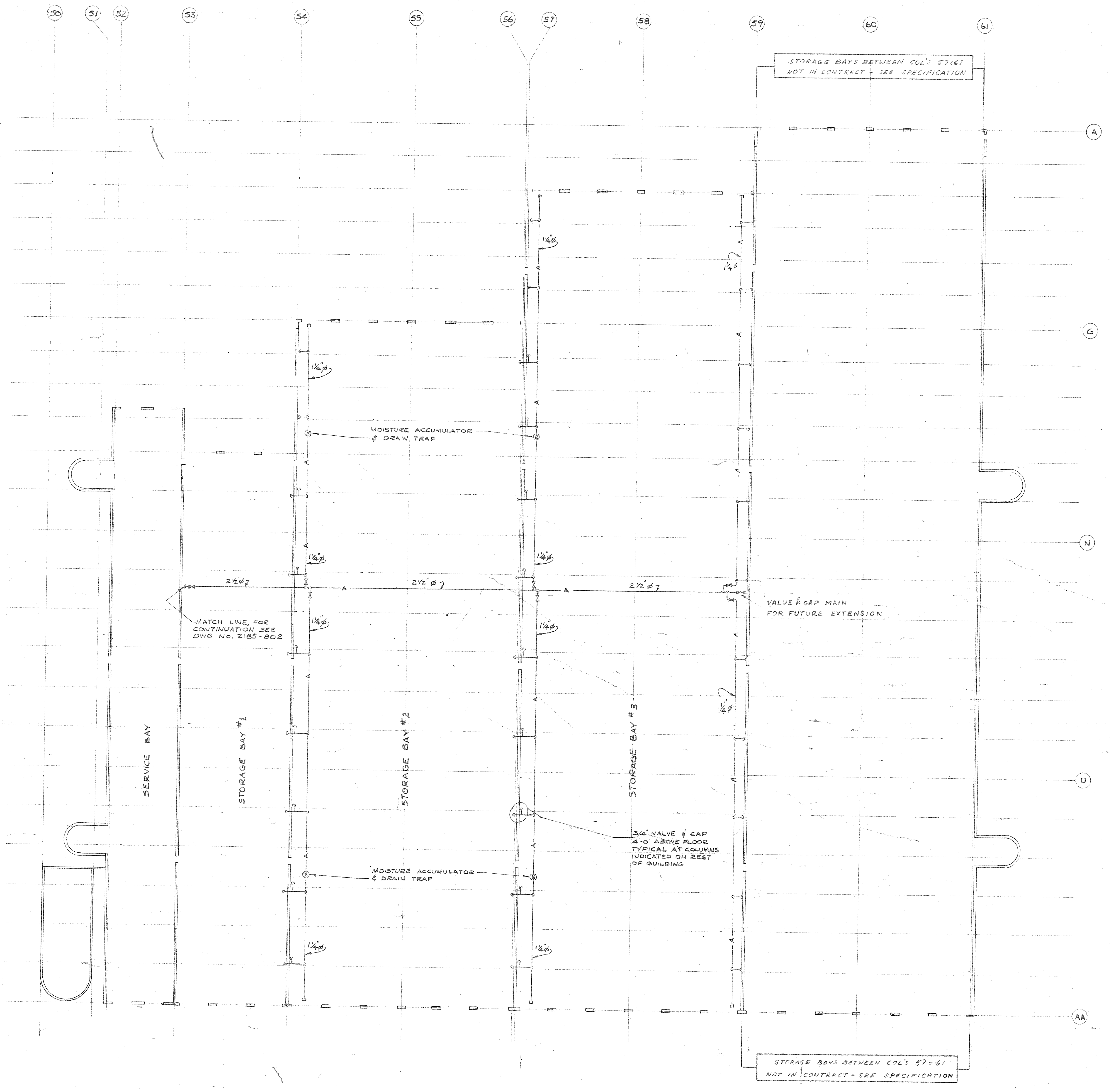
Winnipeg Transit Garage
421 Osborne - Premise # 6399318
Historical Electric and Gas Info

Serv Month	Svc Cnt	Elec Days	Elec kW.h	Elec Bill Dem	% Load Factor	Elec Revenue	Svc Cnt	Gas Days	Gas m3	Gas Bill Dem	Gas Revenue
2014, MAR	2	59	506,037	1,129	61.5	$27,734.55	2	61	104,972	12,238	$200,628.31
2014, FEB	2	62	524,022	1,130	61.5	$28,376.18	2	59	143,914	12,238	$197,882.01
2014, JAN	2	60	510,772	1,126	62.2	$27,883.40	2	61	262,101	13,031	$85,471.67
2013, DEC	2	62	526,486	1,146	57.3	$28,585.24	2	64	270,058	13,796	$63,034.36
2013, NOV	2	64	413,349	1,044	54.4	$23,755.95	2	60	193,349	13,796	$33,366.89
2013, OCT	2	84	381,812	1,053	55.4	$22,749.38	2	59	24,305	13,796	$17,620.13
2013, SEP	2	30	449,955	1,106	55.9	$25,532.98	2	59	13,005	13,796	$6,896.99
2013, AUG	2	68	490,055	1,084	54.8	$26,741.50	2	65	8,320	13,796	$6,227.62
2013, JUL	2	58	442,621	1,126	55.9	$25,473.22	2	60	5,680	13,796	$4,654.20
2013, JUN	2	126	490,531	1,099	54.1	$26,945.52	2	64	24,149	13,796	$9,126.53
2013, MAY	2	29	429,165	1,111	55.0	$24,244.25	2	60	88,108	13,796	$23,642.93
2013, APR	2	29	469,260	1,164	57.3	$25,808.33	2	59	104,306	13,796	$42,921.39
2013, MAR	2	58	445,046	1,219	55.6	$25,528.64	2	58	300,723	13,796	$45,461.74
2013, FEB	2	62	588,222	1,243	59.0	$30,538.21	2	61	372,406	13,796	$57,053.09
2013, JAN	2	60	510,877	1,215	57.7	$27,708.70	2	61	365,766	13,796	$60,988.63
2012, DEC	2	65	572,412	1,282	55.8	$30,302.35	2	64	363,735	15,410	$54,035.11
2012, NOV	2	59	435,535	1,118	55.3	$24,323.86	2	59	244,308	15,410	$37,422.98
2012, OCT	2	57	395,110	1,068	54.5	$22,528.93	2	59	92,261	15,410	$22,908.50
2012, SEP	2	65	467,843	1,047	55.9	$24,397.88	2	63	42,920	15,410	$9,167.75
2012, AUG	2	59	447,091	1,120	56.8	$24,111.80	2	60	4,430	15,410	$4,575.26
2012, JUL	2	58	470,762	1,130	59.3	$24,966.76	2	60	4,586	15,410	$4,614.06
2012, JUN	2	97	499,109	1,102	54.9	$25,679.18	2	64	41,075	15,410	$10,273.61
2012, MAY	2	30	445,500	1,111	55.1	$23,963.01	2	61	108,184	15,410	$20,898.23
2012, APR	2	93	484,959	1,143	54.6	$25,222.24	2	62	140,676	15,410	$28,557.67
2012, MAR	2	29	481,140	1,228	55.7	$25,571.57	2	60	264,129	15,410	$43,494.91
2012, FEB	2	59	544,691	1,270	58.9	$27,983.46	2	59	336,620	15,410	$55,089.14
2012, JAN	2	65	549,266	1,243	56.8	$27,909.21	2	63	401,292	15,410	$70,714.86
2011, DEC	2	89	518,674	1,247	55.3	$26,966.99	2	62	346,478	11,869	$61,648.88
2011, NOV	2	26	372,735	1,133	52.2	$21,364.18	2	56	226,311	11,869	$40,804.67
2011, OCT	2	60	442,637	1,102	53.4	$23,328.35	2	62	121,866	11,869	$23,707.01
2011, SEP	2	65	452,939	1,136	51.4	$23,934.16	2	62	25,807	11,869	$7,307.18
2011, AUG	2	60	444,071	1,133	53.9	$23,631.65	2	61	1,076	11,869	$3,951.48
2011, JUL	2	66	484,173	1,158	52.2	$25,105.67	2	64	2,408	11,869	$4,270.55
2011, JUN	2	90	445,646	1,155	51.3	$23,888.71	2	61	36,203	11,869	$10,970.10
2011, MAY	2	28	400,950	1,178	50.2	$22,624.51	2	59	86,995	11,869	$21,477.67
2011, APR	2	65	502,379	1,189	52.7	$25,614.26	2	63	125,719	11,869	$41,772.08
2011, MAR	2	59	487,658	1,252	55.2	$25,576.78	2	60	298,689	11,869	$66,249.70
2011, FEB	2	55	484,069	1,267	56.0	$25,623.98	2	56	324,694	11,869	$70,999.49
2011, JAN	2	67	562,079	1,279	54.7	$28,076.03	2	64	382,652	12,181	$80,981.87
2010, DEC	2	60	480,556	1,185	55.7	$24,758.81	2	61	322,824	12,521	$68,175.84
2010, NOV	2	56	390,846	1,112	51.7	$21,392.67	2	58	210,193	12,521	$45,275.72
2010, OCT	2	58	435,193	1,164	53.2	$23,171.03	2	60	125,209	12,521	$30,313.73
2010, SEP	2	66	518,340	1,203	53.9	$26,028.53	2	63	49,885	12,521	$13,765.45
2010, AUG	2	93	476,826	1,215	54.0	$24,881.58	2	60	11,076	12,521	$5,923.73
2010, JUL	2	33	491,535	1,086	56.6	$24,212.08	2	64	3,909	12,521	$4,490.28
2010, JUN	2	91	459,009	1,132	55.8	$23,644.72	2	61	21,189	12,521	$8,290.26
2010, MAY	2	31	461,835	1,126	54.6	$23,640.62	2	62	95,833	12,521	$24,715.85
2010, APR	2	90	470,588	1,154	54.1	$23,562.00	2	61	150,732	12,521	$43,271.47
2010, MAR	2	28	433,620	1,219	52.4	$22,709.43	2	59	260,474	12,521	$72,141.06
2010, FEB	2	55	433,214	1,244	52.9	$23,022.80	2	55	301,946	12,776	$82,996.04
2010, JAN	2	69	557,629	1,274	51.4	$26,816.41	2	66	356,053	12,776	$99,139.09
2009, DEC	2	59	457,675	1,216	51.7	$23,400.85	2	61	324,609	12,804	$89,584.00
2009, NOV	2	53	377,456	1,135	52.7	$20,424.31	2	56	200,873	13,456	$57,736.23
2009, OCT	2	67	463,408	1,105	52.4	$22,628.08	2	64	158,409	13,456	$49,370.61
2009, SEP	2	59	423,290	1,114	52.3	$21,554.15	2	60	14,447	13,456	$8,433.15
2009, AUG	2	63	464,858	1,105	52.6	$22,668.22	2	64	5,184	13,456	$5,853.07
2009, JUL	2	61	411,413	1,157	50.6	$21,573.74	2	60	5,779	13,456	$5,204.13
2009, JUN	2	65	476,698	1,115	51.9	$23,092.02	2	64	43,483	13,456	$16,660.40
2009, MAY	2	61	401,078	1,112	51.3	$20,908.88	2	60	106,314	13,456	$35,033.10
2009, APR	2	59	447,257	1,258	50.5	$23,032.29	2	59	191,949	13,456	$63,371.53
2009, MAR	2	59	476,992	1,276	51.2	$23,862.26	2	61	294,638	13,456	$95,049.85
2009, FEB	2	55	450,222	1,305	52.3	$23,433.33	2	55	313,844	13,456	$101,719.69
2009, JAN	2	71	596,350	1,277	53.3	$27,154.04	2	67	390,471	15,155	$138,801.59

421 OSBORNE ST. SHOP FACILITIES
address

2185-801
project no. sheet no.

GARAGE BUILDING - PROCESS EQUIP-
description
MENT & SERVICES - PLAN



GARAGE BUILDING - PLAN

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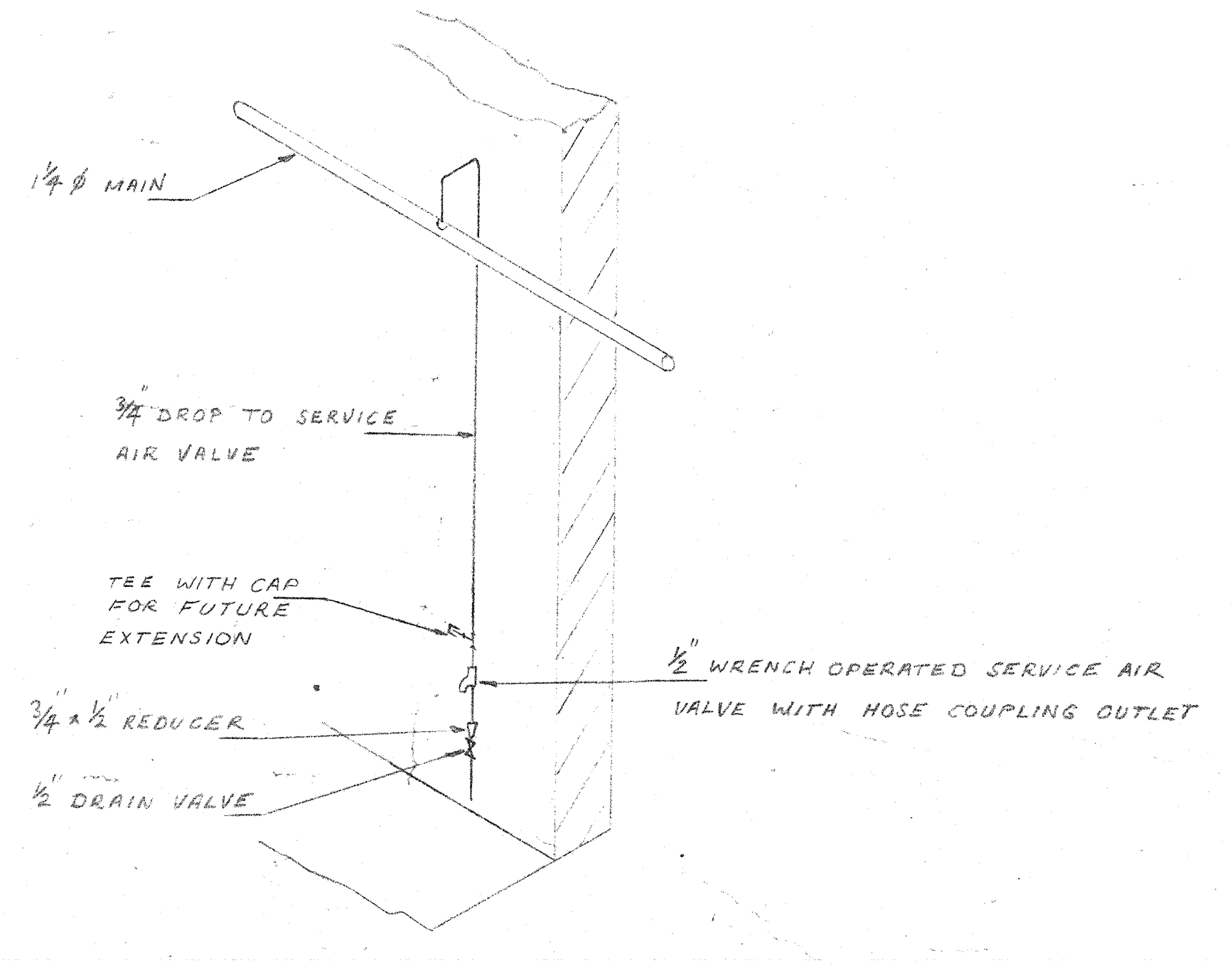


TYPICAL ARRANGEMENT OF TAKE
OFF POINTS ALONG COLUMN LINE 59 ONLY

NOTE :-

FOR TYPICAL COMPRESSED AIR SERVICE POINTS SEE DWG. No. 2185-806.

FOR TYPICAL MOISTURE ACCUMULATOR & DRAIN TRAP SEE DWG. No. 2185-806.

ALL PIPING THROUGH FIREWALLS SHALL BE IN PIPE SLEEVES PACKED WITH ASBESTOS PACKING.

ALL PIPING TO BE HUNG IN JOIST SPACE.

2185-801

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
24/11/69	4		AS BUILT	
29/3/68	3	0	ISSUED FOR CONSTRUCTION	
19/1/68	2	0	FOR TENDER	
20/10/67	1	0	FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

GARAGE BUILDING
PROCESS EQUIPMENT & SERVICES — PLAN

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

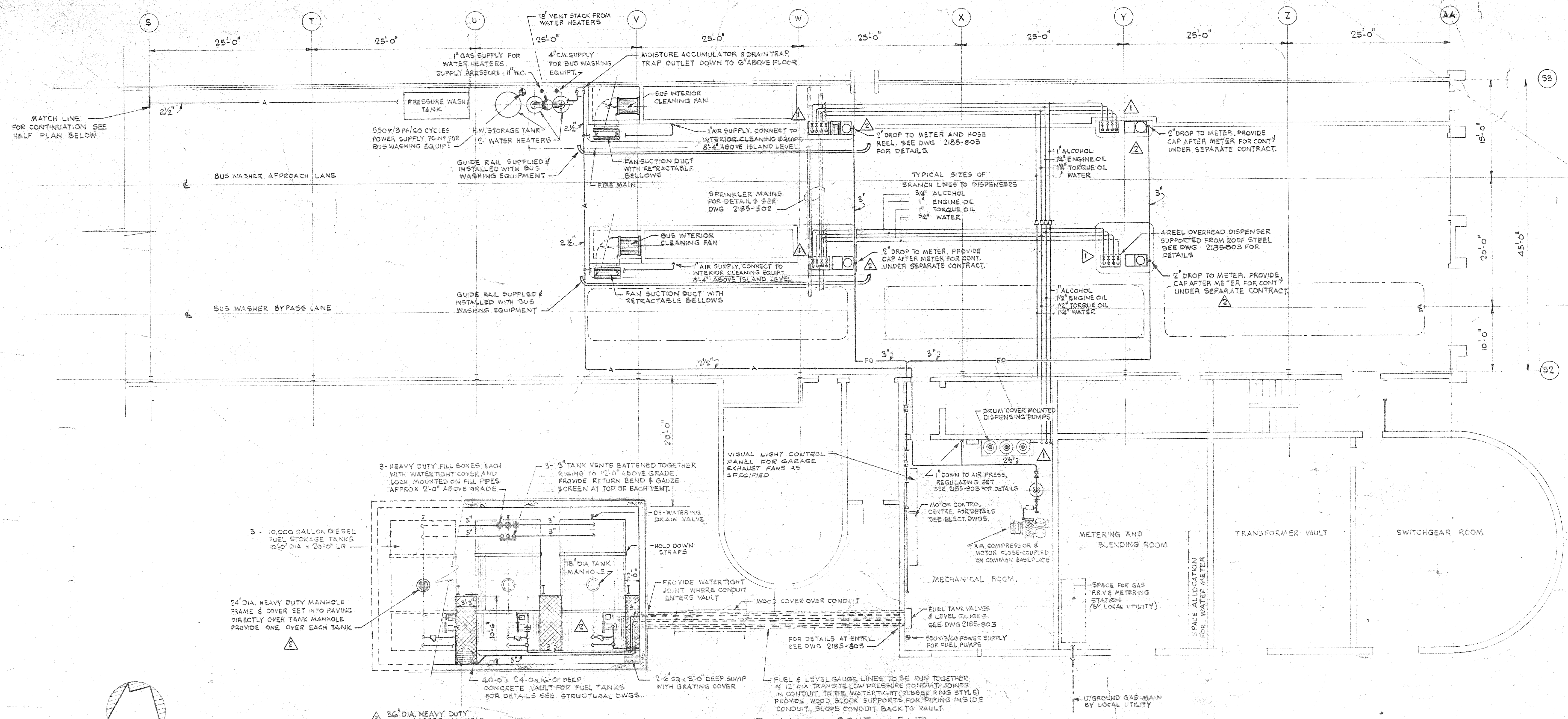
ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY
CHECKED J.T.T.
FILE No.
SHEET No.

DATE AUGUST '67
SCALE 1/32" = 1'-0"
DRAWING No. 2185-801
MECHANICAL

421 Osborne St.
address
Transit Storage Shop Facilities
project no.
2185-802
sheet no.
Garage & Service Bay - Process
description
Equipment & Services - Plan & Details



PLAN - SOUTH END
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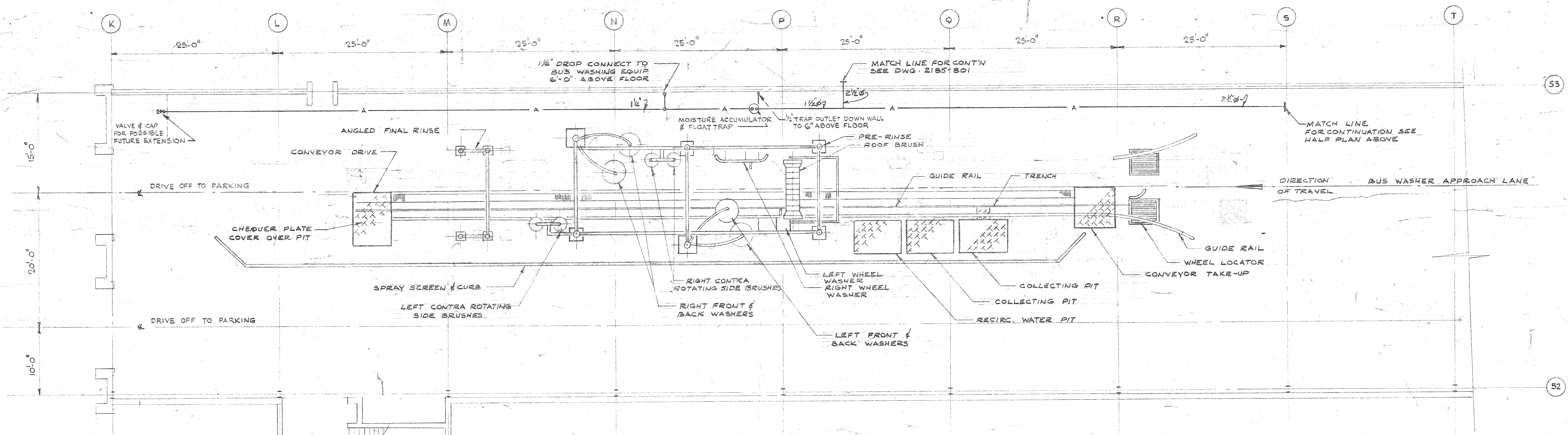

PLAN - NORTH END
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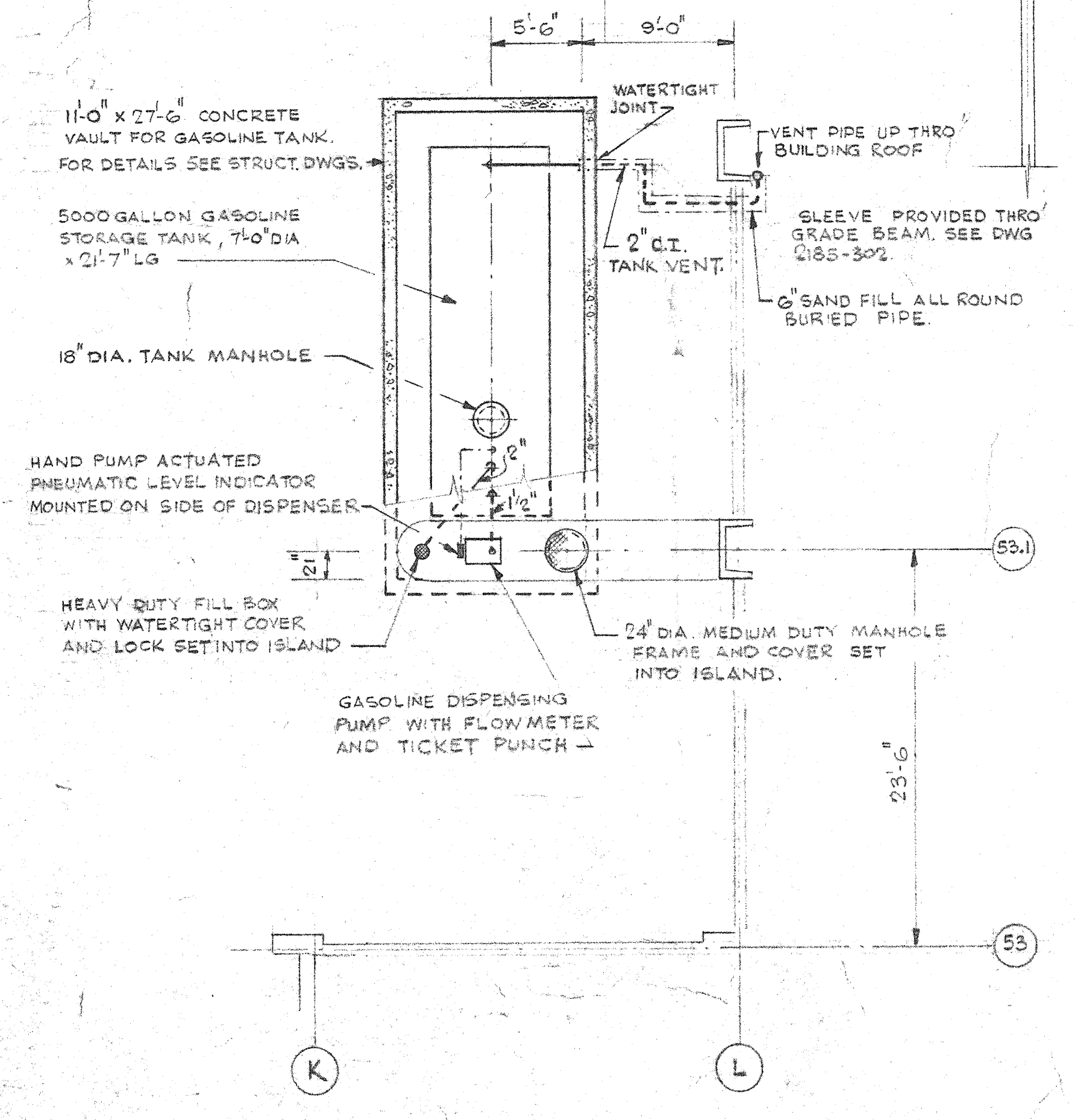


GASOLINE DISPENSING FACILITIES FOR METRO VEHICLES
SCALE 1/8" = 1'-0"

2185 - 802

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
24/11/69	6		AS BUILT	
29/5/68	5	3	ACCESS PLATFORMS IN TANK VAULT ADDED. VAULT M'HOLE WAS 24" DIA	
25/4/68	4	2	BUS FUELLING SYSTEM EQUIPMENT REVISED	
29/3/68	3	1	REVISED PER ADDENDUM No 2 AND ISSUED FOR CONSTRUCTION	
19/1/68	2	0	FOR TENDER	
20/10/67	1	0	FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

GARAGE & SERVICE BAY
PROCESS EQUIPMENT & SERVICES – PLAN & DETAILS

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

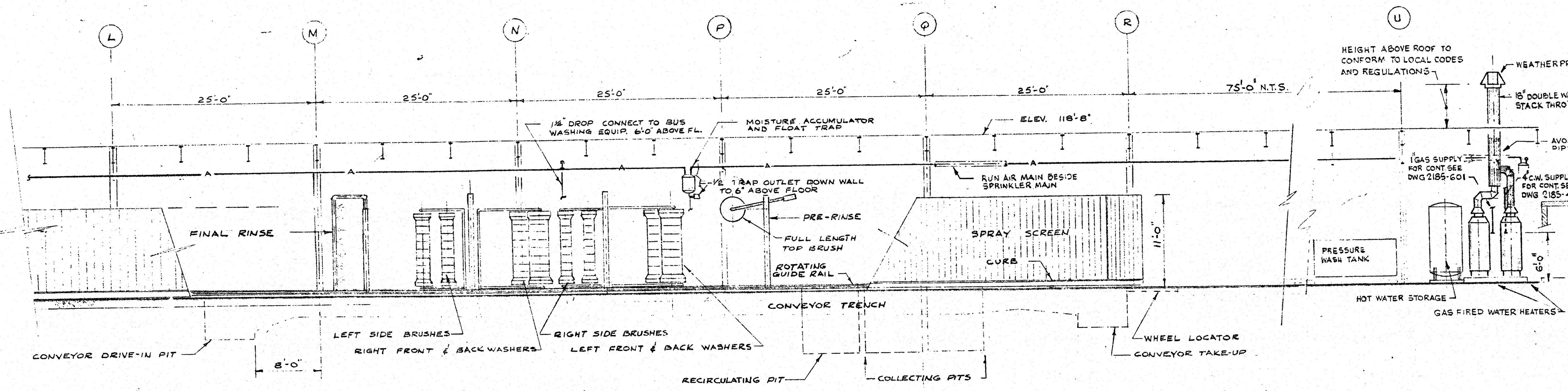
MECHANICAL
J. T. F. THORPE

LICENSED TO PRACTICE IN THE PROVINCE OF MANITOBA
My Licence Expires: 10 Jan, 1968

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY
CHECKED JTT
FILE No.
SHEET No.
DATE AUGUST '67
SCALE 1/8" = 1'-0"
DRAWING No. 2185-802
MECHANICAL

421 Osborne Street
Process Equip & Services
Sections & Details
Drawing Title
Transit Storage & Shop
& Shop Facilities
Project
2185
Project No.
2185-803
Sheet No.
1967
Const. Year



SECTION THROUGH BUS WASH EQUIPMENT
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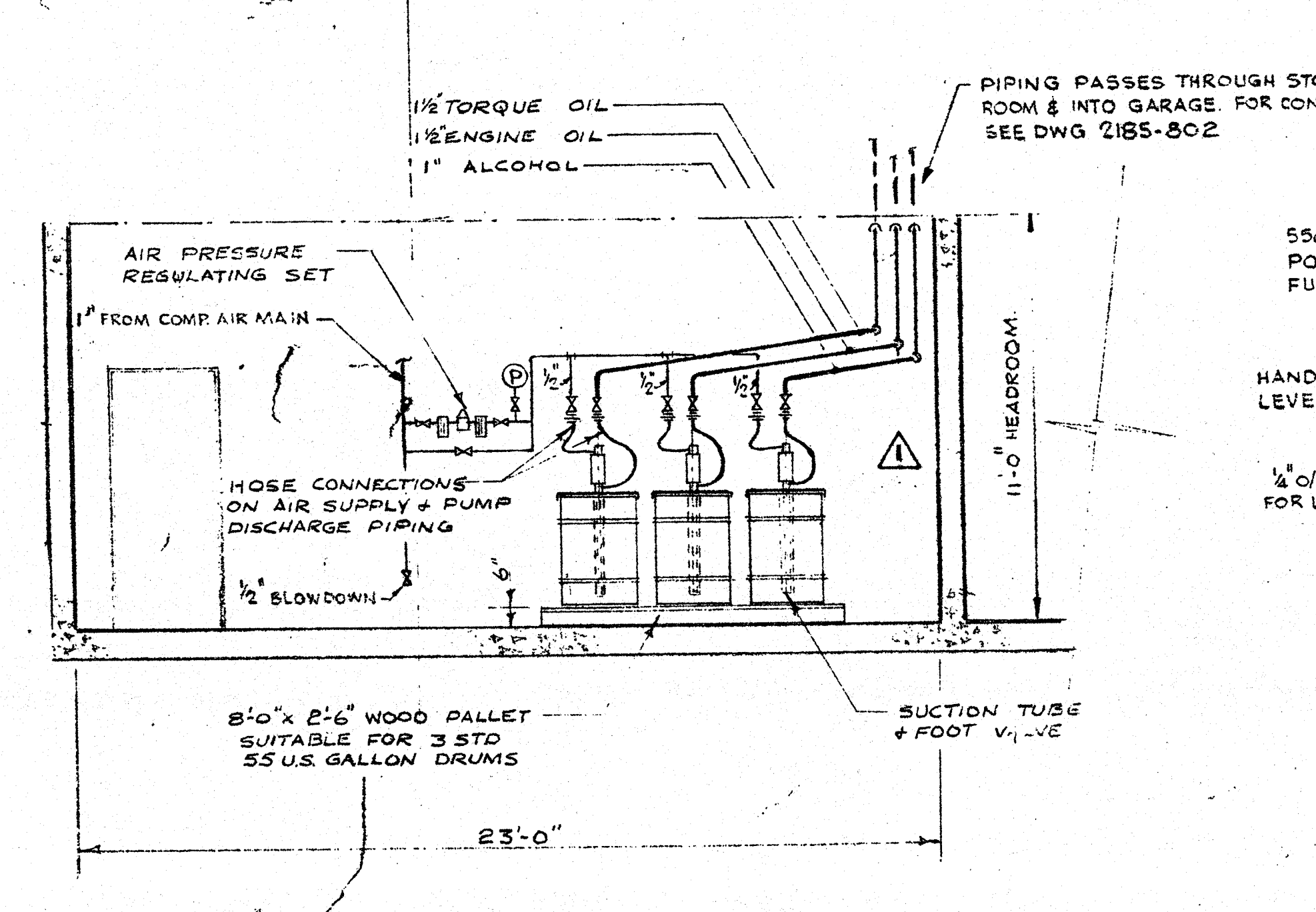

ARRANGEMENT OF AIR OPERATED DISPENSING PUMPS
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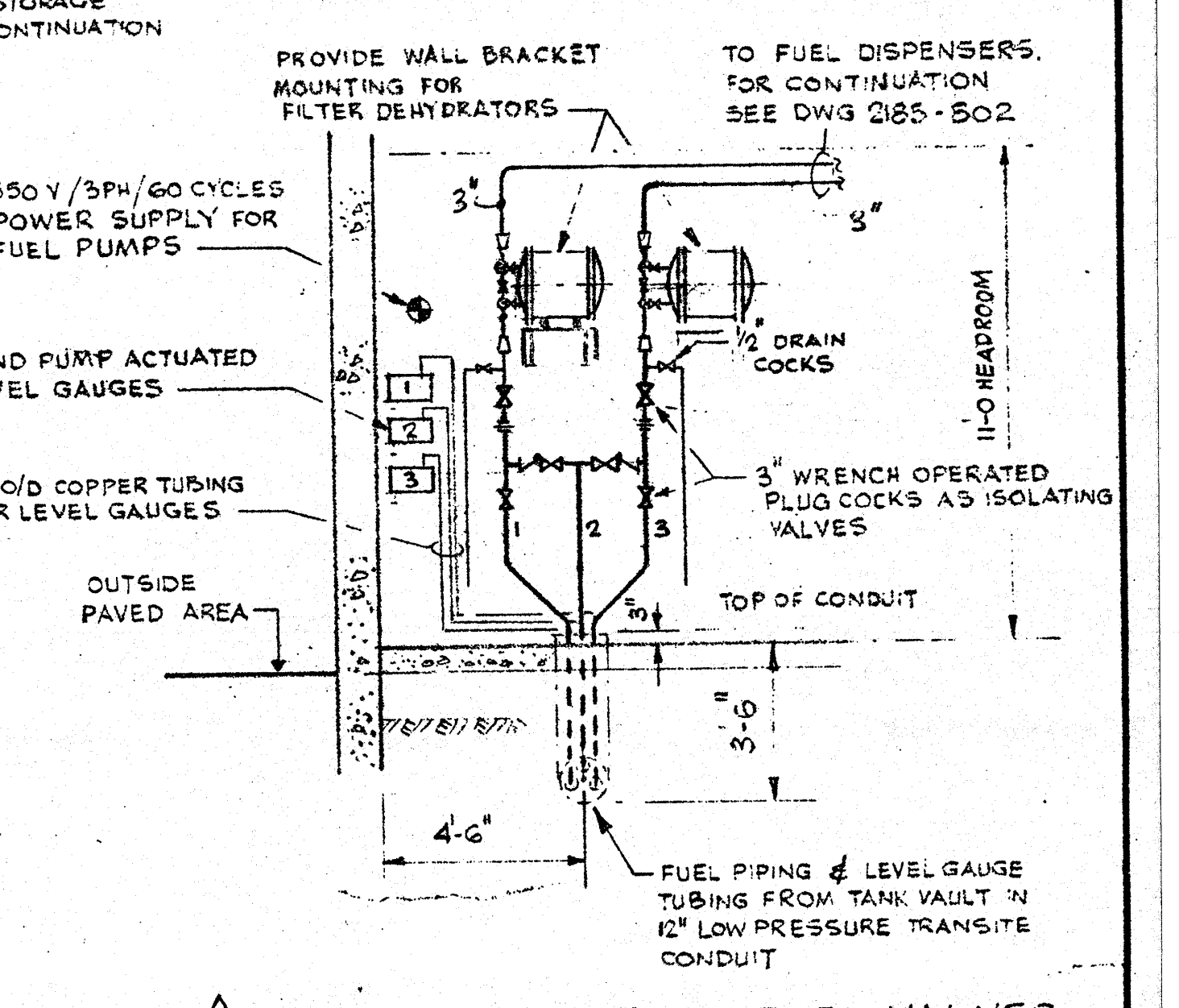

2 ARRANGEMENT OF FUEL VALVES
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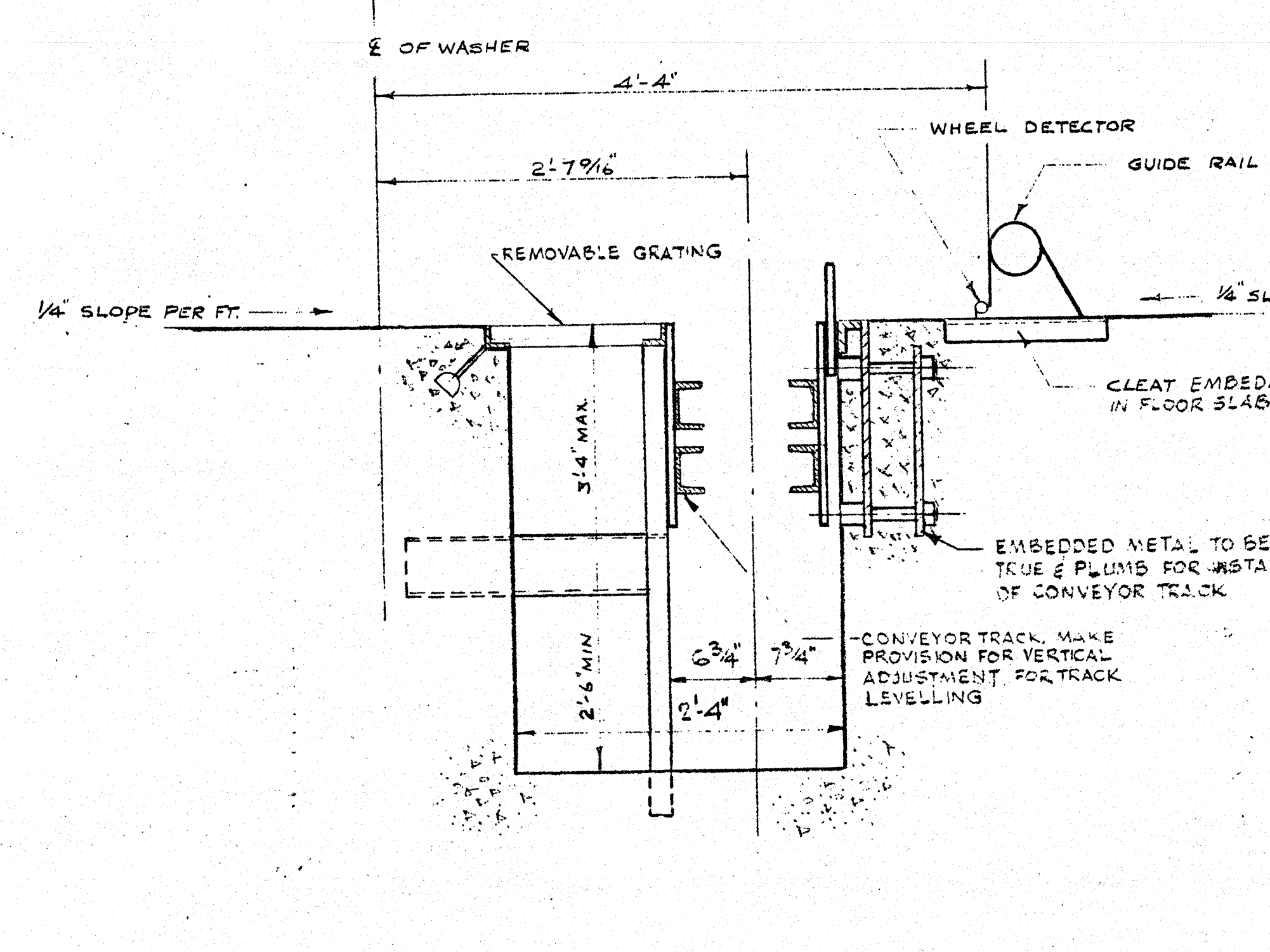

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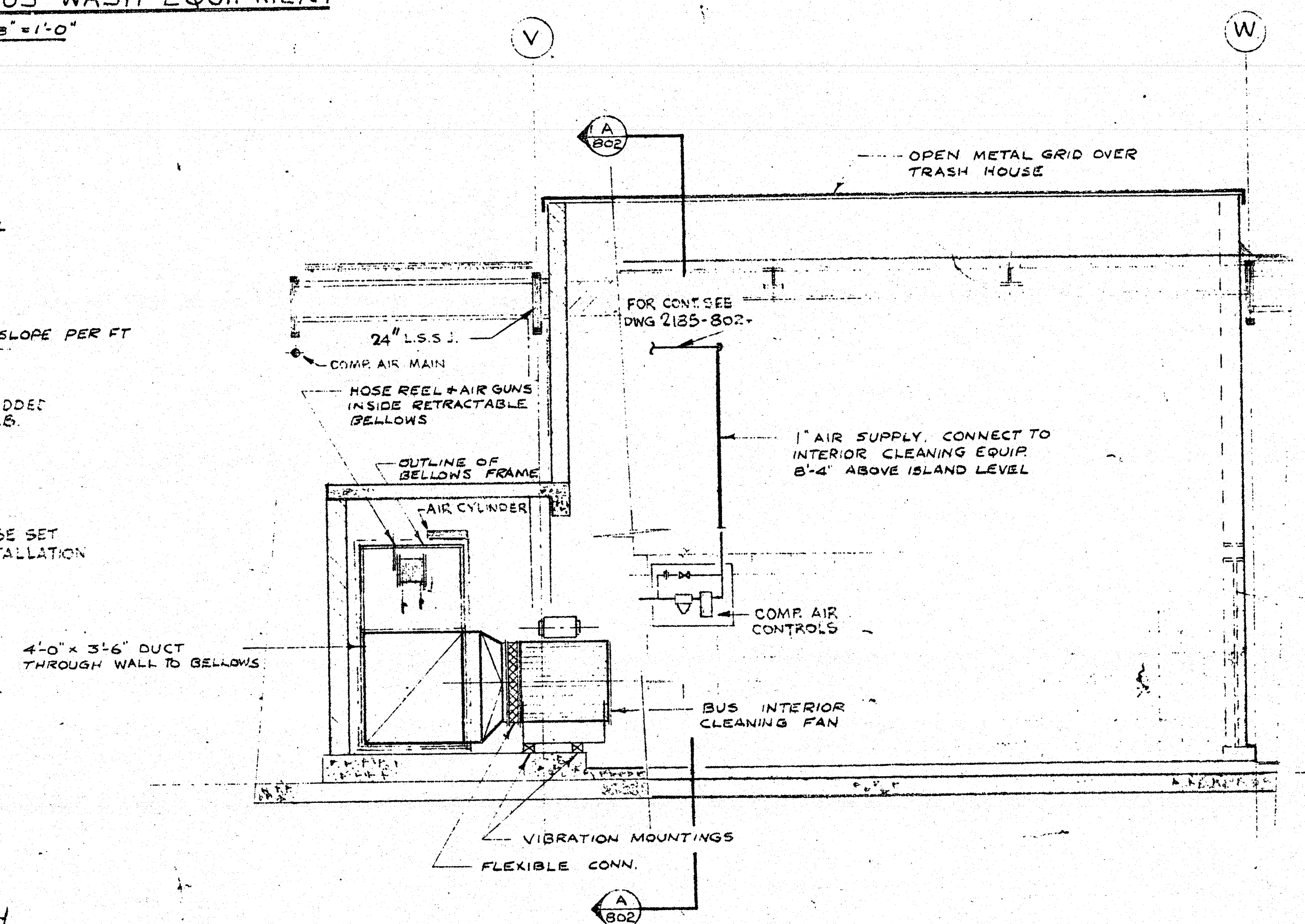

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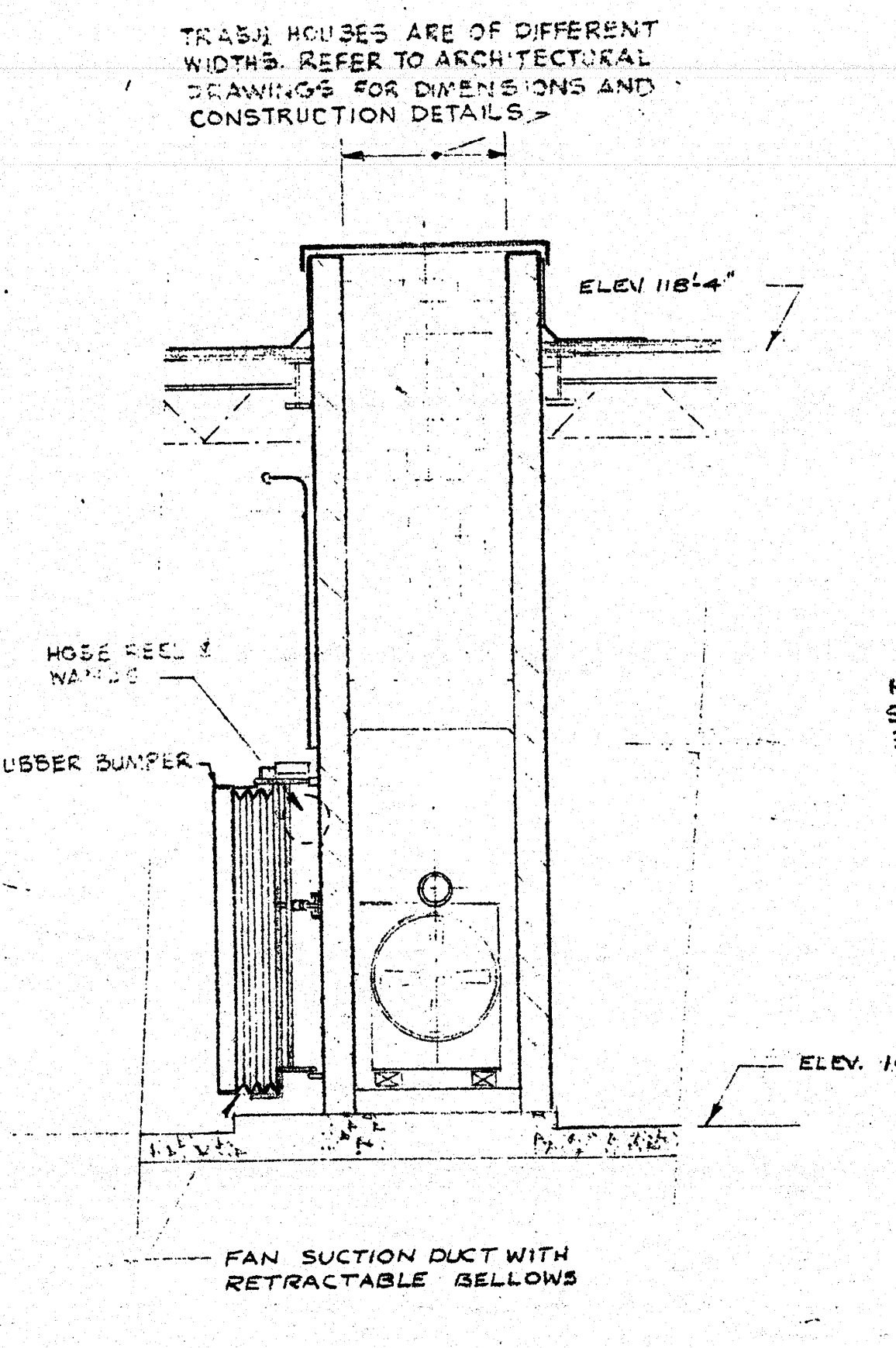
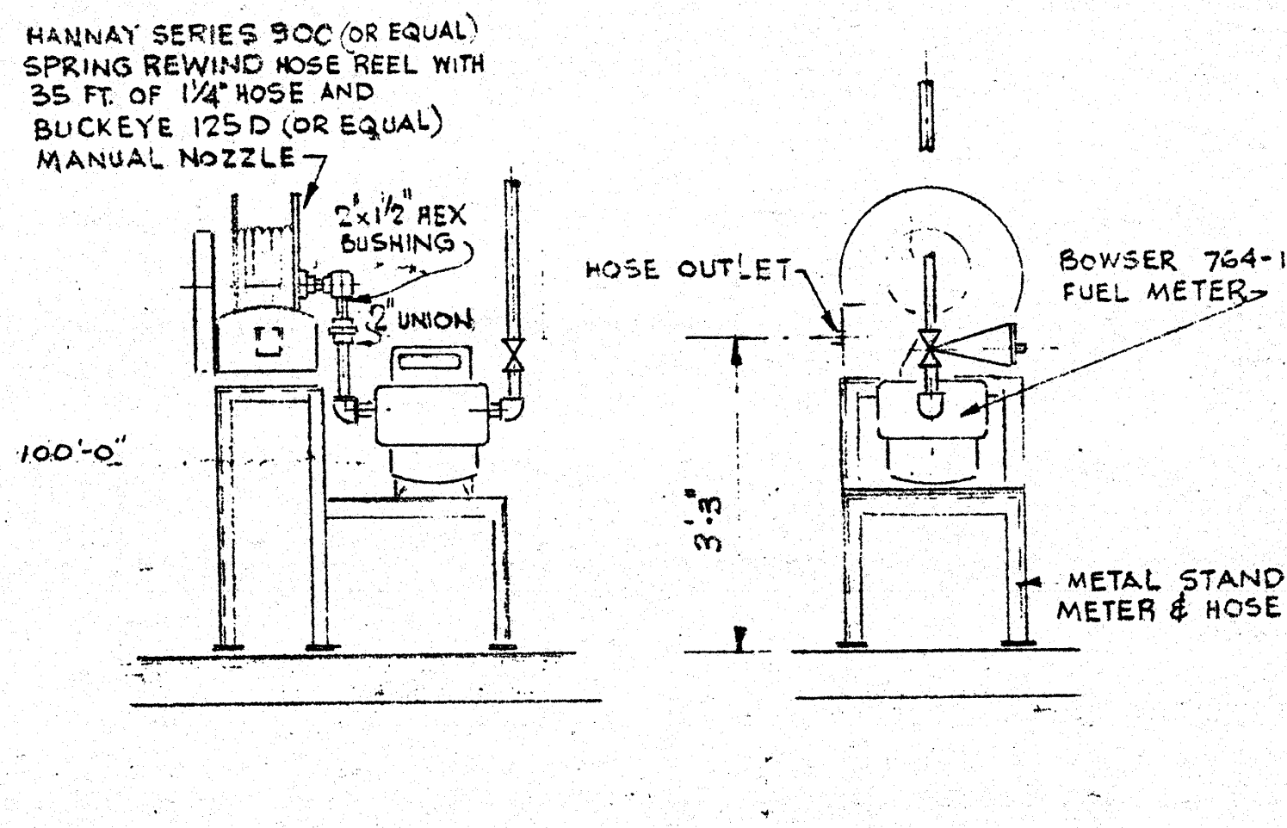


SECTION A/802



2 HOSE AND METER STAND
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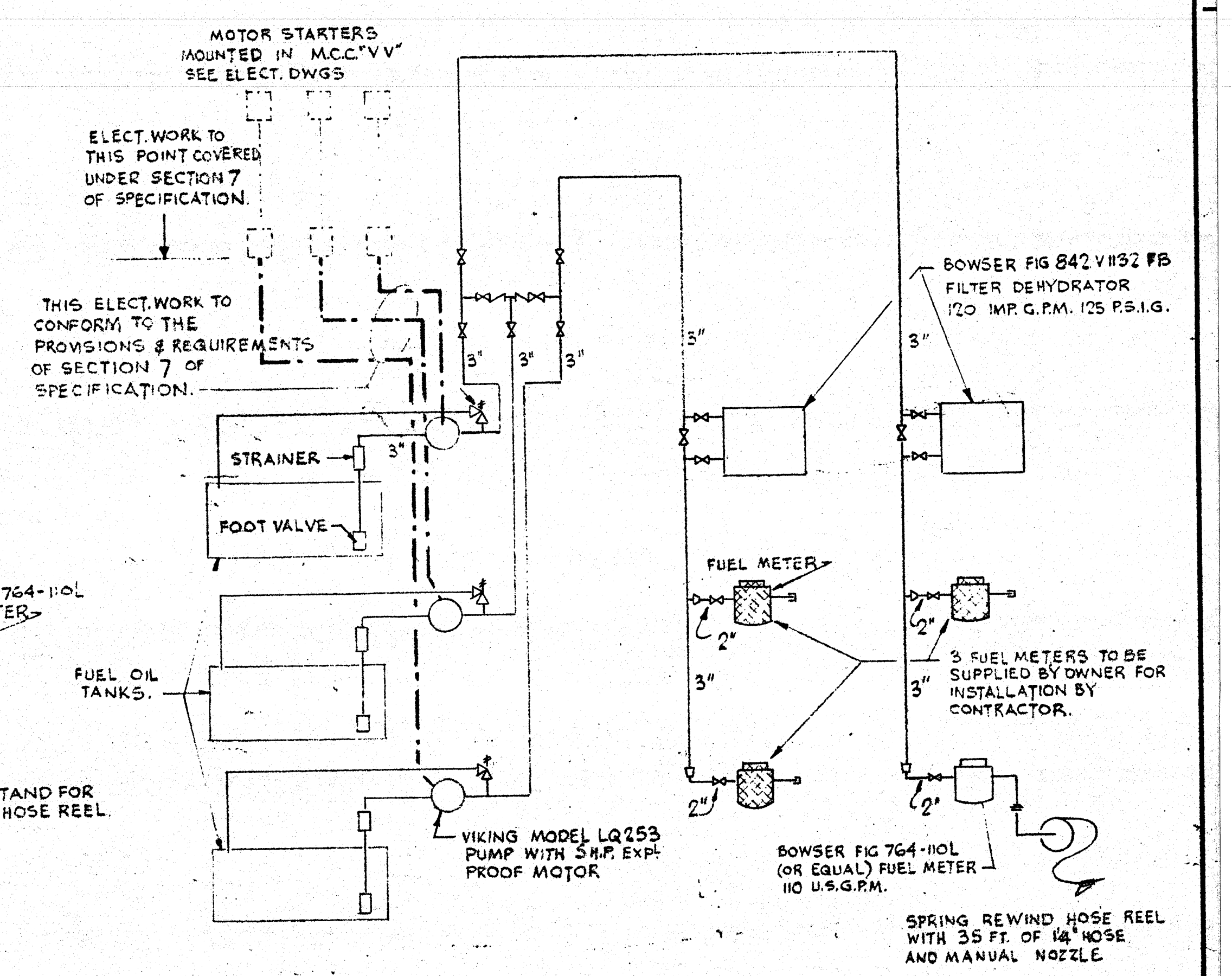
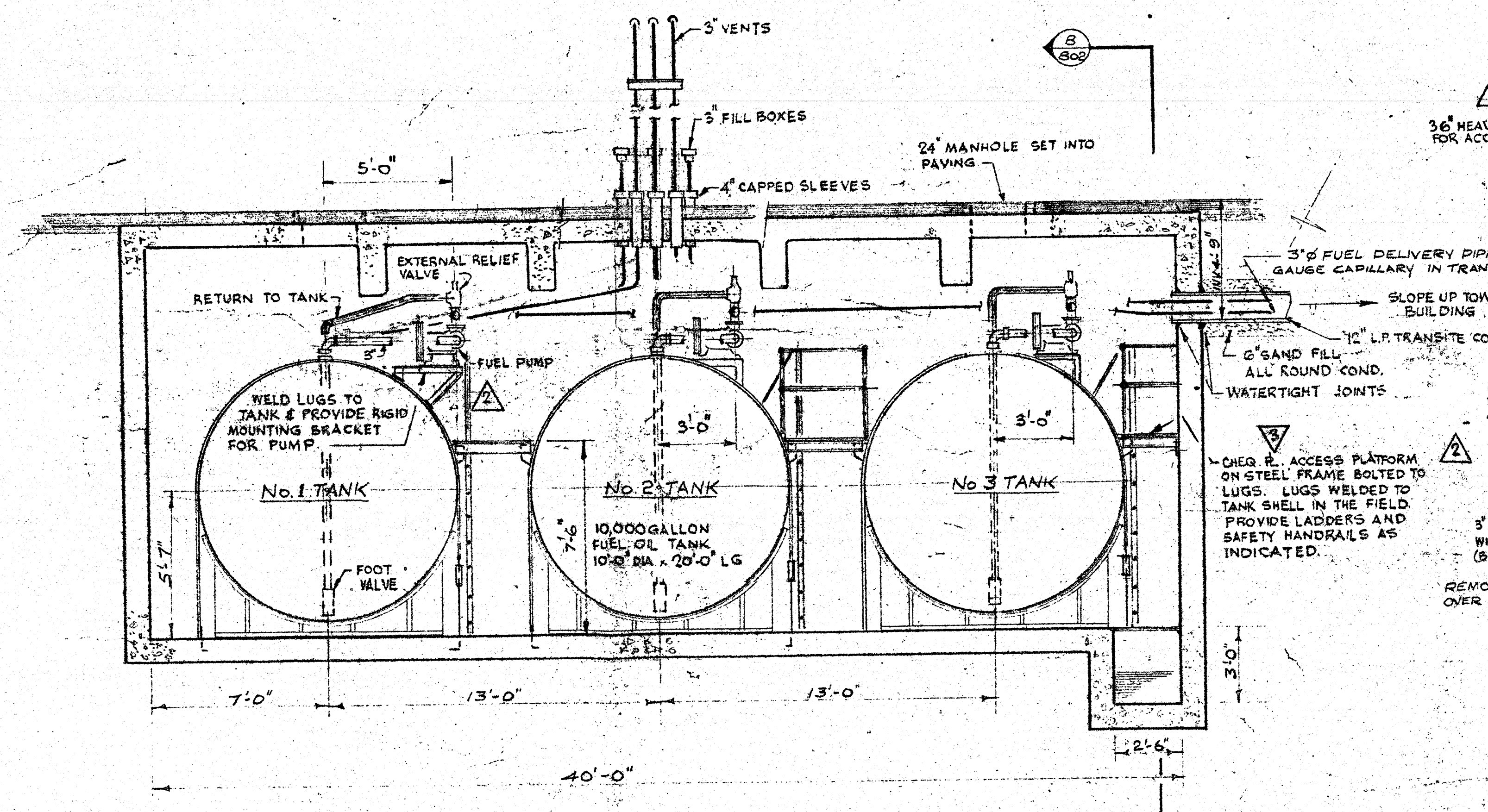


2 SCHEMATIC DIAGRAM - BUS FUELLING SYSTEM.



2 SECTION THROUGH FUEL TANKS
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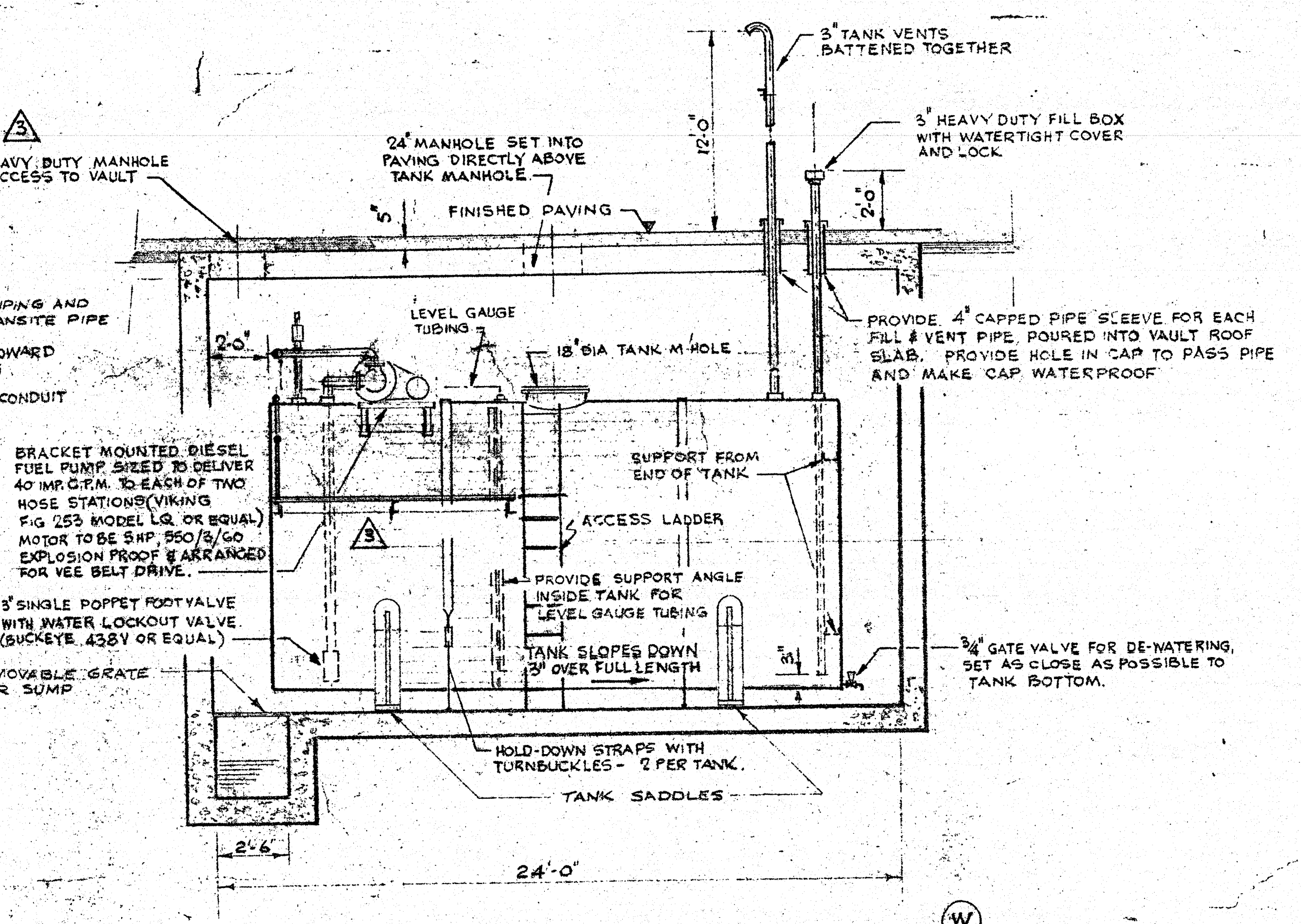
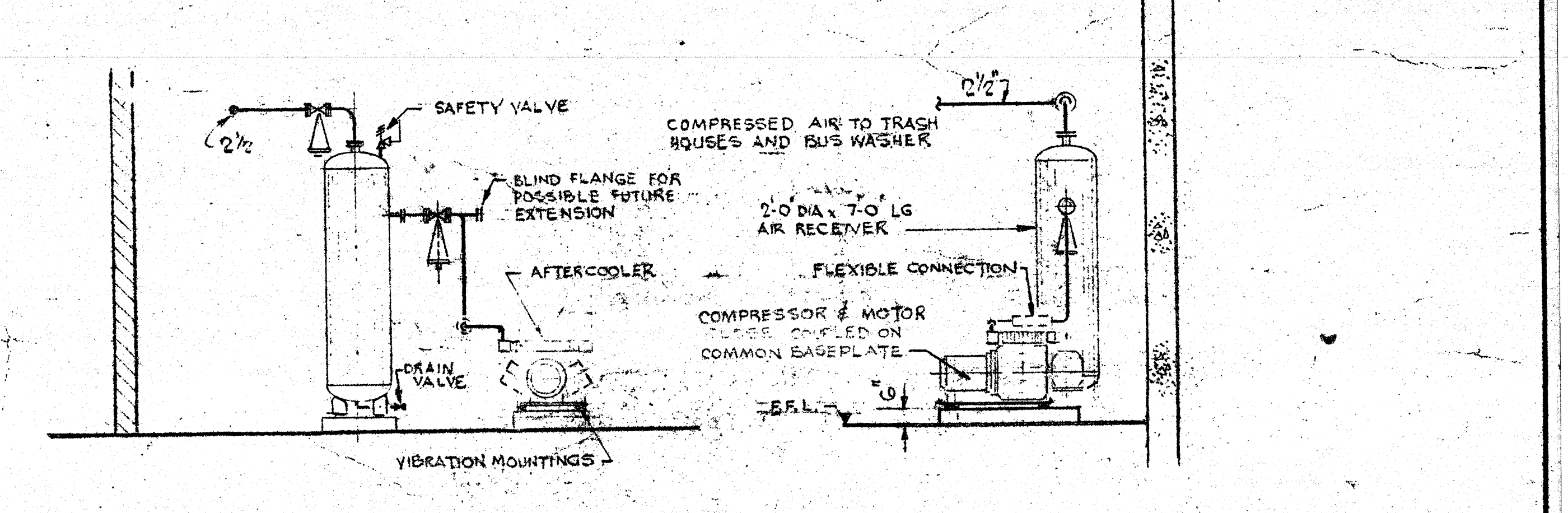


SECTION B/802

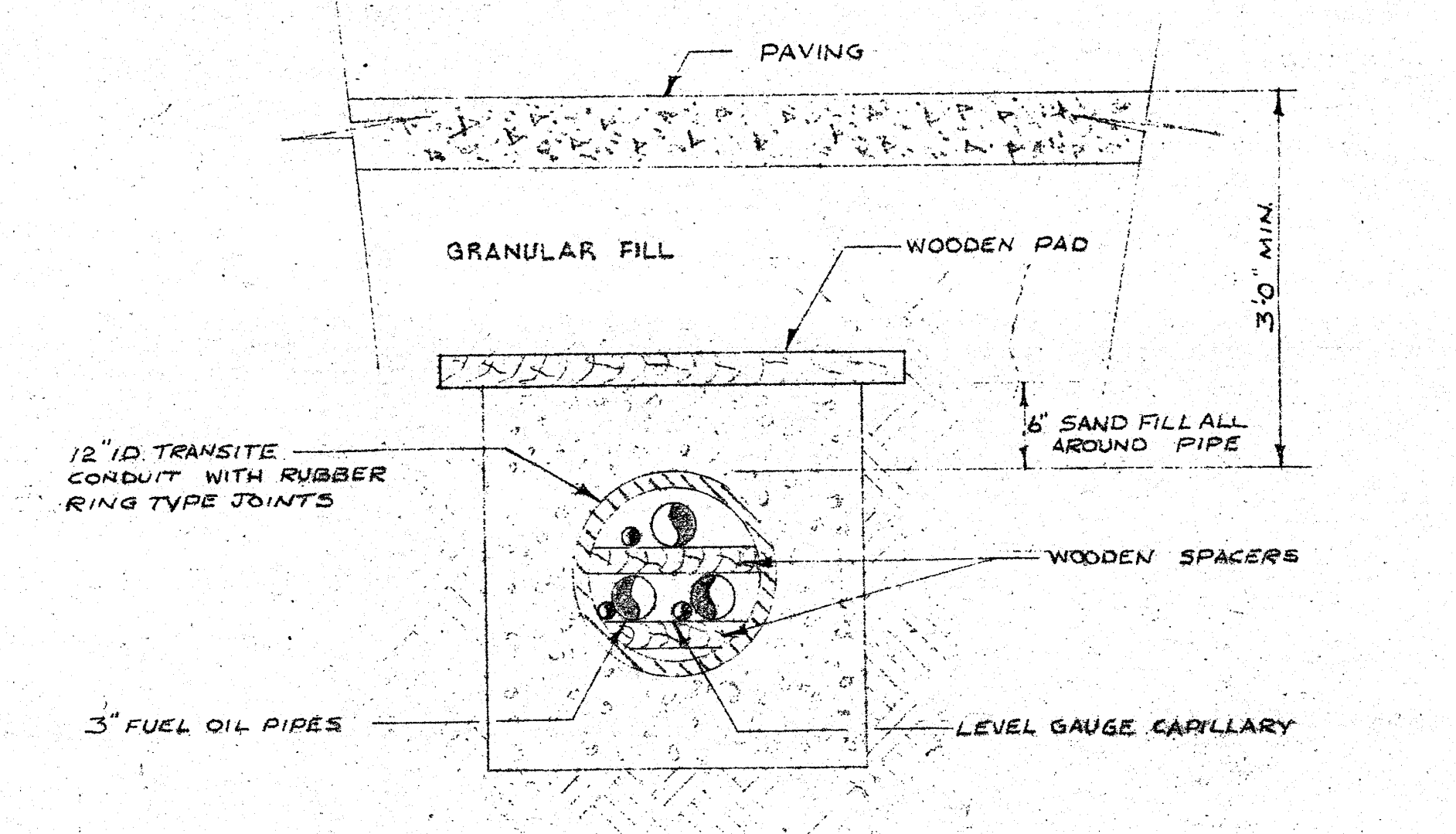


ARRANGEMENT AT AIR COMPRESSOR
SCALE 1/4" = 1'-0"

B-14
FILE
RETURN TO CIVIC
PROPERTIES BUILDING
INVENTORY.

2	91	1

2185-803



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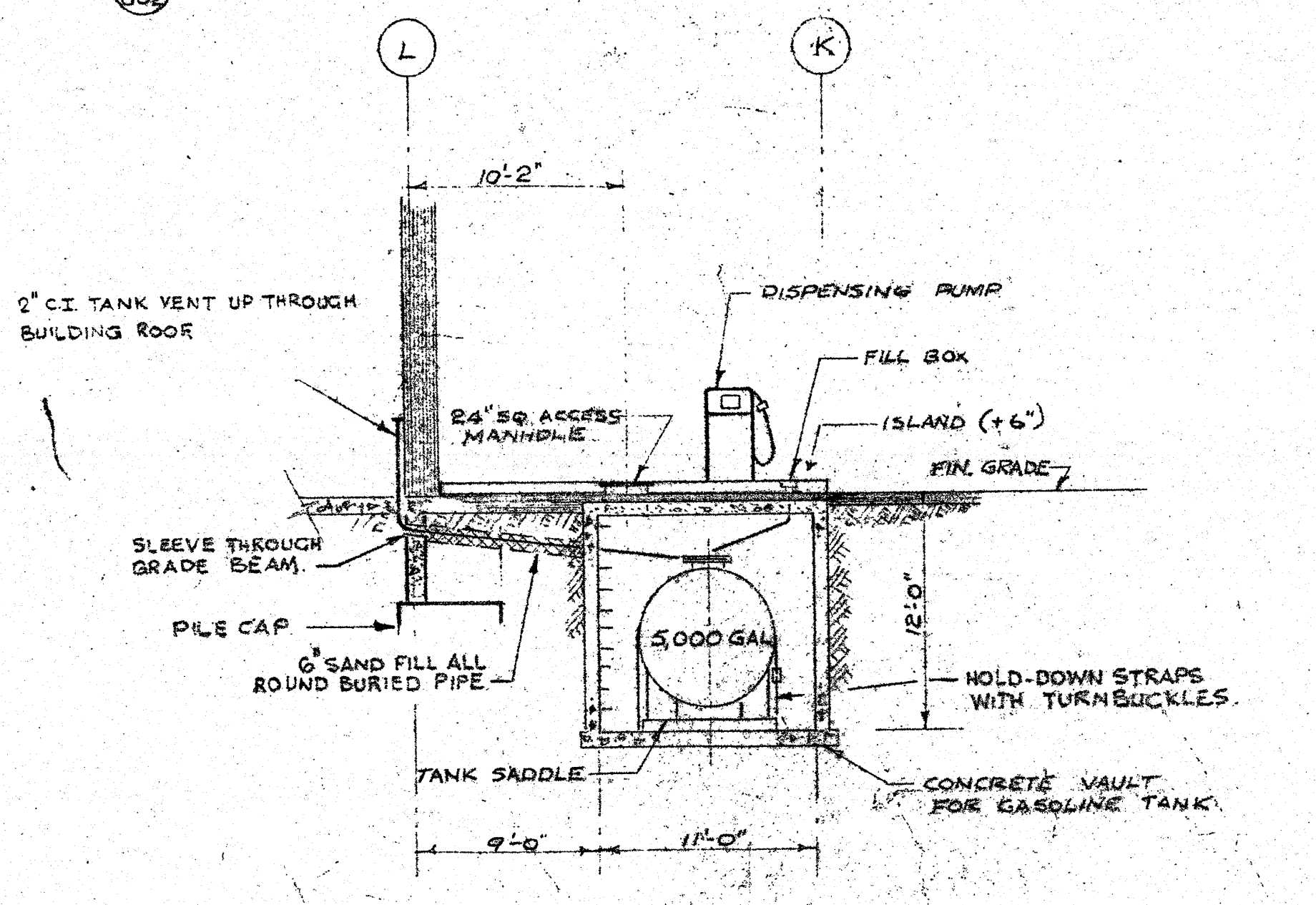
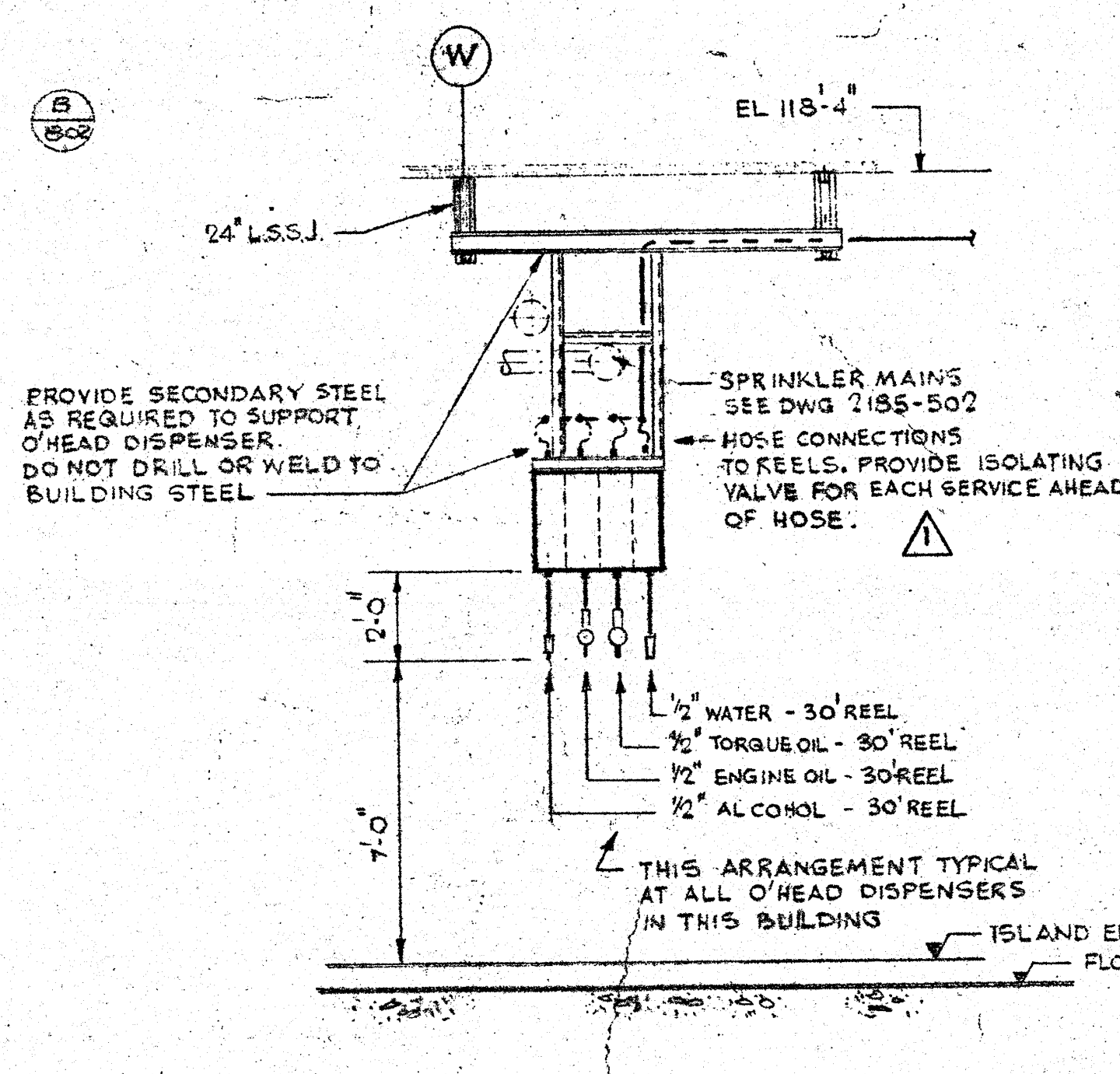


SECTION THROUGH GASOLINE DISPENSING FACILITY
SCALE 1/8" = 1'-0"



SUPPORT FOR O'HEAD DISPENSER
SCALE 1/4" = 1'-0"

WASHRACK

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
24/11/69	6		AS BUILT	
29/5/68	5	3	ACCESS PLATFORMS IN TANK VAULT ADDED. VAULT M'HOLE WAS 24" DIA	
25/4/68	4	2	BUS FUELLING SYSTEM EQUIPMENT REVISED.	
29/3/68	3	1	REVISED PER ADDENDUM No2 AND ISSUED FOR CONSTRUCTION	
19/1/68	2	0	FOR TENDER	
20/10/67	1	0	FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

GARAGE & SERVICE BAY
PROCESS EQUIPMENT & SERVICES – SECTIONS & DETAILS

CONSULTING PROFESSIONAL ENGINEERS
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ARCHITECTS
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10 DONALD STREET, WINNIPEG, MANITOBA

J. T. F. THORPE

LICENSED TO PRACTICE
IN THE
PROVINCE OF MANITOBA
My Licence Expires 10 Jan. 1968

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

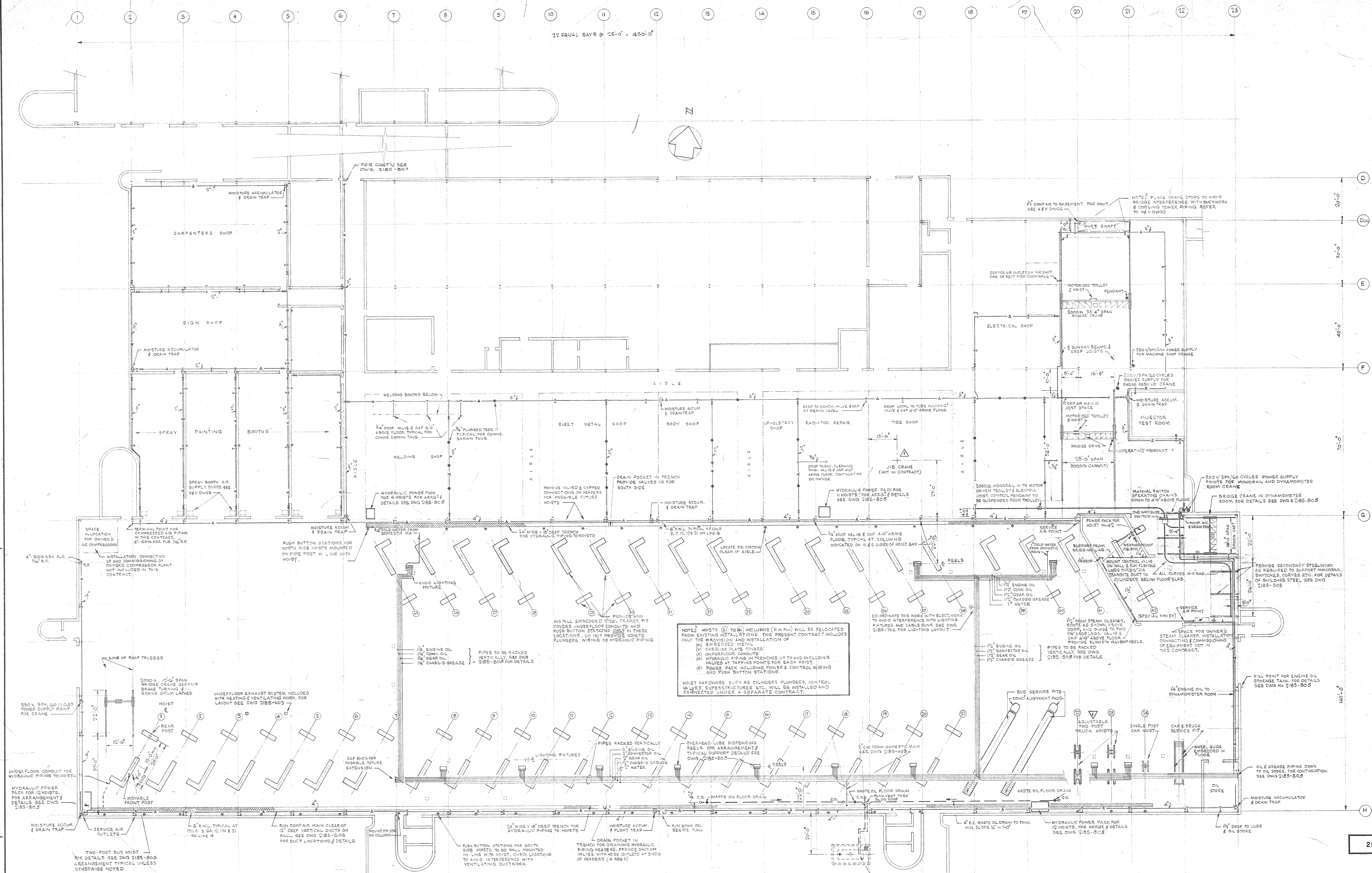
DRAWN BY
CHECKED J.T.T.
FILE No.
SHEET No.
DATE AUGUST '67
SCALE AS SHOWN
DRAWING No. 2185-803
MECHANICAL

421 OSBORNE . ST. address SHOP FACILITIES

project no. 2185-804 sheet no.

OVERHAUL & REPAIR SHOP - PROCESS description

EQUIPMENT & SERVICES - PLAN & DETAILS



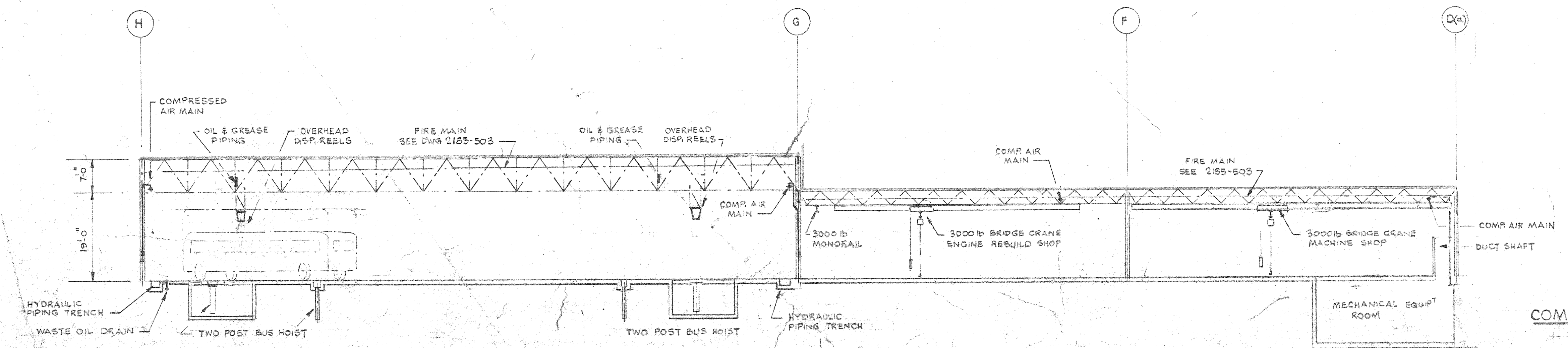
NOTE! HOISTS ㉛ TO ㊶ INCLUSIVE (11 IN ALL) WILL BE RELOCATED FROM EXISTING INSTALLATIONS. THIS PRESENT CONTRACT INCLUDES ONLY THE PROVISION AND INSTALLATION OF

- (a) EMBEDDED METAL
- (b) CHEQUER PLATE COVERS
- (c) UNDERFLOOR CONDUITS
- (d) HYDRAULIC PIPING IN TRENCHES UP TO AND INCLUDING VALVES AT TAPPING POINTS FOR EACH HOIST.
- (e) POWER PACK INCLUDING POWER & CONTROL WIRING AND PUSH BUTTON STATIONS.

HOIST HARDWARE SUCH AS CYLINDERS, PLUNGERS, CONTROL VALVES, SUPERSTRUCTURES ETC., WILL BE INSTALLED AND CONNECTED UNDER A SEPARATE CONTRACT.

PROCESS EQUIPMENT - PLAN
SCALE 1/16" = 1'-0"

2185-804



COMPOSITE SECTION LOOKING WEST
SCALE 1/16" = 1'-0"

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
24/11/69	4		AS BUILT	
29/3/68	3	1	REVISED PER ADDENDUM No 2 AND ISSUED FOR CONSTRUCTION	
19/1/68	2	0	FOR TENDER	
20/10/67	1	0	FOR APPROVAL	

ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

OVERHAUL & REPAIR SHOP
PROCESS EQUIPMENT & SERVICES — PLAN & DETAILS

J. T. F. THORPE

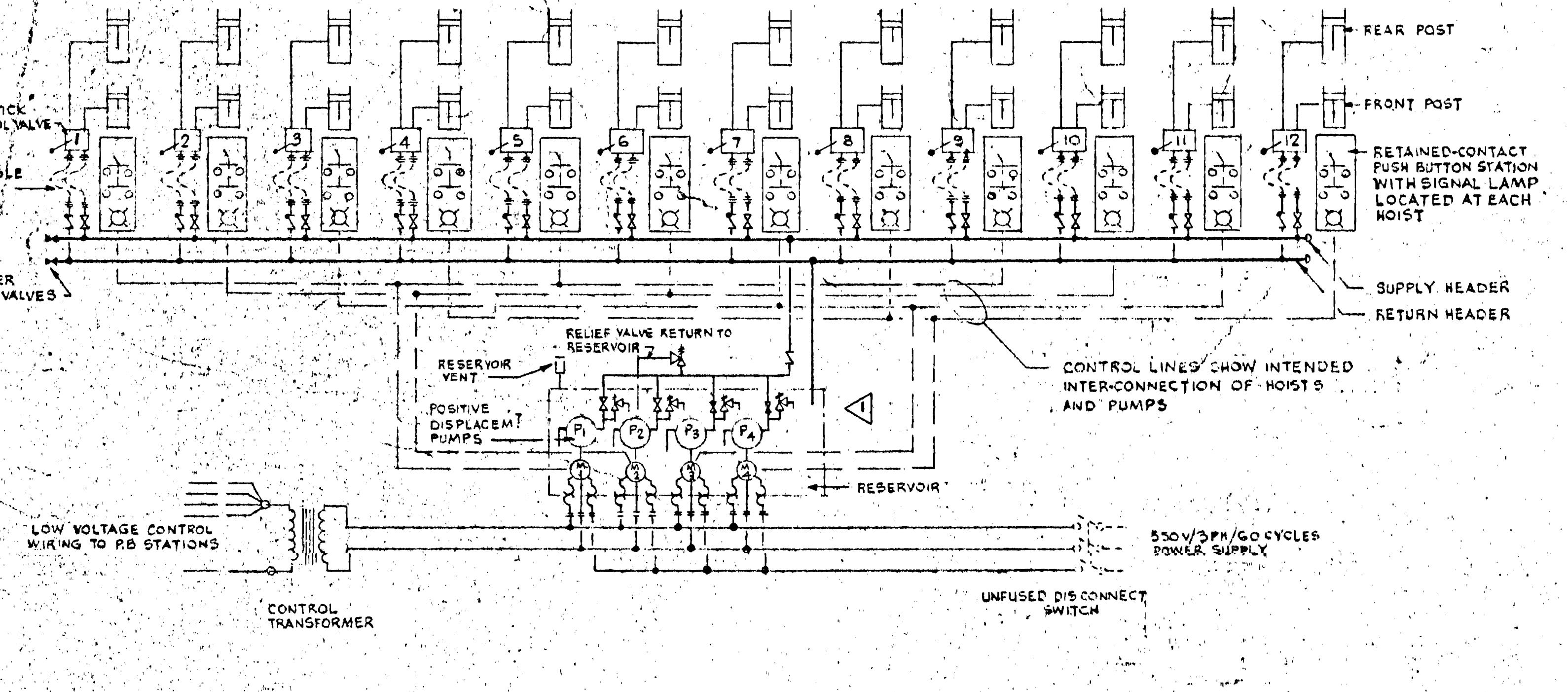
LICENSED TO PRACTICE IN THE PROVINCE OF MANITOBA
My Licence Expires 19 ... 1968

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

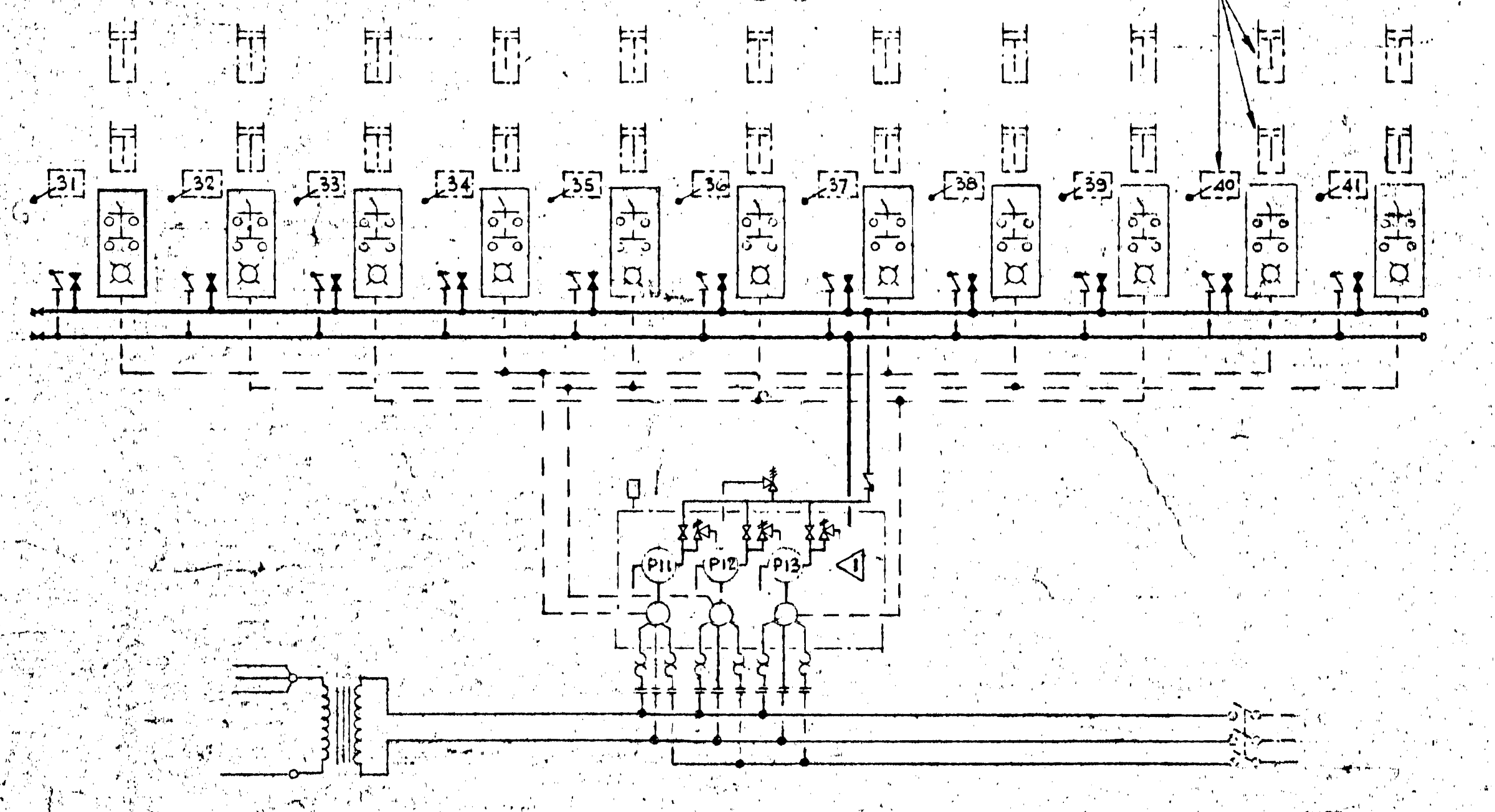
DRAWN BY
CHECKED J.T.T.
FILE No.
SHEET No.
DATE AUGUST '67
SCALE 1/16" = 1' - 0"
DRAWING No. 2185-804
MECHANICAL



SCHEMATIC PIPING & CONTROL DIAGRAM FOR HOISTS 1-12 INCL.

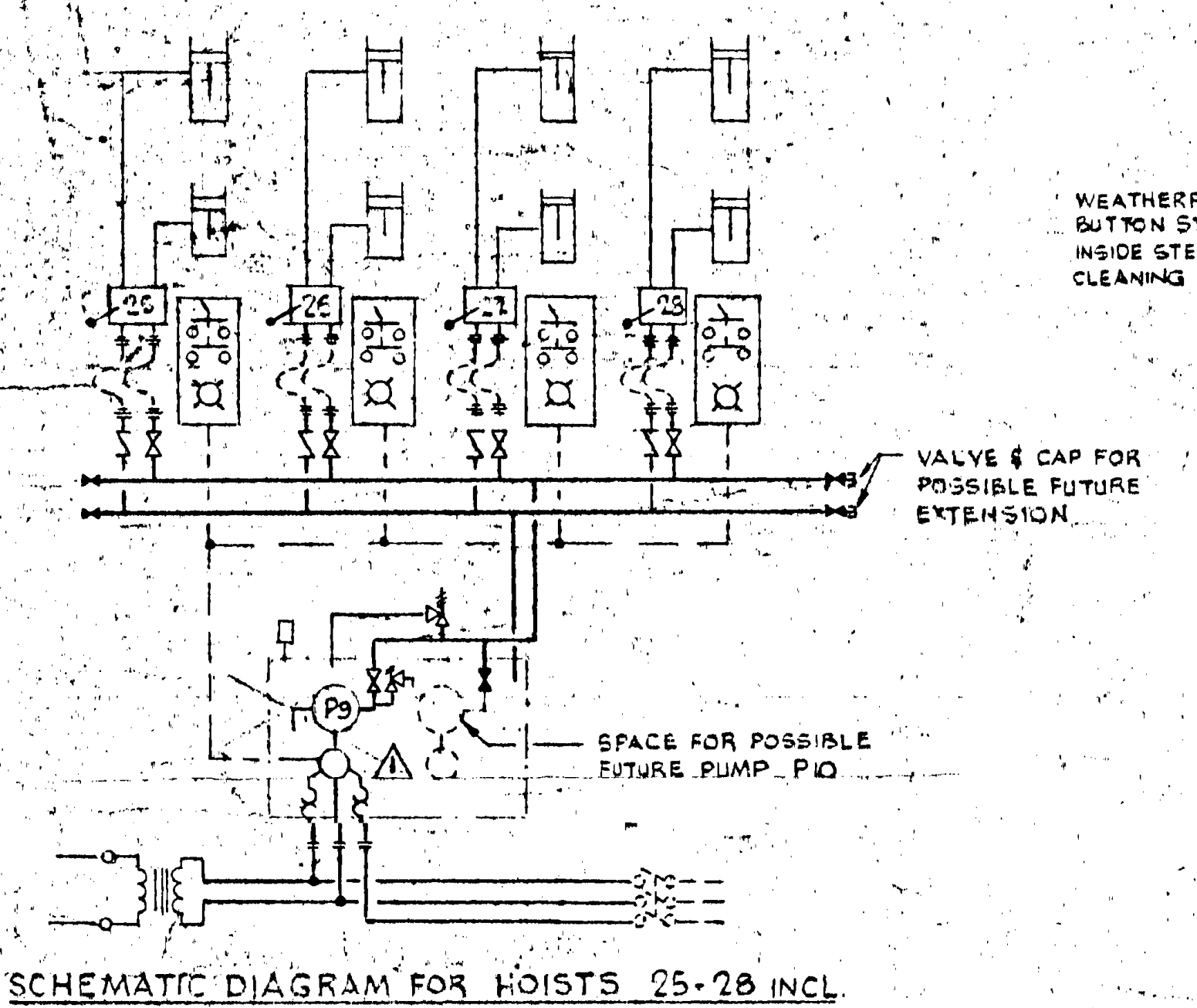
NOTE HOISTS 13-24 INCLUSIVE TO BE ARRANGED IN A SIMILAR FASHION EXCEPT THAT HOIST No 24 SHALL BE SINGLE POST PATTERN. PUMPS TO BE NUMBERED P5, P6, P7, P8.

CYLINDERS, PLUNGERS CONTROL BOXES AND INTER-CONNECTING PIPING FOR HOISTS ㉛-㊶ INCLUSIVE, NOT IN THIS CONTRACT



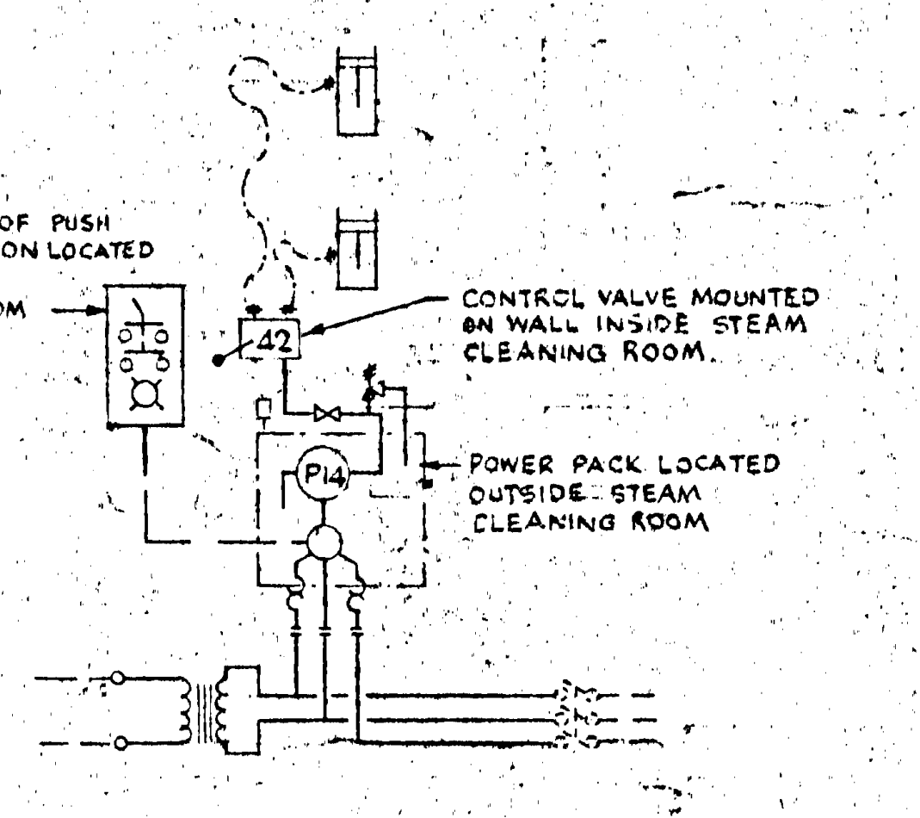
SCHEMATIC PIPING & CONTROL DIAGRAM FOR HOISTS 31-41 INCL.

EQUIPMENT & DETAILS AS FOR DIAGRAM ABOVE

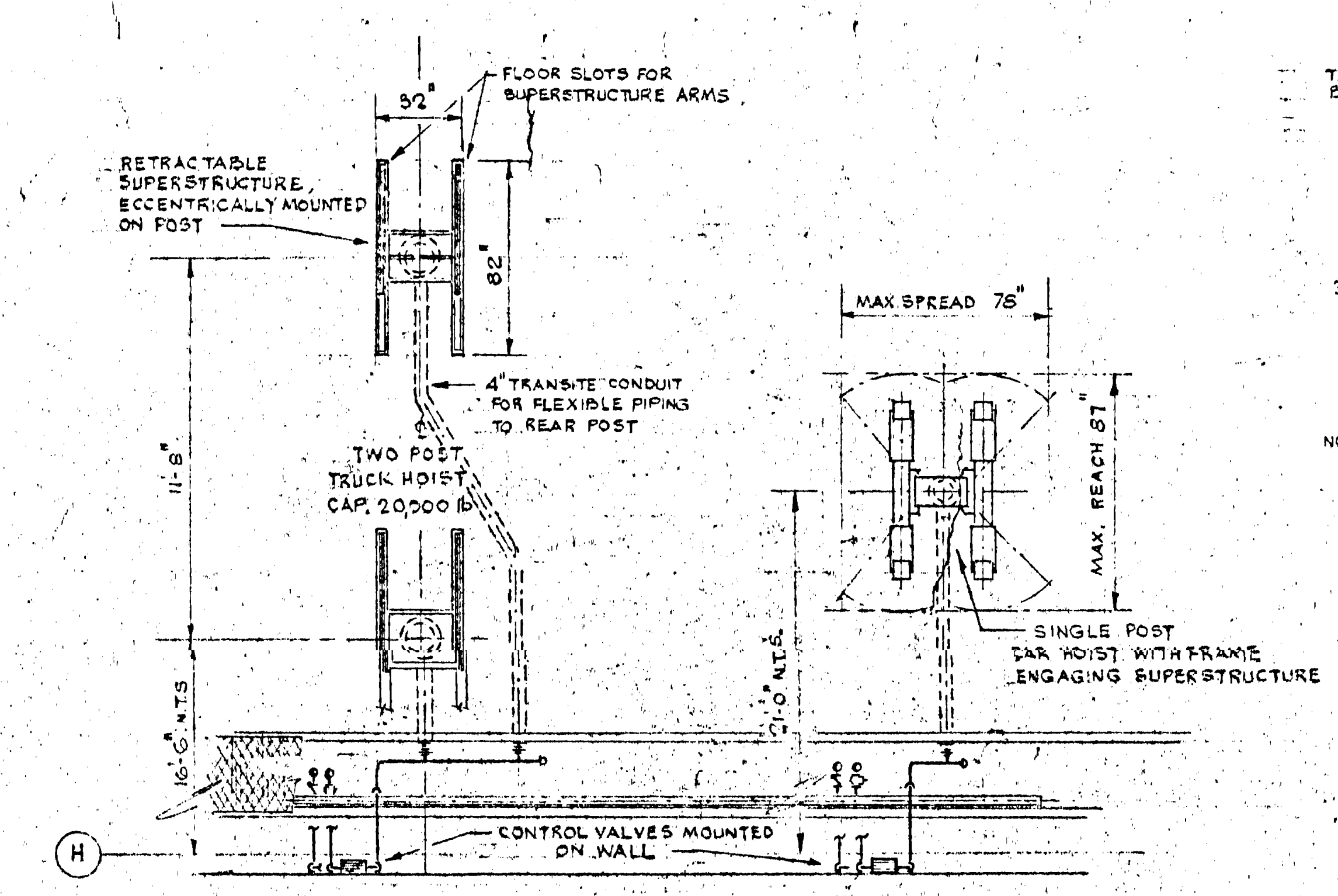


SCHEMATIC DIAGRAM FOR HOISTS 25-28 INCL.

EQUIPMENT & DETAILS AS FOR DIAGRAM ABOVE

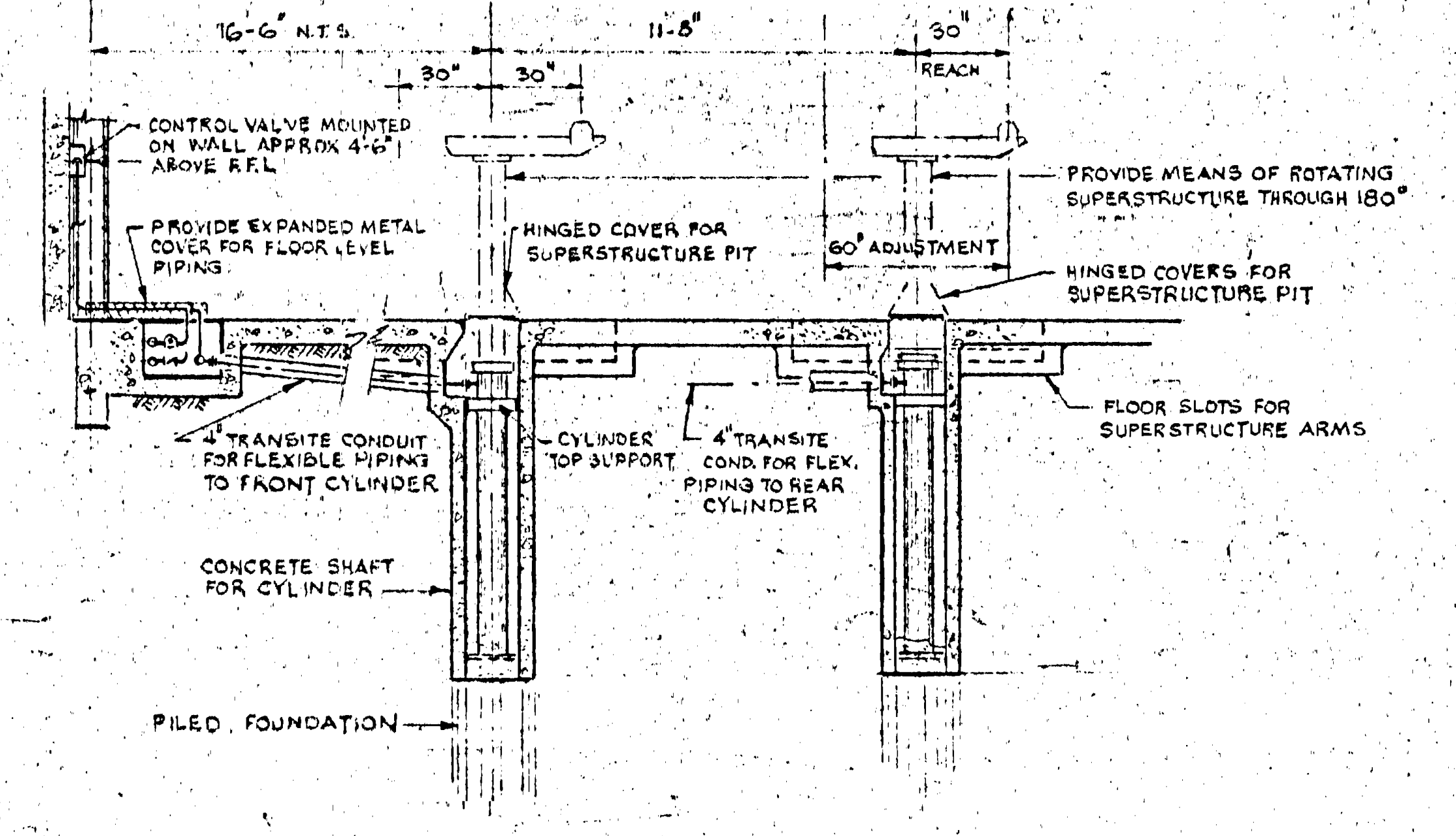


SCHEMATIC DIAGRAM FOR HOIST 42



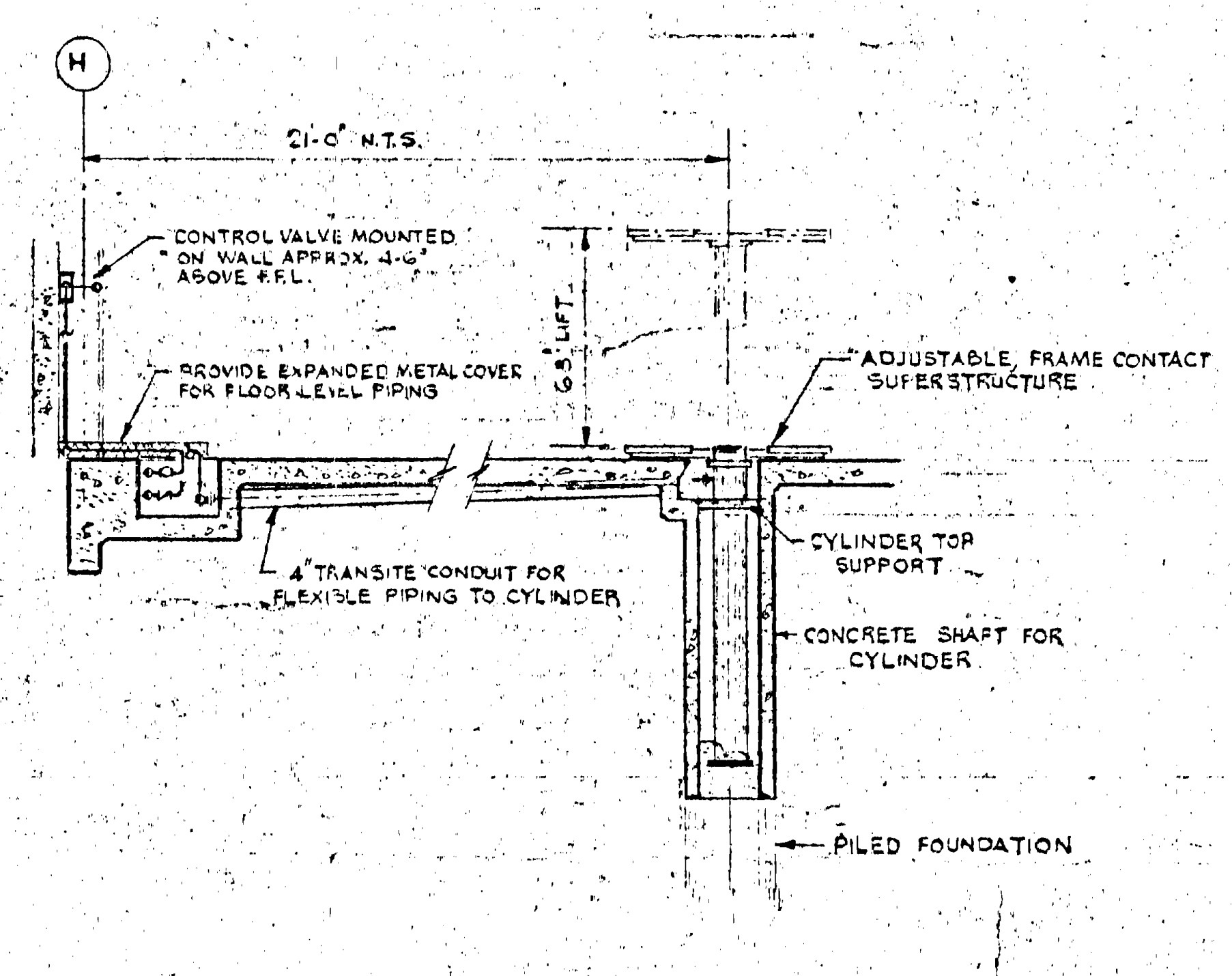
TRUCK AND CAR HOISTS - PLAN

SCALE 1/4" = 1'-0"



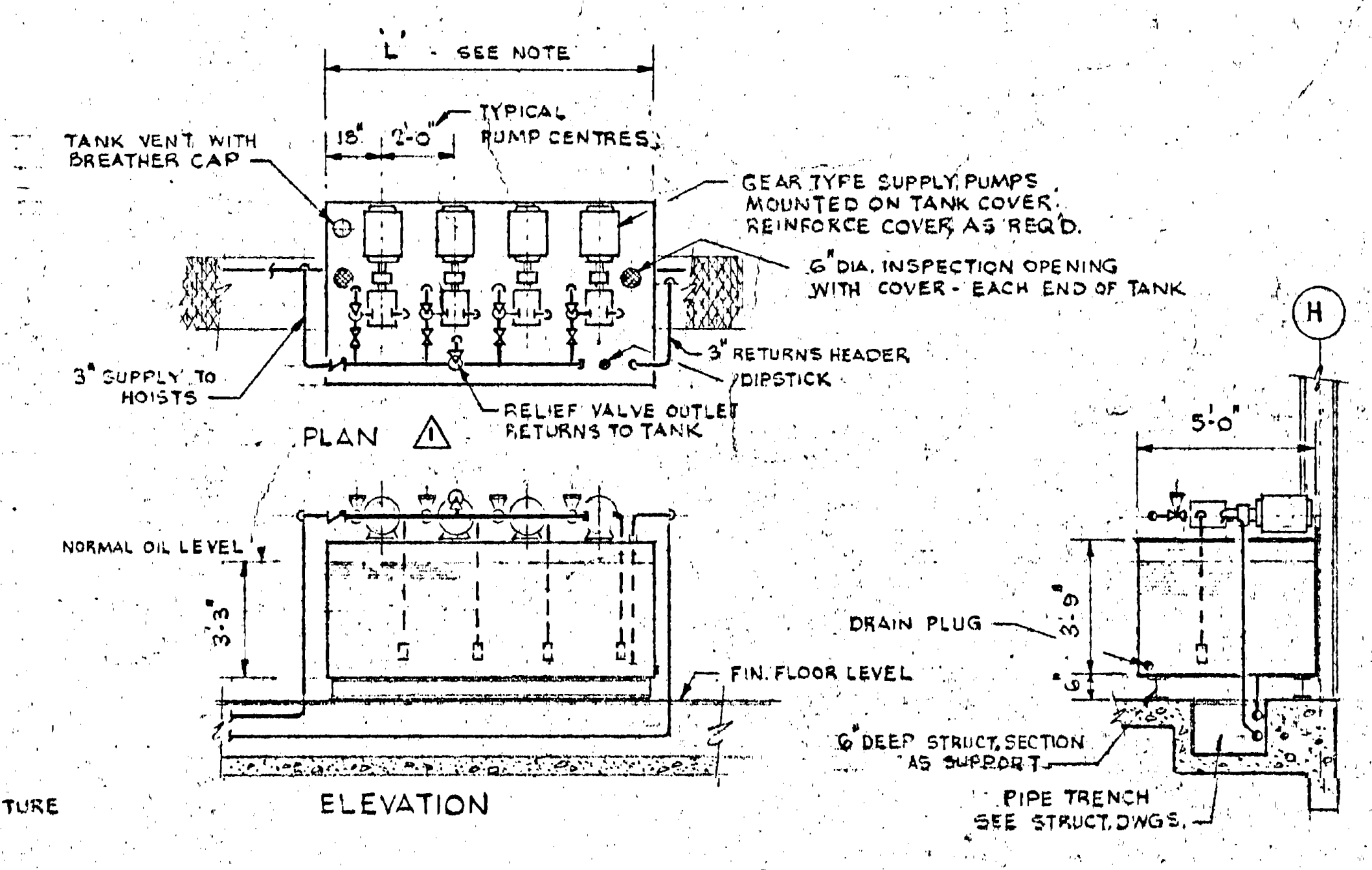
SECTION THROUGH TWO-POST TRUCK HOIST △

SCALE 1/4" = 1'-0"



SECTION THROUGH SINGLE POST CAR HOIST

SCALE 1/4" = 1'-0"



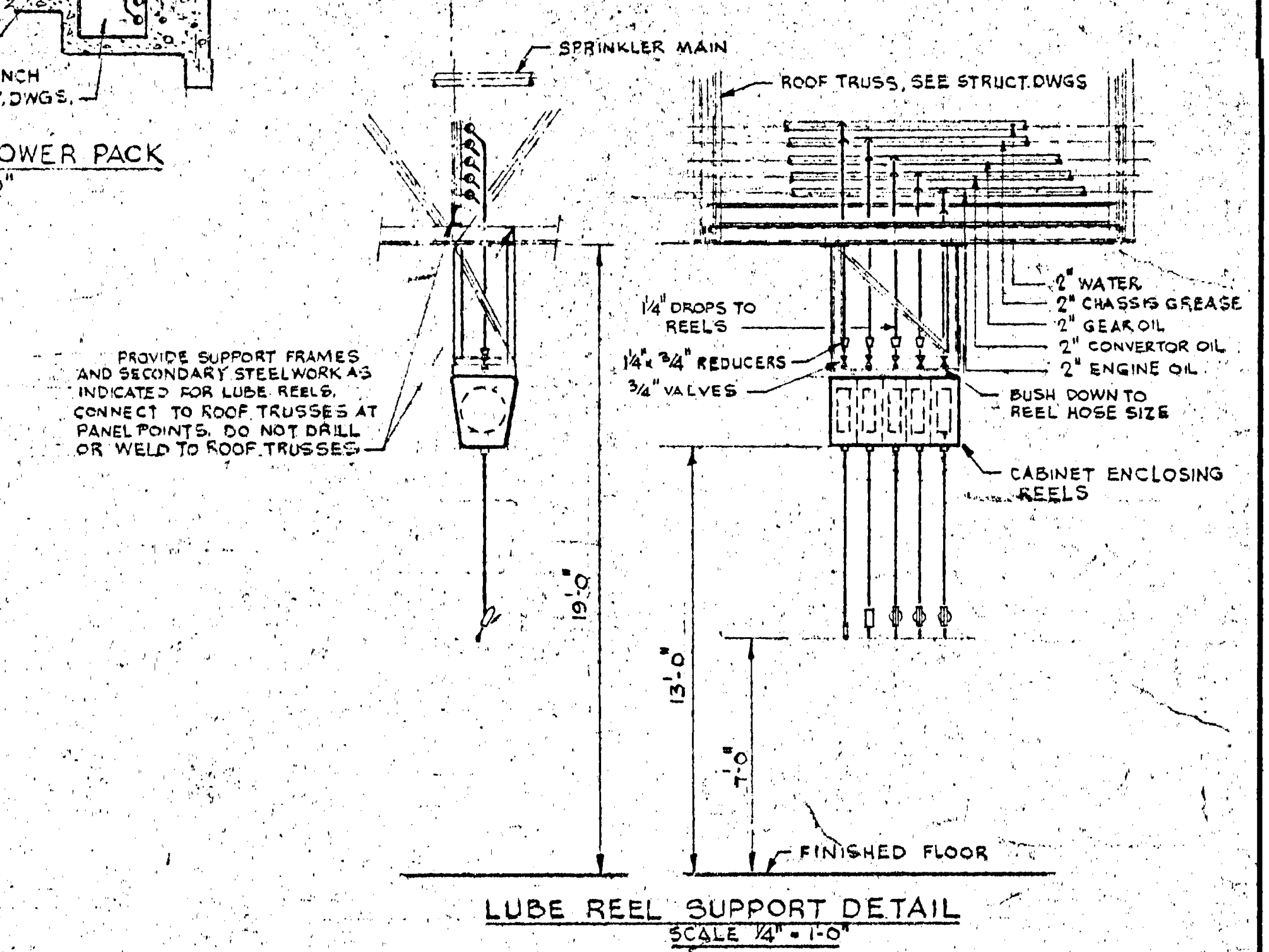
DETAILS OF HOIST POWER PACK

SCALE 1/4" = 1'-0"

NOTES

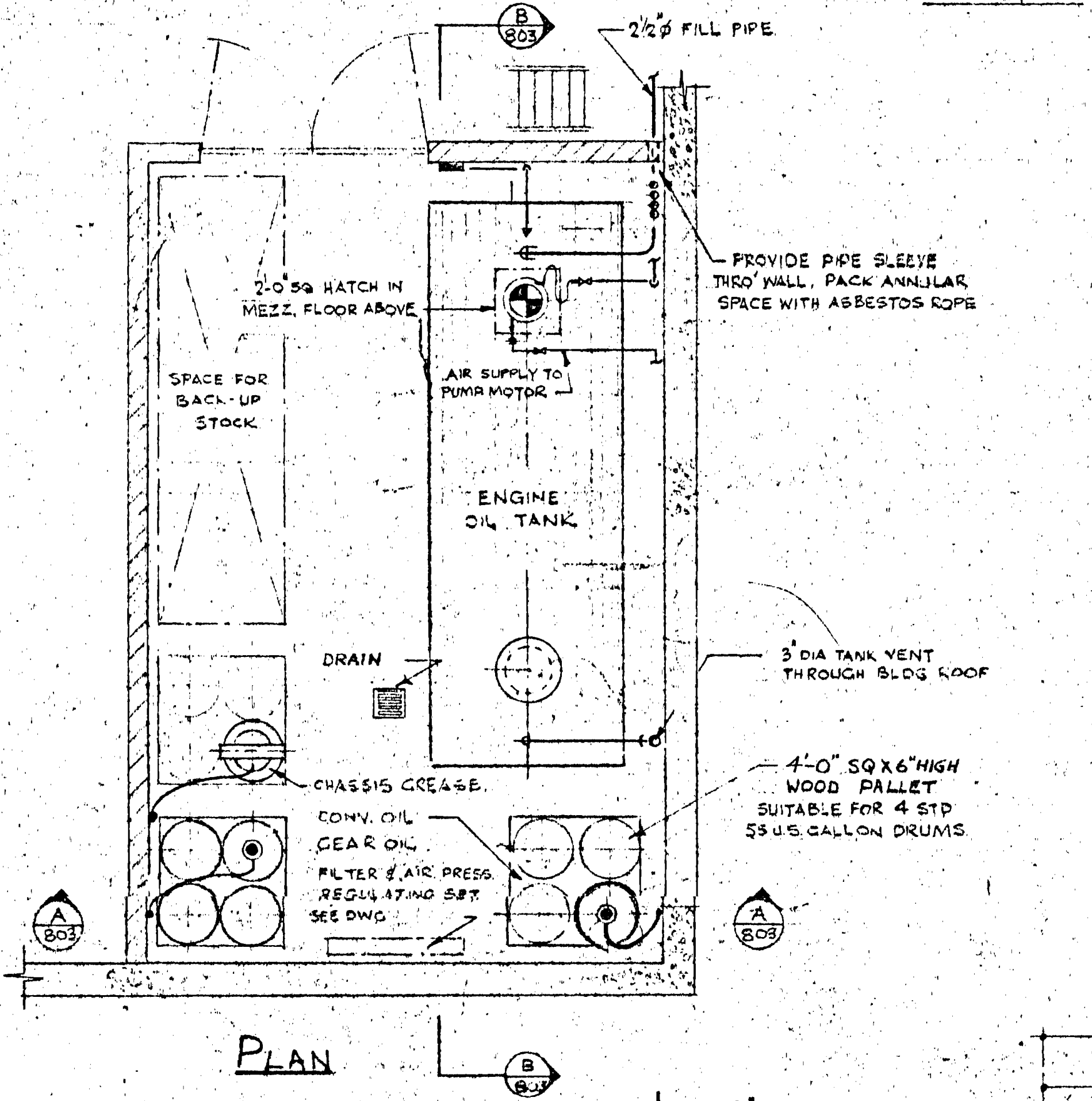
FOR HOISTS 1-12 INCL,	4 PUMPS REQ'D.,	L = 9'-0"	CAPY. =
" " 13-24 INCL,	4 PUMPS REQ'D.,	L = 9'-0"	CAPY =
" " 25-28 INCL,	1 PUMP REQ'D. +SPACE FOR FUT. PUMP	L = 5'-0"	CAPY =
" " 31-41 INCL,	3 PUMPS REQ'D	L = 7'-0"	CAPY =
" " 42	1 PUMP REQ'D	L = 3'-0"	CAPY =

ARRANGEMENT SHOWN IS FOR UNIT AT COL H19. ARRANGE OTHER UNITS TO SUIT INDIVIDUAL LOCATIONS AS INDICATED ON DWG 2185-804

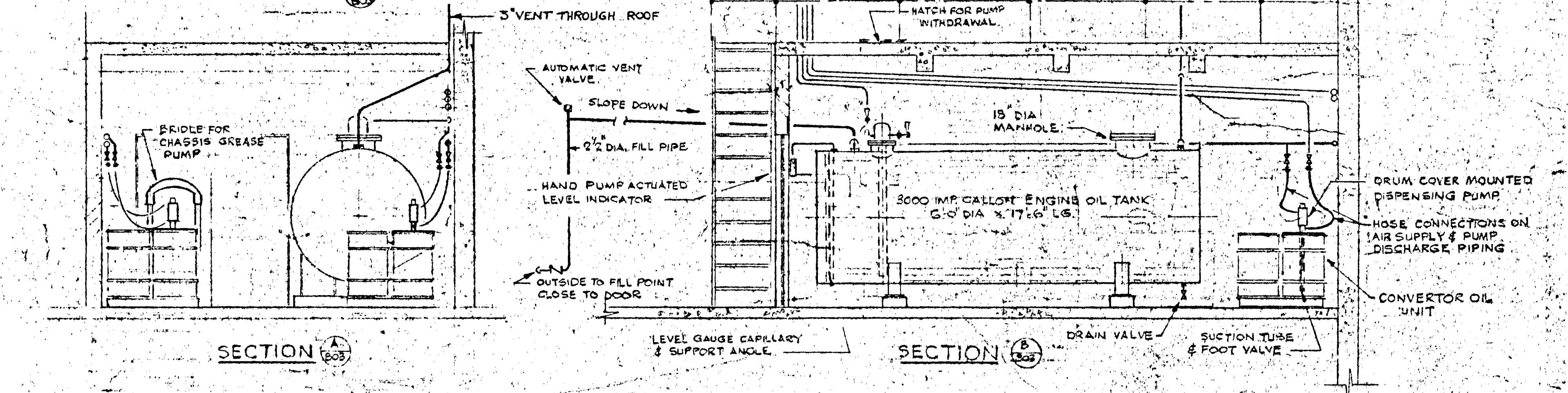


LUBE REEL SUPPORT DETAIL

SCALE 1/4" = 1'-0"

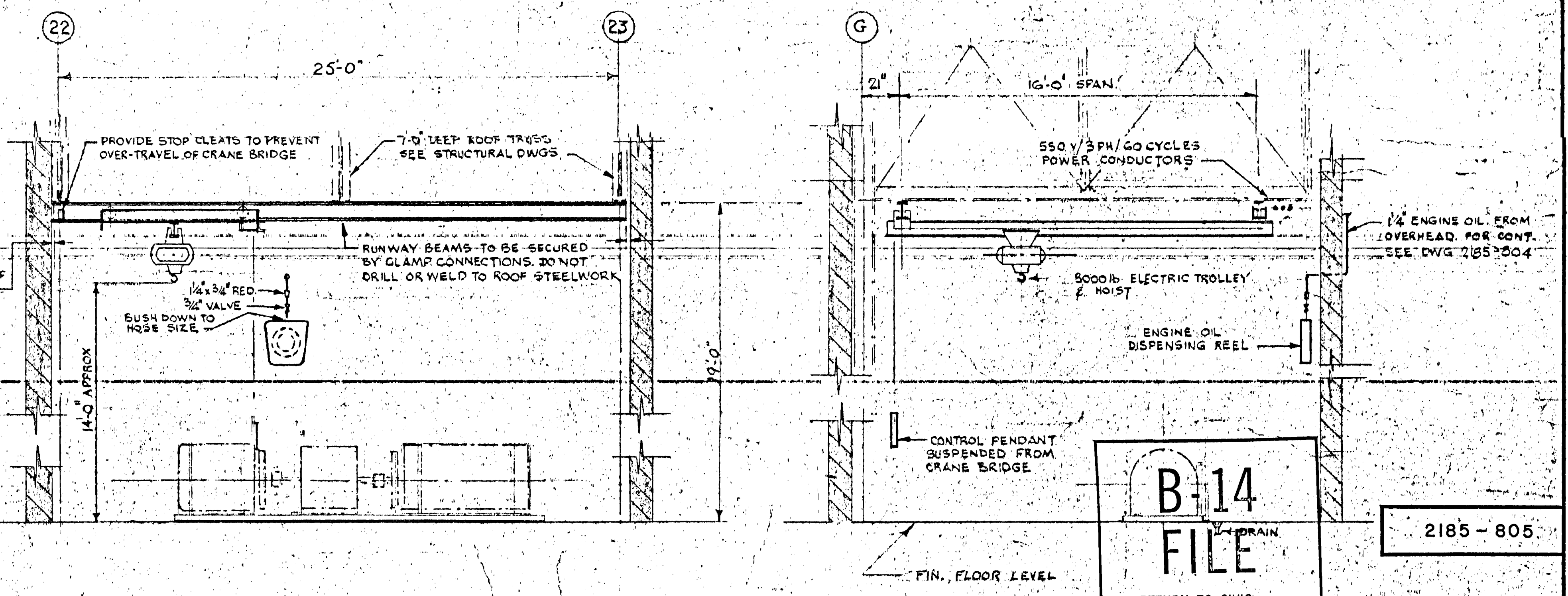


USE STD. WT. CARBON STEEL PIPE FOR GEAR, CONVERTOR & ENGINE OIL PIPING
USE XXS CARBON STEEL PIPE FOR CHASSIS GREASE



LUBE OIL STORAGE LAYOUT

SCALE 1/4 = 1-0

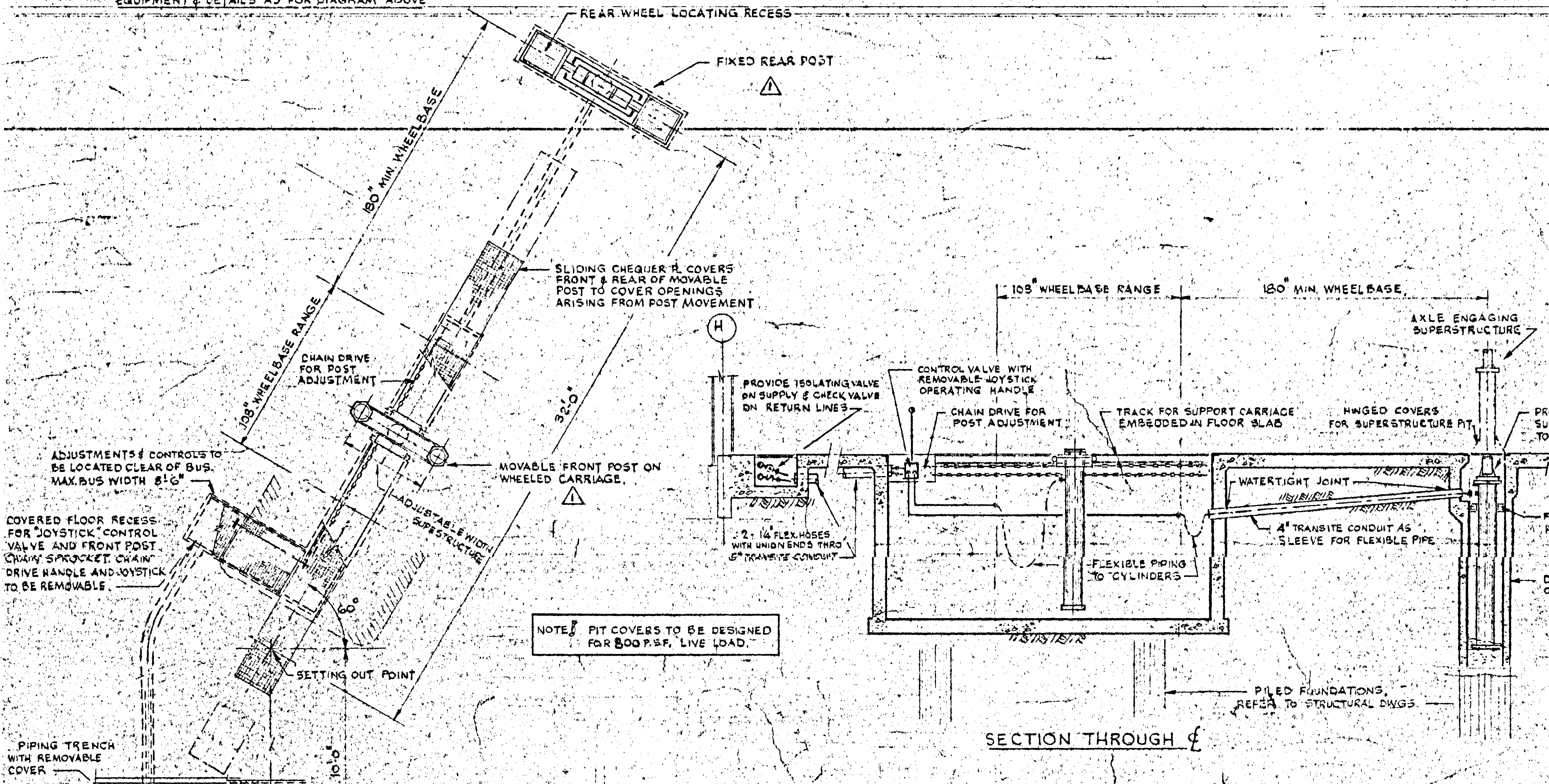


B 14 FILE
RETURN TO CIVIC PROPERTIES BUILDING INVENTORY.
2 | 91 | 1

2185 - 805

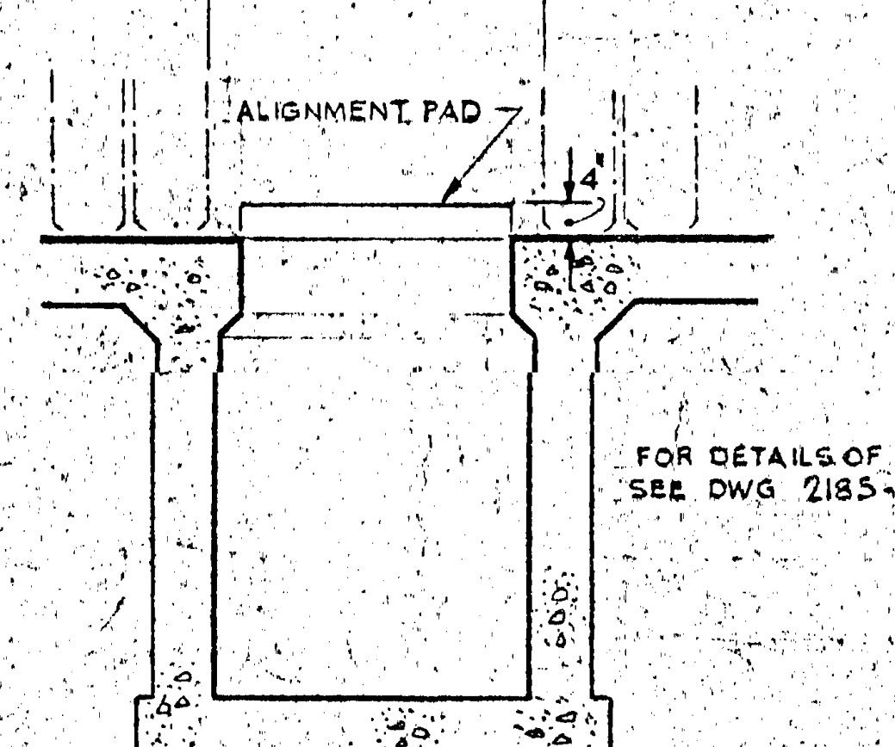
ARRANGEMENT OF DYNAMOMETER ROOM CRANE

SCALE 1/4" = 1'-0"



NOTE: PIT COVERS TO BE DESIGNED FOR 800 P.S.F. LIVE LOAD.

ARRANGEMENT OF TWO-POST BUS HOIST



SECTION THROUGH BUS SERVICE PIT

SCALE 1/2" = 1'-0"

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ISSUE OR REVISION

METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

OVERHAUL & REPAIR SHOP
PROCESS EQUIPMENT & SERVICES — DETAILS (SHEET 1)

CONSULTING PROFESSIONAL ENGINEERS
A. D. MARGISON AND ASSOCIATES LIMITED
1155 LESLIE STREET, DON MILLS, ONTARIO

ARCHITECTS
Waisman Ross • Blankstein Coop Gillmor Hanna
10 DONALD STREET, WINNIPEG, MANITOBA

MECHANICAL
J. T. F. THORPE

LICENSED TO PRACTICE IN THE PROVINCE OF MANITOBA
My Licence Expires 10 Jan. 1968

APPROVED
DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY
CHECKED J.T.T.
FILE No.
SHEET No.
DATE AUGUST '67
SCALE AS SHOWN
DRAWING No. 2185-805 MECHANICAL

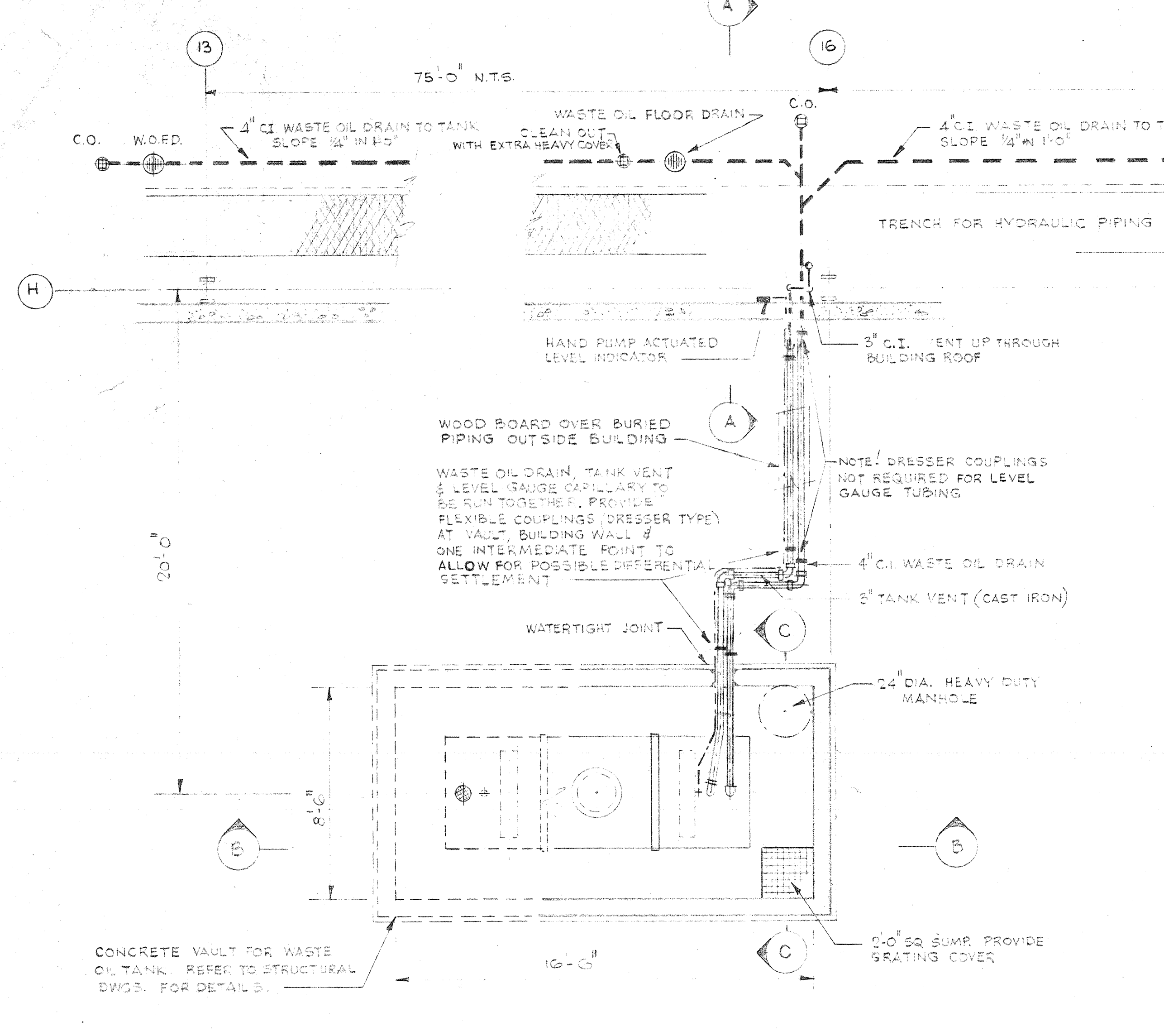
N.W.O.L. TRANSTEX 15 400-8-66

421 OSBORNE ST. TRANSIT STORAGE SHOP FACILITIES
address

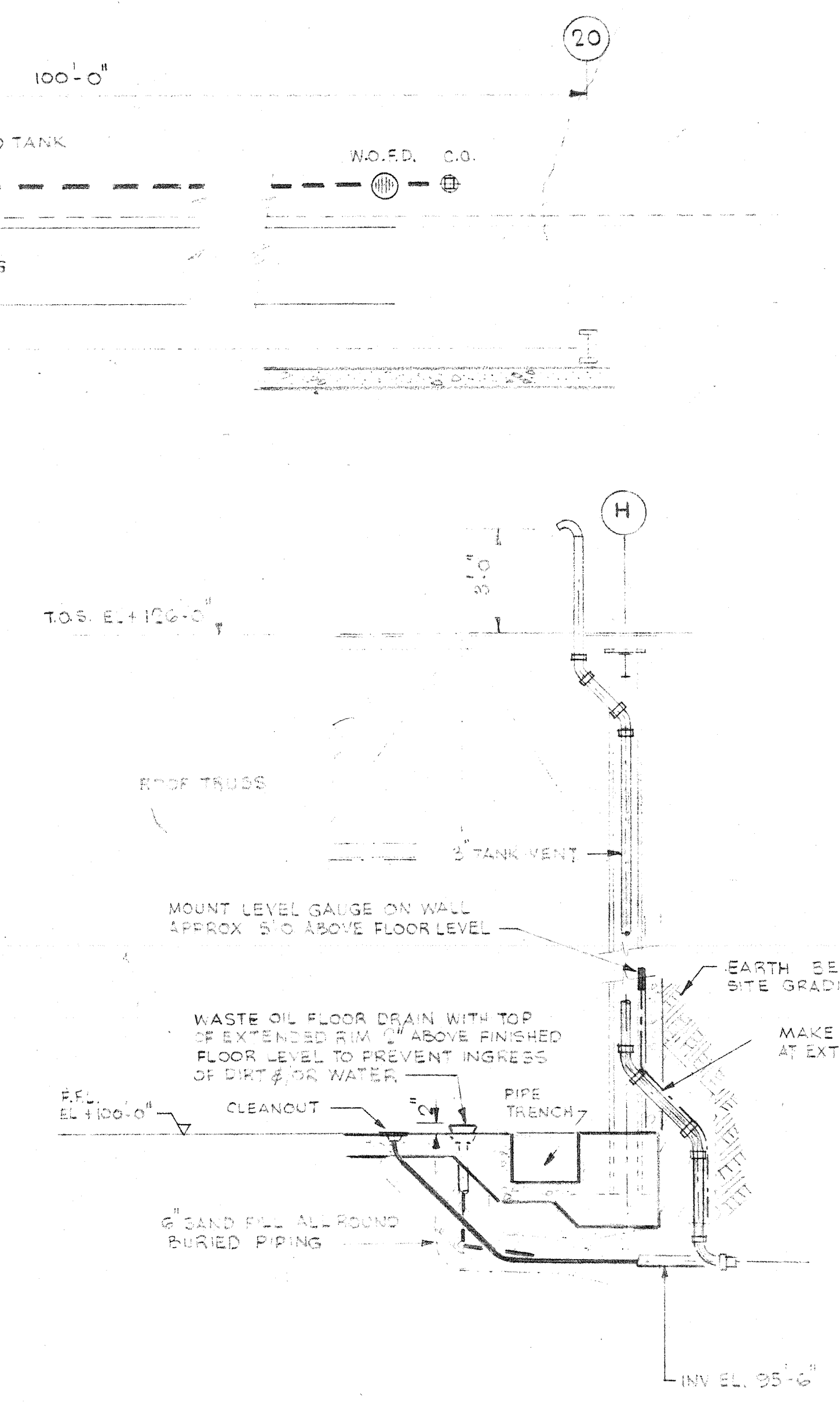
2185-806
project no. sheet no.

OVERHAUL & REPAIR SHOP - PROCESS
description

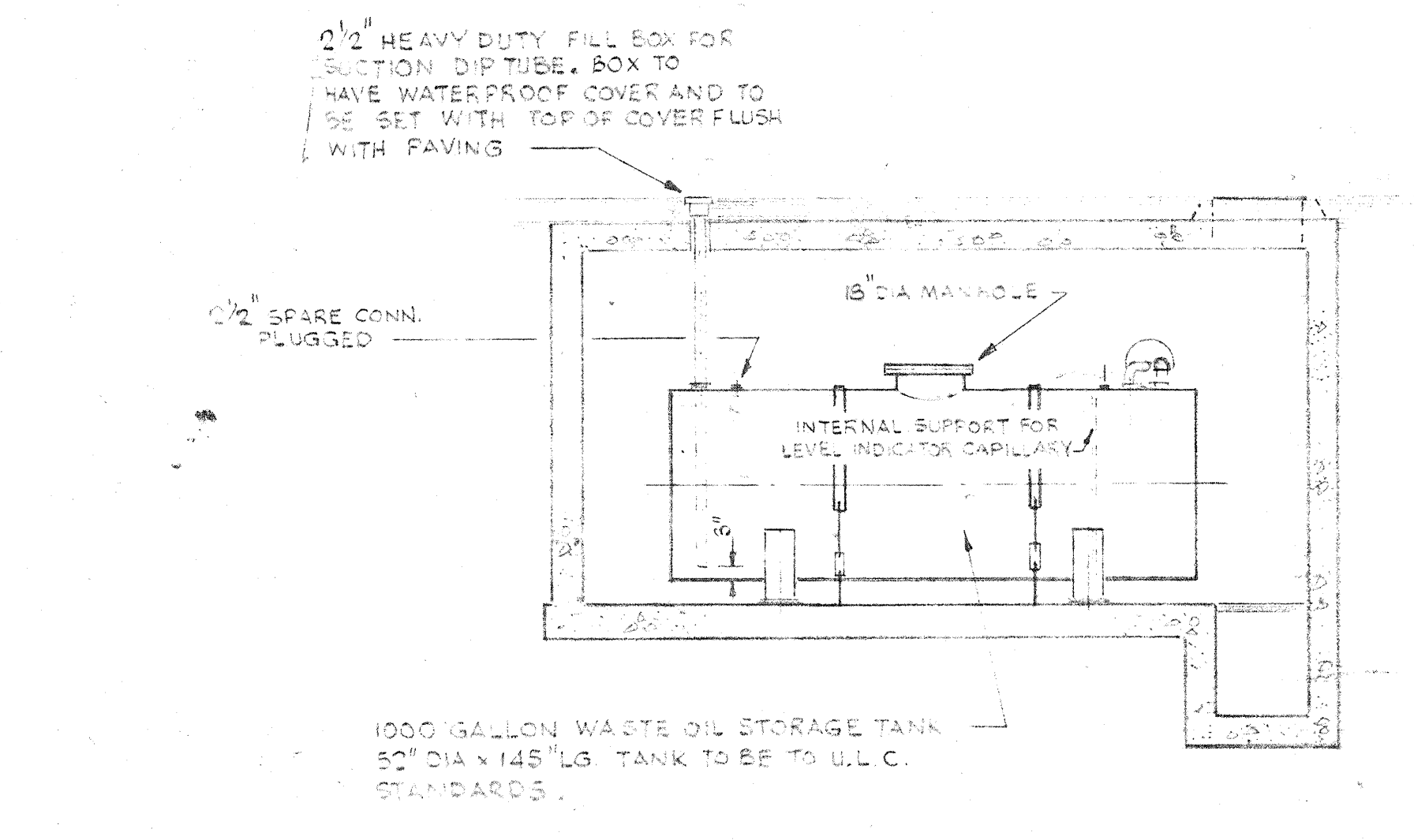
EQUIPMENT & SERVICES - DETAILS (SHEET 2)



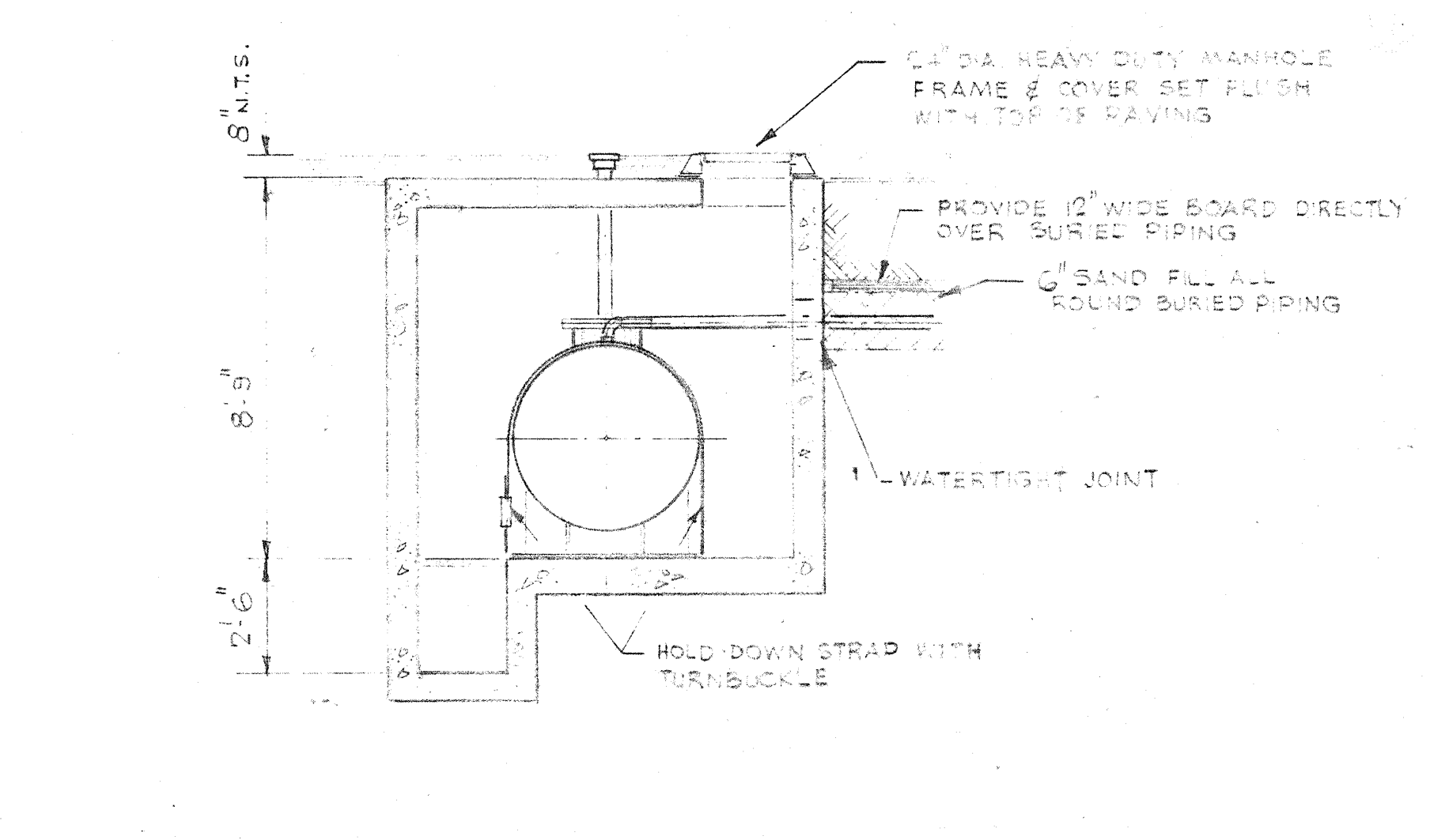
WASTE OIL DISPOSAL - PLAN
SCALE 1/4" = 1'-0"



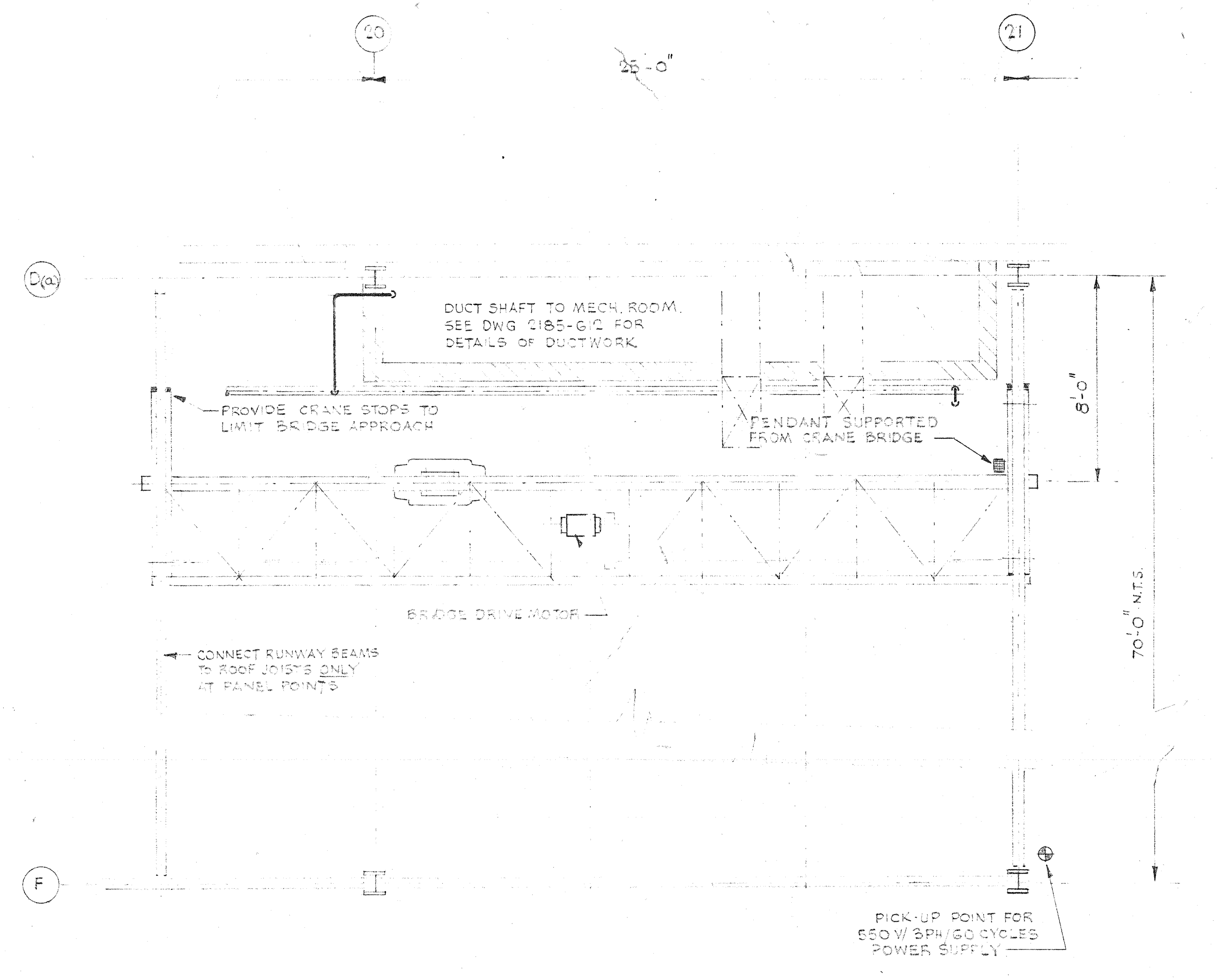
SECTION A A
SCALE 1/4" = 1'-0"



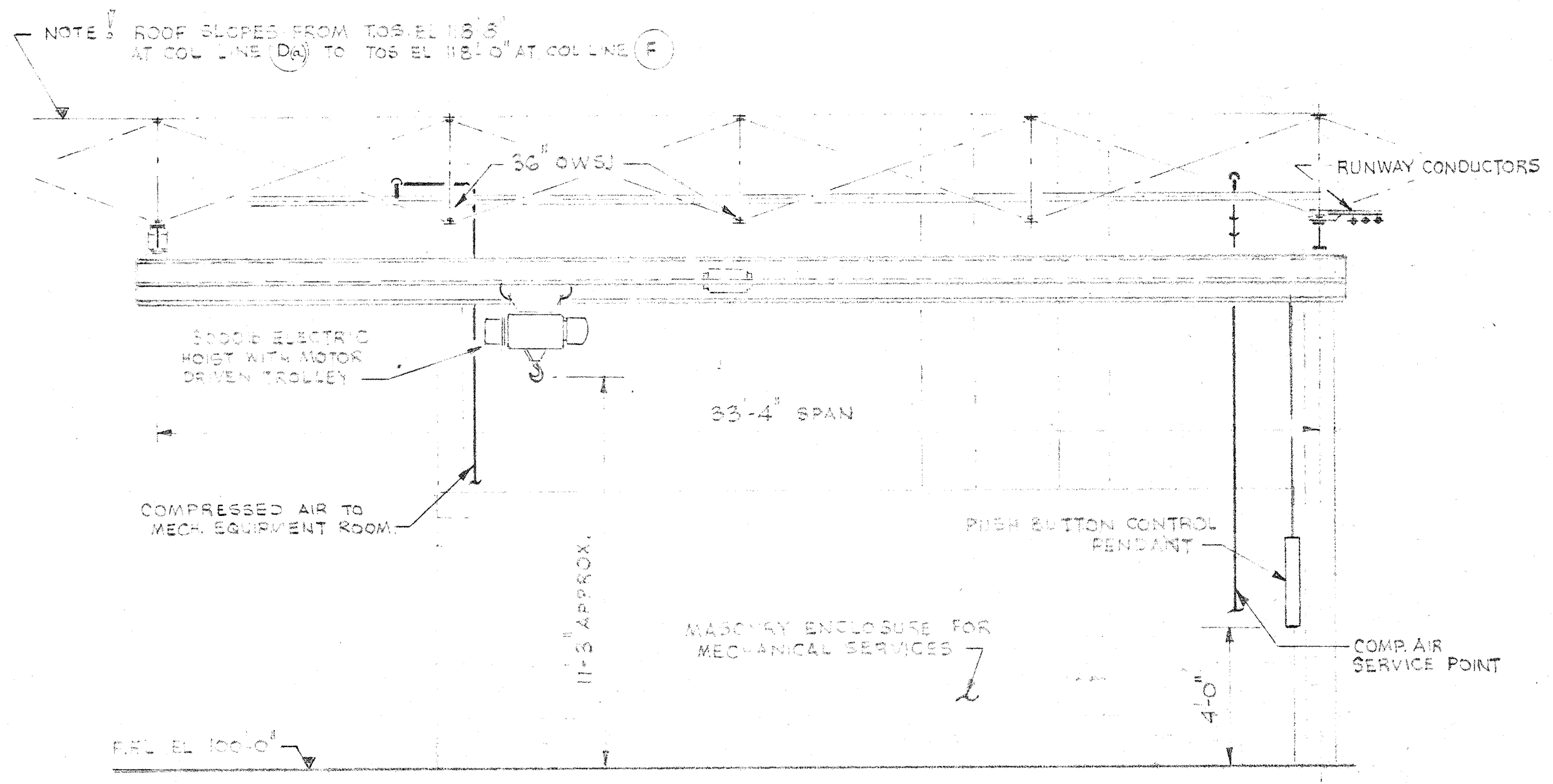
SECTION B-B
SCALE 1/4" = 1'-0"



SECTION C-C
SCALE 1/4" = 1'-0"



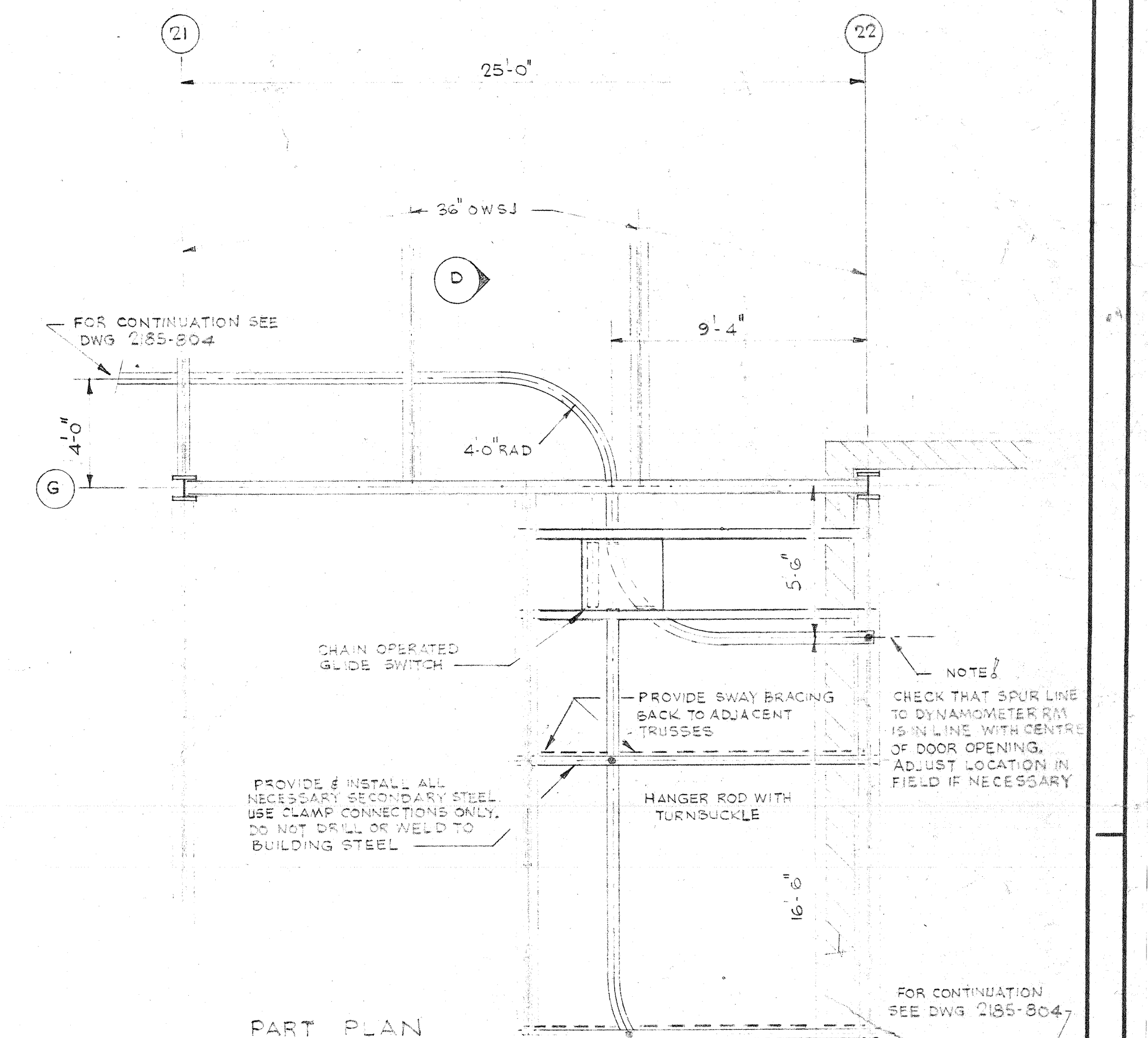
PLAN
SCALE 1/4" = 1'-0"



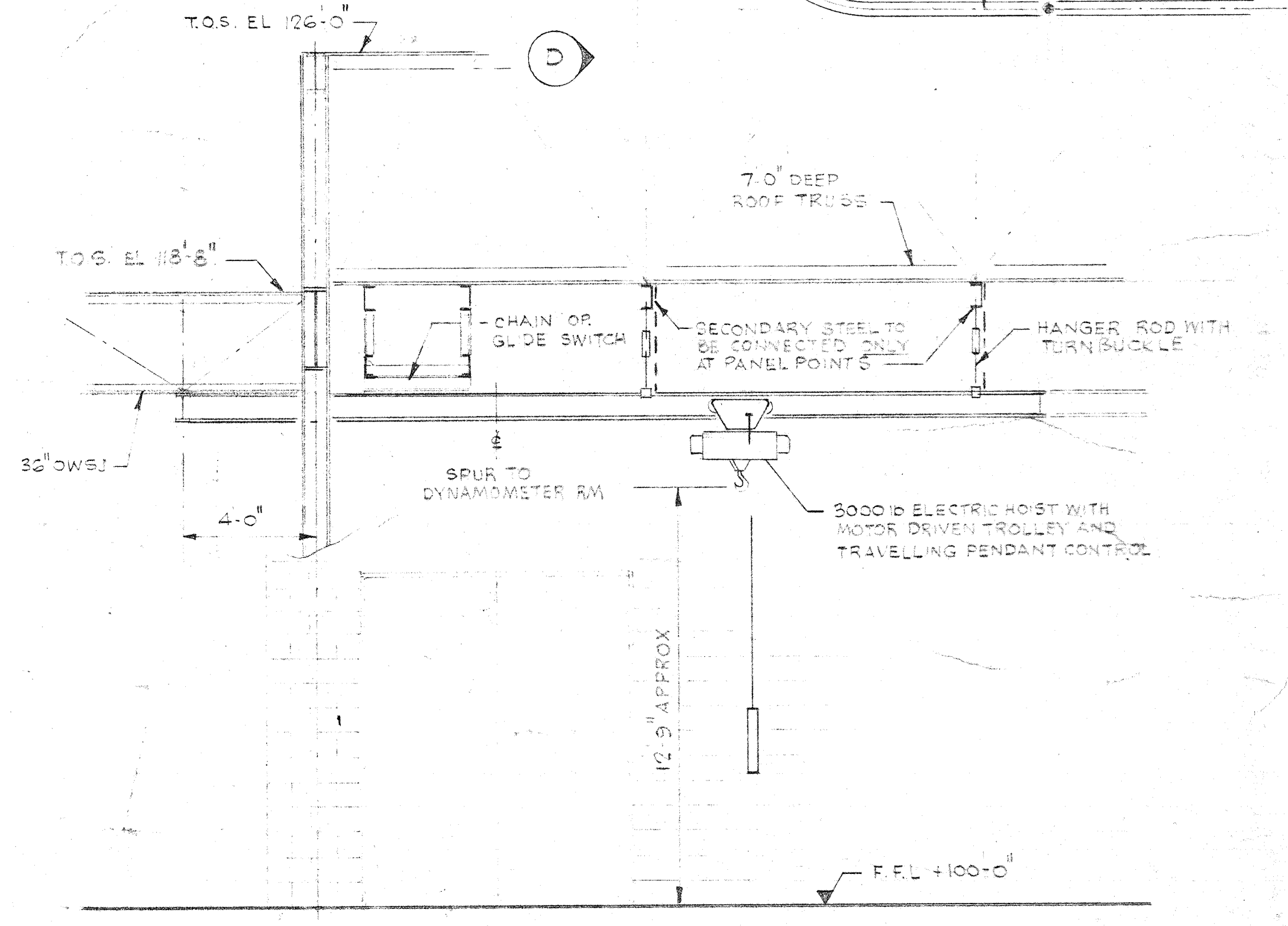
ELEVATION
SCALE 1/4" = 1'-0"

MACHINE SHOP CRANE - 1 REQ'D

ENGINE REBUILD SHOP CRANE GENERALLY SIMILAR EXCEPT THAT SPAN SHALL BE 25'-0". REFER TO DWG 2185-804 FOR ADDITIONAL DETAILS



PART PLAN
SCALE 1/4" = 1'-0"

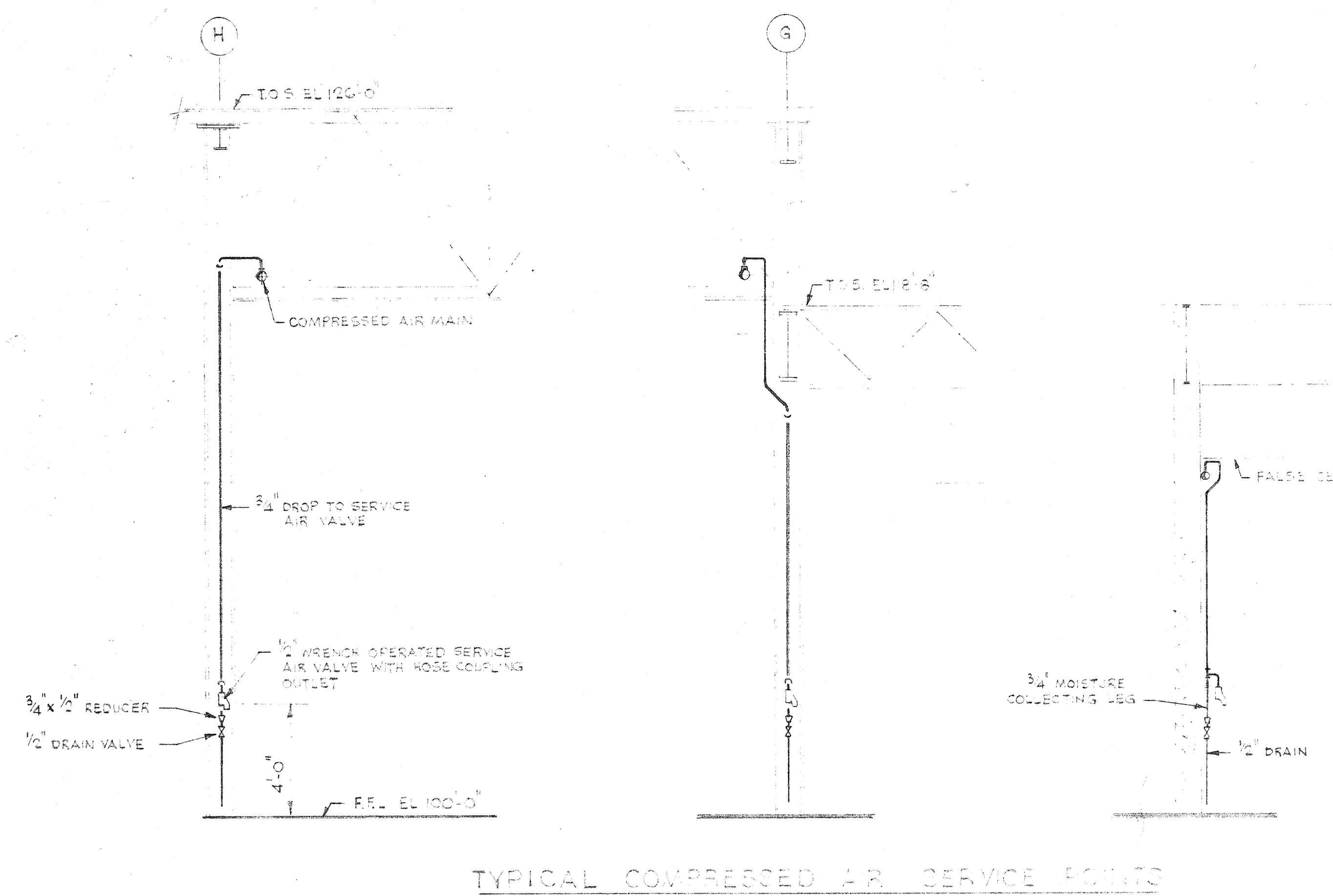


SECTION D-D
SCALE 1/4" = 1'-0"

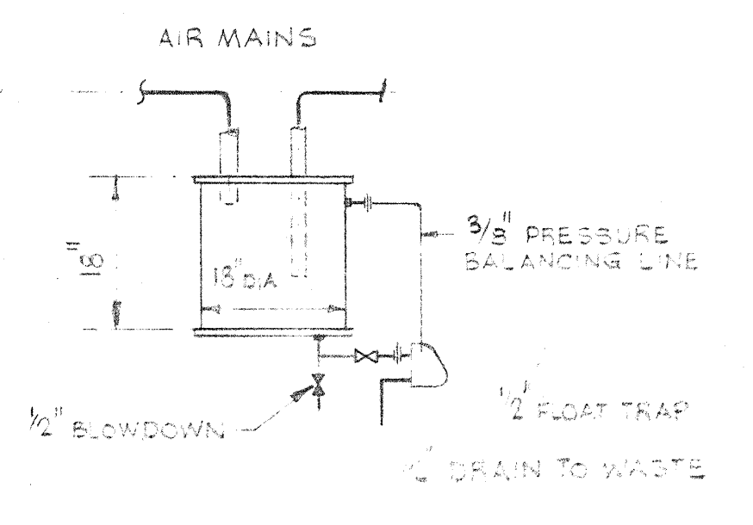
DETAILS OF MONORAIL

FOR FULL EXTENT OF LAYOUT SEE DWG 2185-804

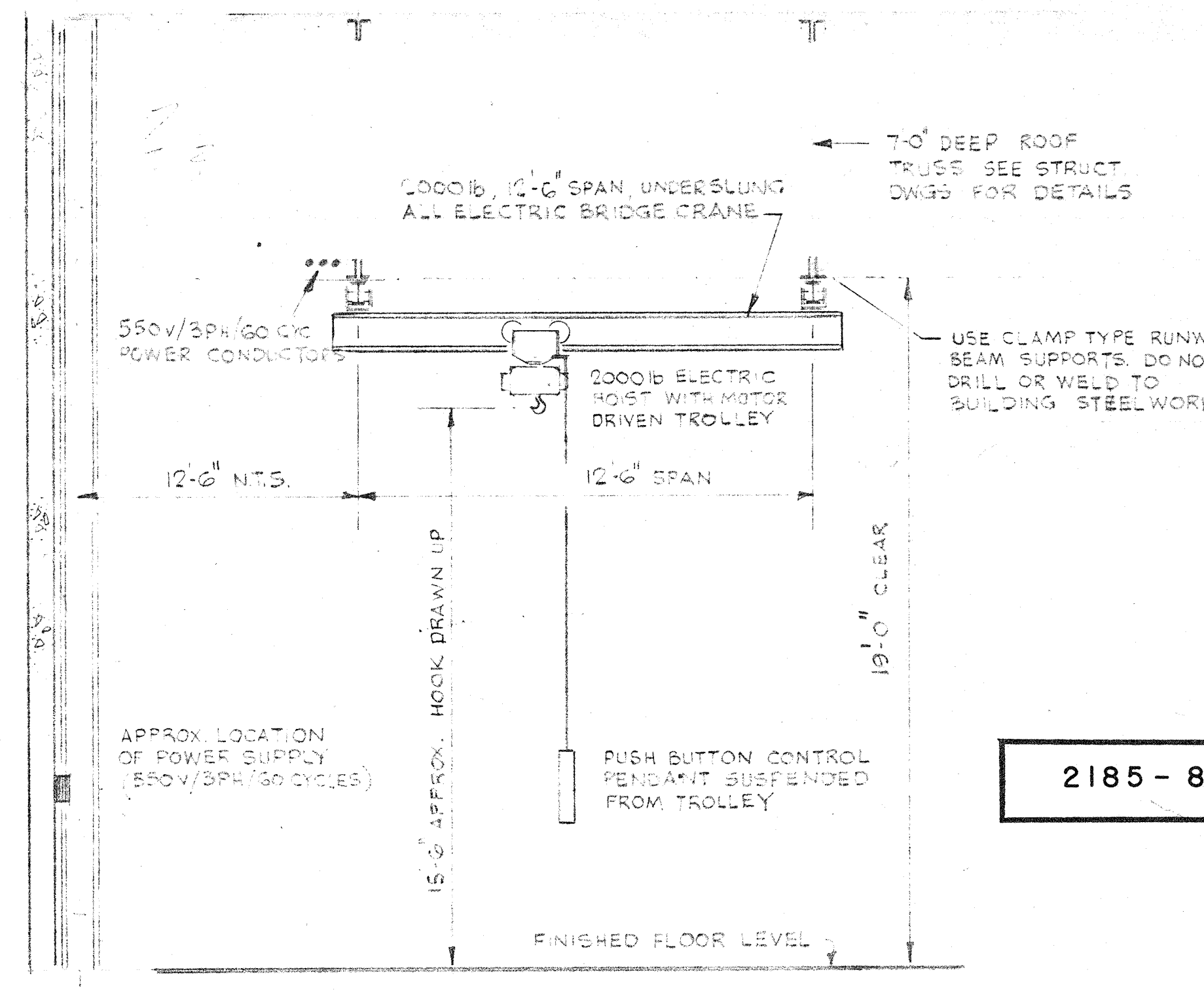
GARAGE ADDITION



TYPICAL COMPRESSED AIR SERVICE POINTS



MOISTURE ACCUMULATOR & DRAIN TRAP
SCALE 1/2" = 1'-0"



BRAKE TURNING LATHE CRANE
SCALE 1/4" = 1'-0"

2185-806

NUMBER TEN ARCHITECTURAL GROUP
ARCHITECTS & PLANNERS 210-175 HARGRAVE ST. WINNIPEG, CANADA R3C 3R9 (204) 942-0981

APPROVED

MAY

A. D. MARGISON ASSOCIATES LTD.
CONSULTING PROFESSIONAL ENGINEERS
SUITE 302—1320 YONGE STREET
TORONTO, ONTARIO M4T 1X2

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
9.5.77	5	1	GARAGE ADDITION - FOR TENDER	
24/11/69	4		AS BUILT	
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METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

OVERHAUL & REPAIR SHOP
PROCESS EQUIPMENT & SERVICES – DETAILS (SHEET 2)

CONSULTING PROFESSIONAL ENGINEERS
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DEPUTY DIRECTOR OF STREETS AND TRANSIT

DRAWN BY
CHECKED J.T.T.
FILE No.
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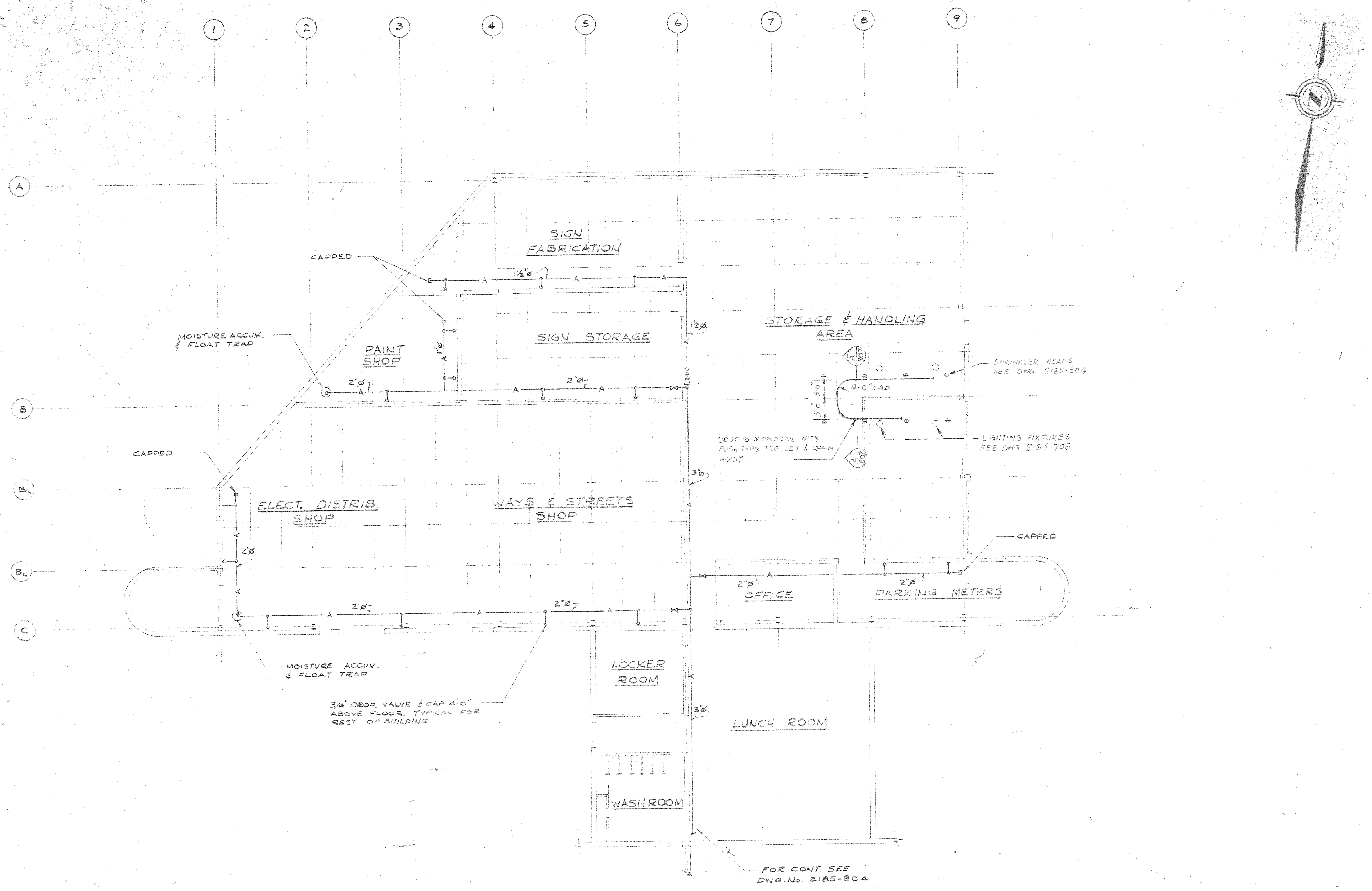
DRAWING No. 2185-806
MECHANICAL

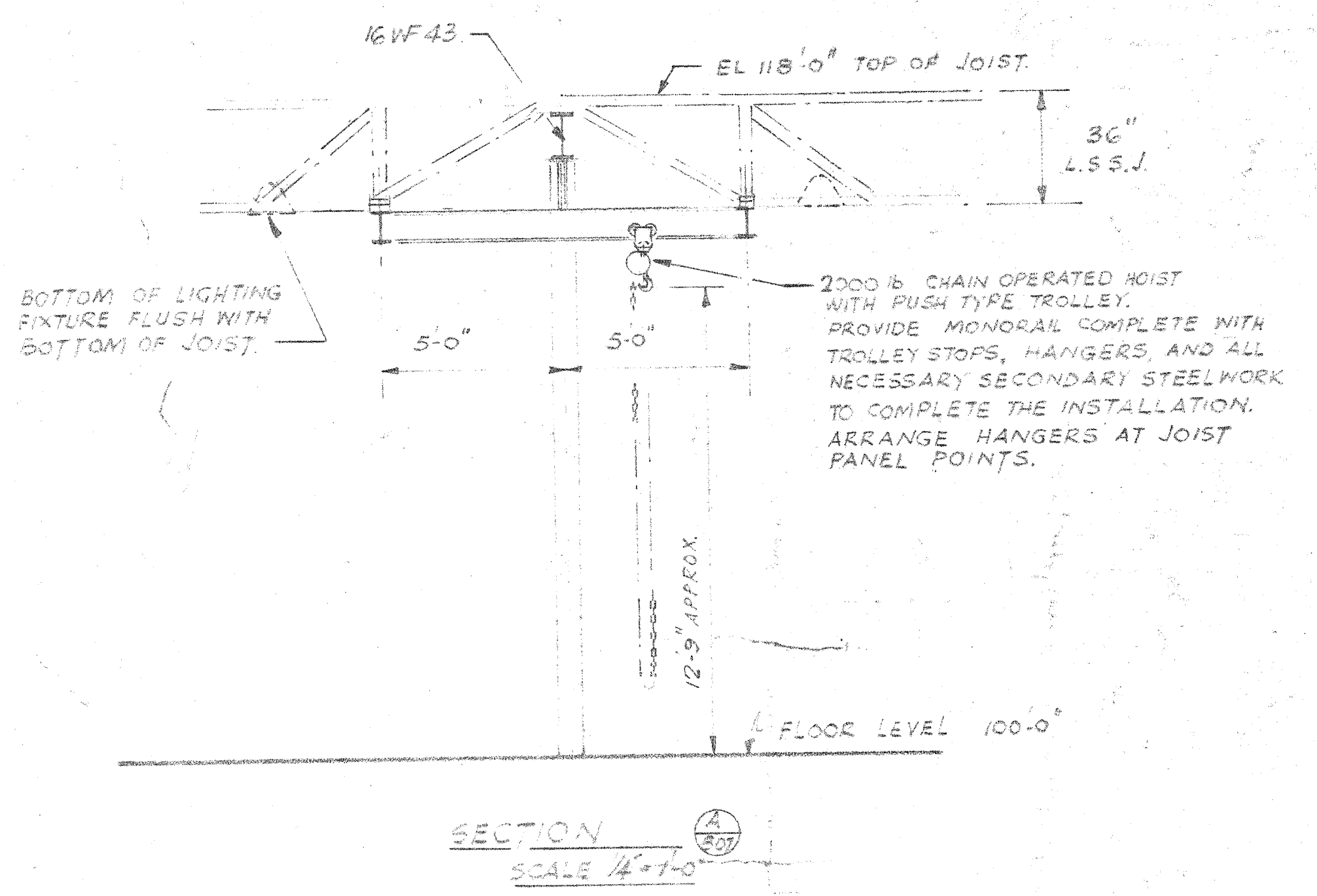
421 OSBORNE ST. TRANSIT STORAGE SHOP FACILITIES
address

project no. 2185 - 807
sheet no.

WAYS & SERVICES - PROCESS EQUIP-
description
MENT & SERVICES - PLAN



WAYS & STREETS FACILITIES BUILDING - PLAN
SCALE 1/16" = 1'-0"



SECTION A/807
SCALE 1/4" = 1'-0"

2185 - 807

DATE	ISSUE No.	REV. No.	DESCRIPTION	DRAWN BY
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METROPOLITAN CORPORATION OF GREATER WINNIPEG
STREETS AND TRANSIT DIVISION

TRANSIT STORAGE AND SHOP FACILITIES

WAYS & SERVICES
PROCESS EQUIPMENT & SERVICES — PLAN

REGISTERED PROFESSIONAL ENGINEER
MECHANICAL
J. T. F. THORPE
PROVINCE OF ONTARIO

LICENSED TO PRACTICE
IN THE
PROVINCE OF MANITOBA
My Licence Expires: 10 Jan. 1968

CONSULTING PROFESSIONAL ENGINEERS
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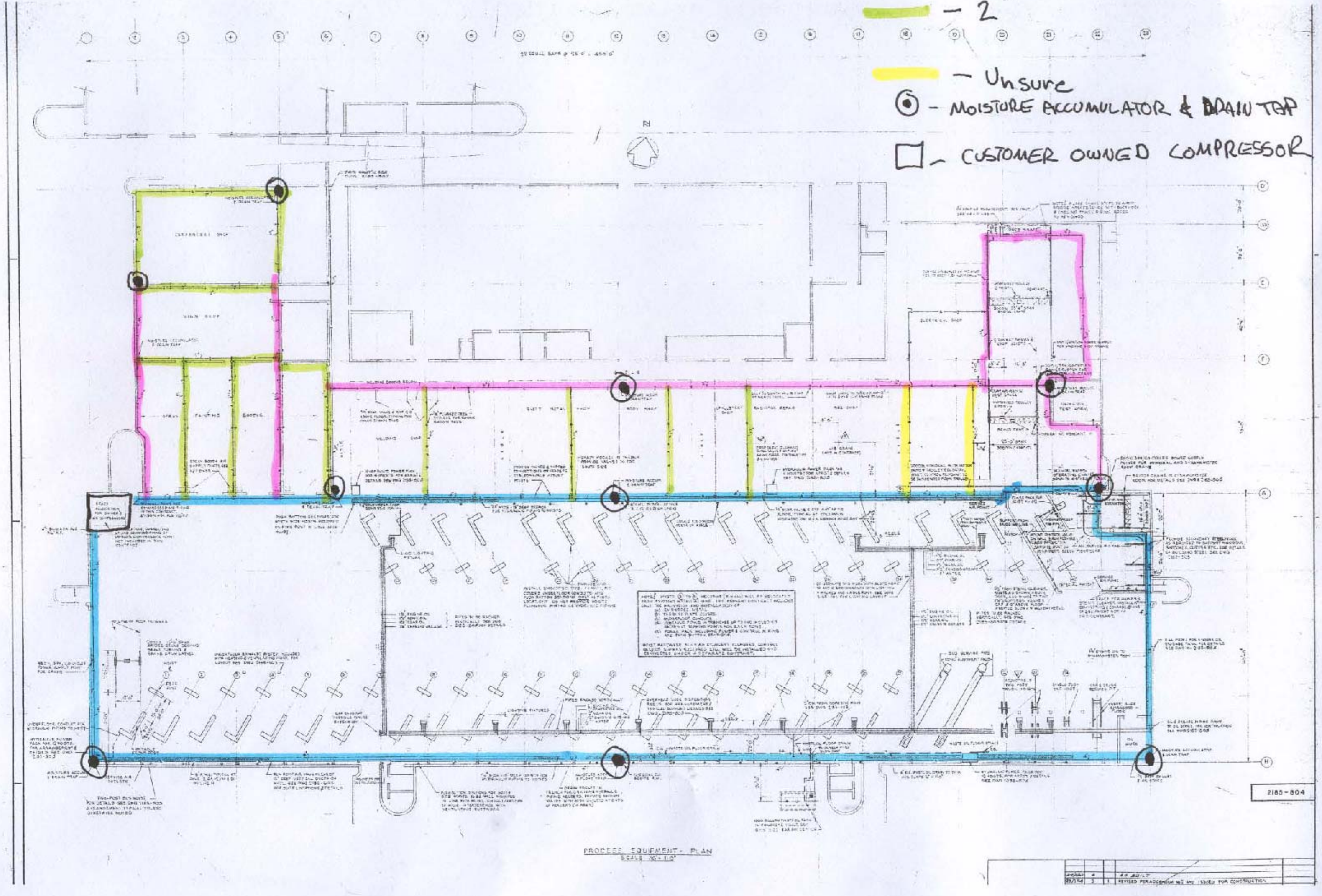
DRAWN BY
CHECKED J.T.T.
FILE No.
SHEET No.
DATE AUGUST '67
SCALE 1/16" = 1'-0"
DRAWING No. 2185 - 807
MECHANICAL

COMPRESSED AIR SCHEMATIC

🟦 - 4"
🟪 - 3"
🟩 - 2"
🟨 - Unsure
⊙ - MOISTURE ACCUMULATOR & DRAIN TRAP
☐ - CUSTOMER OWNED COMPRESSOR



ASBESTOS INVENTORY CONTROL

Winnipeg

Planning, Property and Development Department
Municipal Accommodations Division
4th Floor - 185 King Street • Winnipeg, MB • R3B 1J1

Building Name:	Building A, Maintenance Shop	**Inspection Date:**	July 8, 2015
Building Code:	TR01	**Inspected By:**	Elias Occupational Hygiene Consulting
Building Address:	421 Osborne Street	**Construction Date:**	

Material Location	**Material Description**	**Drawing Label**	**Material Condition**	**Testing Status**	**Date** M/Y	**Test %**	**Est. %**
	Stucco Column Cladding Throughout Building Should Be Tested Before Any Work Is Performed						
	Various Areas Have Been Tested See Inventory for Details						
Basement							
Cafeteria Storage	12x12 Ceiling Tile	C12	Good	**Tested**	May'09	0	
Cafeteria	Mastic - Pipe - Above Ceiling	MA	Good	**Tested**	May'10	25-50	
	Pipe Fitting Insulation - Above Ceiling	PF	Good	**Tested**	May'10	0.1-1	
Furnace Room	Pipe Fitting Insulation	PF	Good				
Kitchen Hallway	Mastic - Pipe - Above Ceiling	MA	Good	**Tested**	May'10	25-50	
	Pipe Fitting Insulation - Above Ceiling	PF	Good	**Tested**	May'10	0.1-1	
Dispatch Area	Pipe Insulation - Above Ceiling	PI	Good				25-50
	Pipe Fitting Insulation - Above Ceiling	PF	Good				25-50
Dispatch Supervisor Office	Pipe Insulation - Above Ceiling	PI	Good				25-50
	Pipe Fitting Insulation - Above Ceiling	PF	Good				25-50
Tunnel	Pipe Insulation - Above Ceiling	PI	Good				25-50
	Pipe Fitting Insulation - Above Ceiling	PF	Good				25-50
Boiler Room	Pipe Fitting Insulation	PF	**Removed**				
Stairwells	Stucco - Walls	ST	**Needs Repair**	**Tested**	May'09	0	
Admin Area- Main Floor							
Foyer (Inside Heater)	Mastic - Pipe	MA	Good				10
Foyer	Stucco - Ceiling	ST	Good				0
	Mastic - Pipe - Above Ceiling	MA	Good				10
	Pipe Fitting Insulation - Above Ceiling	PF	Good				5-10
Front Reception	Stucco - Ceiling	ST	Good	**Tested**	Apr/'11	0	
	Mastic - Pipe - Above Ceiling	MA	Good				10
	Pipe Fitting Insulation - Above Ceiling	PF	Good				5-10
North Offices (Inside Heater Cabinets)	Pipe Fitting Insulation	PF	Good				5-10
	Mastic - Pipe	MA	Good				10
South Offices (Inside Heaters)	Mastic - Pipe	MA	Good				10
South Offices	Pipe Fitting Insulation - Above Ceiling	PF	**Needs Repair**	**Tested**	Feb/ 11	5-10	
	Mastic - Pipe - Above Ceiling	MA	Good	**Tested**		10	
Control Office (Inside Heater)	Mastic - Pipe	MA	Good				10

Material Location	Material Description	Drawing Label	Material Condition	Testing Status	Date M/Y	Test %	Est. %
Control Office	Mastic - Pipe - Above Ceiling	MA	Good				10
	Pipe Fitting Insulation - Above Ceiling	PF	Good				5-10
	Stucco - Walls	ST	Good	**Tested**	Nov/ 12	0	
East Offices (Inside Heaters)	Mastic - Pipe	MA	Good				10
East Offices	Pipe Fitting Insulation - Above Ceiling	PF	Good				5-10
	Mastic - Pipe - Above Ceiling	MA	Good				10
West Offices (Inside Heaters)	Mastic - Pipe	MA	Good				10
West Offices	Pipe Fitting Insulation	PF	Good				5-10
	Mastic - Pipe	MA	Good				10
West Corridor	Pipe Fitting Insulation - Above Ceiling	PF	Good				5-10
	Mastic - Pipe - Above Ceiling	MA	Good				10
Men's Washroom	Pipe Fitting Insulation - Above Ceiling	PF	Good				5-10
	Mastic - Pipe - Above Ceiling	MA	Good				10
	12x12 Floor Tile	F12	Good				
Women's Washroom	Pipe Fitting Insulation - Above Ceiling	PF	**Needs Repair**				5-10
	Mastic - Pipe - Above Ceiling	MA	Good				10
	12x12 Floor Tile	F12	Good				
Janitor's Room	Mastic - Pipe	MA	Good				10
	12x12 Floor Tile	F12	Good				
Photocopy Room	Pipe Fitting Insulation	PF	Good				5-10
	Mastic - Pipe	MA	Good				10
	12x12 Floor Tile	F12	Good				
Hallway By Bathrooms	Pipe Fitting Insulation - Above Ceiling	PF	Good				5-10
	Mastic - Pipe - Above Ceiling	MA	Good				10
Admin Area- 2nd Floor							
Offices (All Heaters and Heater Cabinets)	Pipe Fitting Insulation	PF	**Needs Repair**				5-10
	Mastic - Pipe	MA	Good				10
2 North Offices (inside cabinets) (Site:Confirm offices)	Pipe Fitting Insulation	PF	**Removed01/13**				5-10
	Mastic - Pipe	MA	Good				10
Men's Washroom	Pipe Fitting Insulation - Above Ceiling	PF	Good				5-10
	Mastic - Pipe - Above Ceiling	MA	Good				10
	12x12 Floor Tile	F12	Good				
Women's Washroom	Pipe Fitting Insulation - Above Ceiling	PF	Good				5-10
	Mastic - Pipe - Above Ceiling	MA	Good				10
	Duct Insulation - Above Ceiling	DI	Good	**Tested**	Nov/ 10	10	
	12x12 Floor Tile	F12	Good				
Janitor's Room	Roof Drain	RD	Good				
	12x12 Floor Tile	F12	Good	**Tested**	Nov/ 10	3	
Photocopy Room	Roof Drain	RD	Good				

Material Location	Material Description	Drawing Label	Material Condition	Testing Status	Date M/Y	Test %	Est. %
	12x12 Floor Tile	F12	Good				
Hallway By Bathrooms	Pipe Fitting Insulation - Above Ceiling	PF	Good				5-10
	Mastic - Pipe - Above Ceiling	MA	Good				10
	Roof Drain	RD	Good				
Stores Area (102)							
Stores Area (102)	Pipe Fitting Insulation	PF	Good				
	Pipe Insulation	PI	Good				
	Roof Drain	RD	Good				
Uniform Stores Mezzanine	12x12 Floor Tile	F12	Good	**Tested**	Nov/ 10	0	
Tire Storage	Pipe Fitting Insulation	PF	Good				
	Pipe Insulation	PI	Good				
	Plaster - Columns	PL	**Needs Repair**	**Tested**	Jan/ 12	0	
Receiving Bay	Spray On Insulation - Steel Beam	SO	**Needs Repair**	**Tested**		40-60	
	Pipe Insulation	PI	Good				
	Pipe Fitting Insulation	PF	Good				
Northwest Corner	Tank Insulation	TI	Good	**Tested**		POS	
	Pipe Fitting Insulation	PF	Good	**Tested**		POS	
	Pipe Insulation	PI	Good	**Tested**		NEG	
	Asbestos Fabric - Isolation Gasket	AF	**Needs Repair**				
Above Washroom	Pipe Fitting Insulation	PF	**Removed 2011**	**Tested**	Jan/ 12	5	
	Pipe Insulation	PI	**Removed 2011**				
Offices Beside Washroom	12x12 Floor Tile	F12	**Removed'13**	**Tested**	Nov/ 10	3	
	Sheet Flooring	SF	**Removed'13**				
Electrical & Engine Repair Area (103)							
Electrical & Engine Repair Area (103)	Pipe Fitting Insulation	PF	Good				
	Pipe Insulation	PI	Good				
Washroom	24x48 Ceiling Tile	C48	**Removed**	**Tested**	May/09	0	
	Pipe Fitting Insulation - Above Ceiling	PF	Good				
Battery Room	Pipe Fitting Insulation	PF	Good				
	Pipe Insulation	PI	Good				
Unit Rebuild Area (104)							
Unit Rebuild Area (104)	Pipe Fitting Insulation	PF	Good				
	Pipe Insulation	PI	Good				
North Area	Pipe Fitting Insulation	PF	Good				
	Pipe Insulation	PI	Good				
	Duct Insulation	DI	Good	**Tested**	Nov/ 10	0	

Material Location	Material Description	Drawing Label	Material Condition	Testing Status	Date M/Y	Test %	Est. %
Money Meter Room	Pipe Fitting Insulation	PF	Good				
	Pipe Insulation	PI	Good				
Engine Room	Pipe Fitting Insulation	PF	Good				
	Pipe Insulation	PI	Good				
Inspection Area (105)							
Inspection Area (105)	Wall Plaster- Top of Wall	PL	Good				1-2
	Stucco - On Ledge	ST	Good	**Tested**		1-2	
	Pipe Fitting Insulation	PF	Good				POS
	Pipe Insulation	PI	Good				NEG
	Drywall Compound - Top Of Wall	DC	Good				
	Roof Drain	RD	Good				
Sprinkler Room	Pipe Fitting Insulation	PF	**Removed'14**				
	Pipe Insulation	PI	**Removed'14**				
Sprinkler Room Mezzanine	Pipe Fitting Insulation	PF	Good	**Tested**	Jul/ 10	60	
	Pipe Insulation	PI	Good	**Tested**	Jul/ 11	0	
	Asbestos Fabric - Isolation Gasket	AF	Good				
Body Repair Area (106)							
Body Repair Area (106)	Pipe Fitting Insulation	PF	Good				
	Pipe Insulation	PI	**Needs Repair**				
	Plaster - Columns	PL	Good	**Tested**	May/09	0	
	Roof Drain	RD	Good	**Tested**	Aug/11	85	
Foreman's Office	Sheet Flooring	SF	Good	**Tested**	Jan/12	0	
Body Repair Area (106A)							
Body Repair Area (106A Weldig Shop)	Wall Plaster- Top of Wall	PL	Good	**Tested**		1-2	
	Roof Drain	RD	Good				
Aisleway East of Paint Booth #4	Spray On Insulation - Steel Beam	SO	**Removed 2011**	**Tested**		1-2	
	Plaster - Columns	PL	**Needs Repair**	**Tested**	Sep/12	0	
	Plaster - Columns	PL	Good	**Tested**	Sep/14	<1	
Locker Area & Washroom	24x48 Ceiling Tile	C48	**Needs Repair**	**Tested**		0	
	Pipe Fitting Insulation - Above Ceiling	PF	Good				
	Pipe Insulation - Above Ceiling	PI	Good				
	12x12 Floor Tile	F12	**Removed 2011**	**Tested**	Nov/10	2	
Carpenter Shop	Pipe Fitting Insulation	PF	Good				
	Duct Insulation	DI	Good				
	Asbestos Fabric - Isolation Gasket	AF	**Needs Repair**	**Tested**	Sep/'14	60	
Paint Shop- Main Area	Pipe Fitting Insulation	PF	Good	**Tested**		15	
	Pipe Insulation	PI	Good	**Tested**	Aug/10	0	

Material Location	**Material Description**	**Drawing Label**	**Material Condition**	**Testing Status**	**Date** M/Y	**Test %**	**Est. %**
	roof drain	RD	Good				
	Spray On Insulation - Steel Beam	SO	**Removed 2001**	**Tested**	Sep/12	0	
Paint Boths #1-3	Drywall Compound - Ceiling	DC	Good				3
	Duct Insulation	DI	**Needs Repair**				75
	Duct Insulation - Above Ceiling	DI	Good				75
	Plaster - Columns	PL	**Needs Repair**	**Tested**	Sep/12	1	
	Spray On Insulation - Steel Beam - Above Ceiling	SO	**Removed 2001**				0
Paint Booth #4	Drywall Compound - Ceiling	DC	**Removed 2012**	**Tested**	Oct/11	3	
	Spray On Insulation - Steel Beam - Above Ceiling	SO	**Removed 2012**				
	Duct Insulation	DI	**Removed 2012**	**Tested**	Jul/12	75	
	Duct Insulation - Above Ceiling	DI	**Removed 2012**				75
	Plaster - Columns	PL	**Removed 2012**	**Tested**	Sep/12	2	
Paint Booth Fan Room	Duct Insulation	DI	Good	**Tested**	May/09	0	
	Spray On Insulation - Steel Beam - Above Ceiling	SO	Good				85
Brake Shop Area (107)							
Brake Shop Area (107)	Wall Plaster- Top of Wall	PL	Good				1-2
	Roof Drain	RD	Good				
	Stucco - On Ledge	ST	Good				1-2
	Pipe Fitting Insulation	PF	Good				
General Repair Area (108)							
General Repair Area (108)	Wall Plaster- Top of Wall	PL	Good	**Tested**	Mar/11	1-2	
	Stucco - On Ledge	ST	Good				1-2
	Pipe Fitting Insulation	PF	Good	**Tested**		POS	
	Pipe Insulation	PI	Good	**Tested**		NEG	
	Roof Drain	RD	Good				
Sprinkler Room	Pipe Fitting Insulation	PF	**Removed'14**				
	Pipe Insulation	PI	**Removed'14**				
Sprinkler Room Mezzanine	Pipe Fitting Insulation	PF	Good	**Tested**		60	
	Pipe Insulation	PI	Good	**Tested**		0	
	Asbestos Fabric - Isolation Gasket	AF	Good				
Washroom	Plaster - Walls	PL	**Needs Repair**	**Tested**	May/14	0	
Instruction Area (9)							
Hallway	12x12 Floor Tile	F12	Good	**Tested**	May/09	2-5	
	Mastic - Floor Tile	MA	Good	**Tested**	May/09	2-5	
Traffic Services Area (112)							
Traffic Services Area (112)	Drywall Compound - Top Of Wall	DC	Good				1-2
	Pipe Insulation	PI	Good				0
	Pipe Fitting Insulation	PF	Good				15

Material Location	Material Description	Drawing Label	Material Condition	Testing Status	Date M/Y	Test %	Est. %
	Roof Drain	RD	Good	**Tested**	Aug/11	60	
Sign Shop	Drywall Compound - Top Of Wall	DC	Good				1-2
	Drywall Compound - Ceiling	DC	Good	**Tested**	Mar/11	2-3	
	Pipe Insulation	PI	Good	**Tested**		0	
	Pipe Fitting Insulation	PF	Good	**Tested**		15	
	Roof Drain	RD	**Removed**				
	Asbestos Fabric - Lined Safe	AF	Good				
	Spray On Insulation - Behind Steel Beam	SO	Good	**Tested**		5-30	
Offices	12x12 Floor Tile - Under Carpet	F12	**Removed 2014**				1-2
Parking Meter Repair Room	12x12 Floor Tile	F12	**Needs Repair**				1-2
	Sheet Flooring on Workbench	FS	**Removed 2011**	**Tested**	Nov/ 10	0	
	Asbestos Fabric - Lined Safe	AF	**Removed**				
	Sheet Flooring on Workdesk	FS	**Removed 2011**	**Tested**	Feb/11	4-15	
	Asbestos Fabric - Fireproof Cabinet	AF	**Removed**				
Communications Area (113)							
Garage Area	Pipe Fitting Insulation	PF	Good				
	Pipe Insulation	PI	Good				
Mezzanine	Roof Drain	RD	Good				
Office Hallway	12x12 Floor Tile	F12	**Removed 2014**	**Tested**	Nov/10	2	
Storage Area	Pipe Insulation	PI	Good				
	Pipe Fitting Insulation	PF	Good				

NOTES:

2. There may be asbestos containing materials present that were not located during asbestos inspections.
2. There may be asbestos containing materials present that were not located during asbestos inspections.
3. Floor tile and sheet flooring installed before 1990 may contain asbestos and must be treated as an asbestos containing material.
4. Vermiculite insulation may contain pockets of asbestos. All vermiculite insulation must be treated as an asbestos containing material.
5. For asbestos related inquiries, call Central Control at 204-986-2382

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