

LEGEND

5	STREET CENTERLINE
	SURVEY BASELINE
	PROPERTY LINE
	RIGHT OF WAY
	TEMPORARY EASEMENT
	PERMANENT EASEMENT

EXISTING

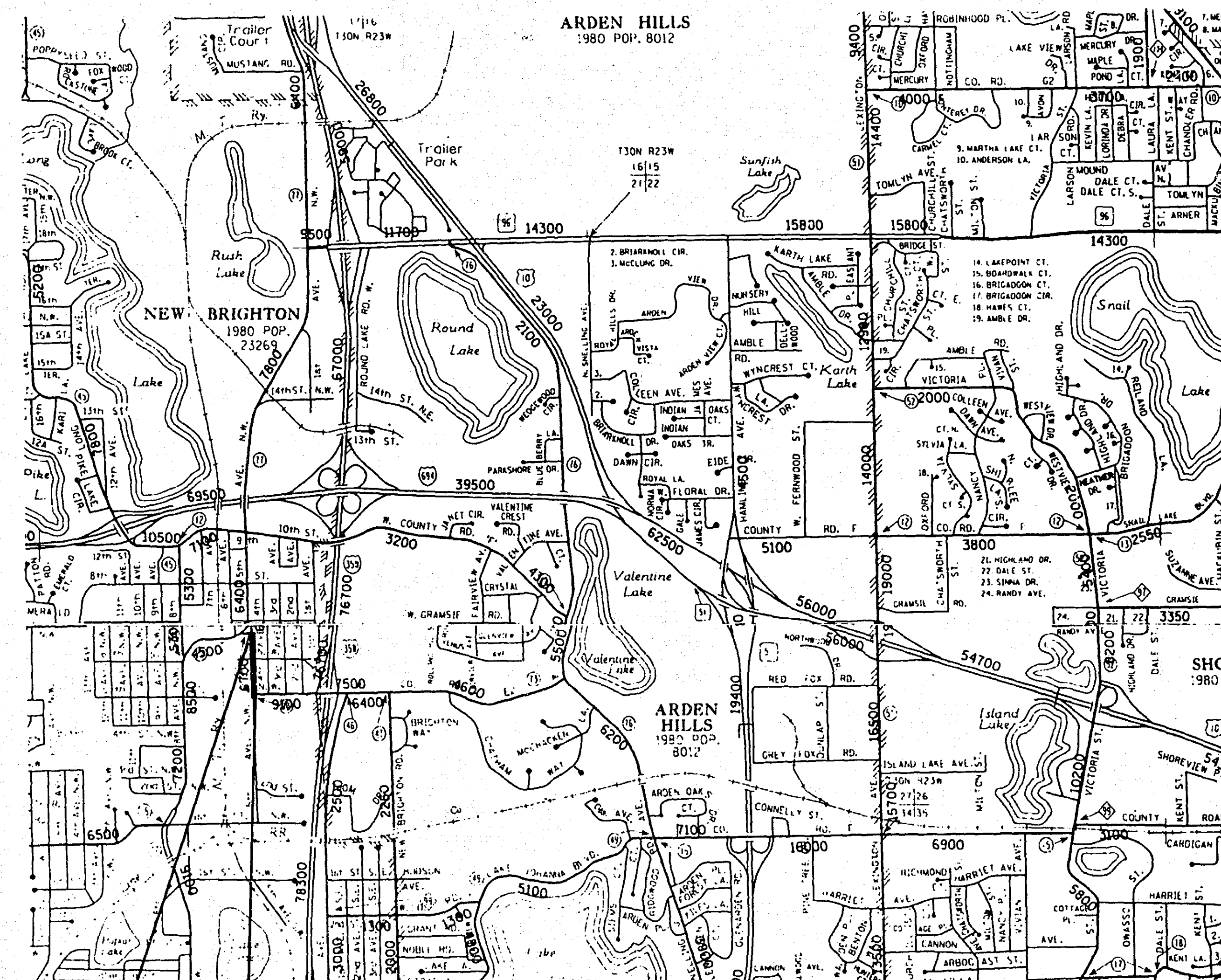
	SANITARY SEWER AND MANHOLE
	STORM SEWER AND MANHOLE
	WATERMAIN, HYDRANT AND VALVE
	FORCEMAIN
	BULKHEAD
	SANITARY SEWER SERVICE
	WATER SERVICE AND CURB STOP BOX
	CATCH BASIN
	WATER VALVE MANHOLE
	CULVERT
	UNDERGROUND TELEPHONE CABLE OR CONDUIT
	UNDERGROUND ELECTRIC CABLE OR CONDUIT
	TELEPHONE MANHOLE
	TELEPHONE PEDESTAL
	CABLE TV PEDESTAL
	ELECTRIC MANHOLE
	POWER POLE
	DOWN GUY ANCHOR
	STEEL LIGHT POLE
	TRAFFIC SIGNAL, STANDARD
	GAS MAIN
	GAS VALVE
	SOIL BORING
	CONCRETE CURB AND GUTTER
	CONCRETE PAVEMENT OR SIDEWALK
	SIGN (HWY, PARK, STOP, ETC.)
	STREET SIGN
	DITCH
	RAILROAD TRACKS
	FENCE
	TREE (DECIDUOUS)
	TREE (CONIFEROUS)
	BUSH-SHRUB
	WOODED AREA
	BUILDING

NEW CONSTRUCTION

	SANITARY SEWER AND MANHOLE
	STORM SEWER AND MANHOLE
	WATERMAIN, HYDRANT AND VALVE
	FORCEMAIN
	BULKHEAD
	SANITARY SEWER SERVICE
	WATER SERVICE AND CURB STOP BOX
	CATCH BASIN
	WATER VALVE MANHOLE
	CULVERT
	CONCRETE CURB AND GUTTER
	STEEL LIGHT POLE
	TRAFFIC SIGNAL, STANDARD
	SIGN (HWY, PARK, STOP, ETC.)
	STREET LIGHT FEED POINT
	STREET LIGHTING CABLE

	TOTAL	
GROSS LENGTH	1140	0.22
BRIDGE LENGTH	—	—
EXCEPTION	—	—
NET LENGTH	1140	0.22

PLAN	10 20 30 40
PROFILE HORIZ.	10 20 30 40
PROFILE VERT.	5 10
CROSS SECT.	5 10
LAYOUT MAP	2030'



BEGIN SAP 62-646-09 & S.A.P. 147-020-17
STA. 0+75

END SAP 62-646-09 & S.A.P. 147-020-17
STA. 12+15

DESIGN DESIGNATION

ADT (CURRENT YEAR) 1990	6300
ADT (FUTURE YEAR) 2010	9600
HCADT	8%
EN 18 (20 YEAR)	892,000
DESIGN LOAD	10 TON
STABILOMETER "R" VALUE	60
DESIGN SPEED	30MPH
ARTERIAL	LOW DENSITY
NO. OF TRAFFIC LANES	4
NO. OF PARKING LANES	0

DATE	SHEET NO.	BY
6/4/90	I	TL

S.A.P. 62-646-09 S.A.P. 147-020-17 RAMSEY COUNTY

DEPARTMENT OF PUBLIC WORKS

Construction Plan: FOR GRADING, AGGREGATE BASE,
BITUMINOUS BASE AND SURFACING, STORM SEWER
CONCRETE CURB AND GUTTER. S.A.P. 62-646-09 &
S.A.P. 147-020-17

C.S.A.H.46

5th AVENUE N.W.

BETWEEN CO. RD. E-2 (CSAH 73) & OLD T.H.8 (CSAH 77)

INDEX

- TITLE SHEET
- ESTIMATED QUANTITIES AND STANDARD PLATES
- TYPICAL SECTIONS
- DETAILS
- DETAILS & TABULATIONS
- EROSION CONTROL
- RETAINING WALL
- CHAIN LINK FENCE ANCHORAGE
- SIGNING & DETOUR LAYOUT
- PLANS & PROFILE
- CROSS-SECTIONS

DESIGN SQUAD _____ DATE _____
DRAWN BY _____ DATE _____
CHECKED BY _____ DATE _____

I HEREBY CERTIFY THAT PLAN WAS PREPARED BY ME OR UNDER MY DIRECT
SUPERVISION AND THAT I AM DULY REGISTERED PROFESSIONAL ENGINEER
UNDER THE LAWS OF THE STATE OF MINNESOTA.

DATE 3/15/90 REG. NO. 7046

RAMSEY COUNTY

RECOMMENDED FOR APPROVAL D.S. DATE 4/1/90
RECOMMENDED FOR APPROVAL KMR DATE 4/1/90
RECOMMENDED FOR APPROVAL DD DATE 4/1/90
RECOMMENDED FOR APPROVAL LKF DATE 4/1/90
RECOMMENDED FOR APPROVAL OLE DATE 4/1/90
RECOMMENDED FOR APPROVAL POB DATE 4/1/90
RECOMMENDED FOR APPROVAL Ken DATE 6-1-90
RECOM'D Paul DATE 7/1/90
RECOM'D Wagner DATE 4-1-90

APPROVED _____ DATE _____
APPROVED Julie Prosen DATE 3-14-90
APPROVED H.A. Prosen DATE 6-26-90
CHAIR. OF THE RAMSEY COUNTY BOARD

MINNESOTA DEPARTMENT OF TRANSPORTATION

RECOMMENDED FOR APPROVAL Joe Stallman DATE 4/1/90
RECOMMENDED FOR APPROVAL Shirley DATE 6/4/90
APPROVAL Shirley DATE 6/19/90

Note:
Section Numbers Reads From The South

STOPPING SIGHT DISTANCE BASED ON 3.5' HEIGHT
OF EYE AND 0.5' HEIGHT OF OBJECT.

THE 1988 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION
"STANDARD SPECIFICATIONS FOR CONSTRUCTION" SHALL GOVERN.

State Proj. No. S.A.P. 62-646-09
S.A.P. 147-020-17

Sheet No. 1 of 25 Sheets

STATEMENT OF ESTIMATED QUANTITIES													
ITEM NO.	ITEM	UNIT	TOTAL		SAP 62-646-09 RAMSEY COUNTY		SAP 147-020-17 NEW BRIGHTON		NON-PARTICIPATING NEW BRIGHTON		STORM SEWER		
			ESTIMATED QUANTITIES	FINAL QUANTITIES	ESTIMATED QUANTITIES	FINAL QUANTITIES	ESTIMATED QUANTITIES	FINAL QUANTITIES	ESTIMATED QUANTITIES	FINAL QUANTITIES	ESTIMATED QUANTITIES	FINAL QUANTITIES	
2021.501	MOBILIZATION	L.S.	1		1								
2101.501	CLEARING	ACRE	0.5		0.5								
2101.502	CLEARING	EACH	14		14								
2101.506	GRUBBING	ACRE	0.05		0.05								
2101.507	GRUBBING	EACH	17		17								
2104.501	REMOVE BITUMINOUS CURB	L.F.	450		450								
2104.501	REMOVE CURB	L.F.	530		530								
2104.501	REMOVE CURB & GUTTER	L.F.	385		385								
2104.501	REMOVE CONCRETE BLOCK RET. WALL	L.F.	48		48								
2104.505	REMOVE BITUMINOUS PAVEMENT	S.Y.	5212		5212								
2104.505	REMOVE CONCRETE DRIVEWAY PAVEMENT	S.Y.	113		113								
2104.505	REMOVE CONCRETE WALK	S.Y.	314		314								
2104.509	REMOVE HYDRANT	EACH	3		3								
2104.511	SAWING CONCRETE PAVEMENT	L.F.	95		95								
2104.513	SAWING BITUMINOUS PAVEMENT	L.F.	415		415								
0104.509	REMOVE CONCRETE STAIRS	EACH	2		2								
2105.501	COMMON EXCAVATION	C.Y.	2944		2944								
2105.507	SUBGRADE EXCAVATION P	C.Y.	5032		5032								
2105.522	SELECT GRANULAR BORROW, MOD 7%	C.Y.	643		31		612						
2105.535	SALVAGED TOPSOIL	C.Y.	300		300								
2130.501	WATER	M GAL	100		100								
2211.503	AGGREGATE BASE PLACED, CLASS 6 (P)	TON	3084		3084								
2331.510	TYPE 31 BINDER COURSE MIXTURE	TON	549		549								
2331.514	TYPE 31 BASE COURSE MIXTURE	TON	731		731								
2357.502	BITUMINOUS MATERIALS FOR TACK COAT	GAL	664		664								
2331.508	TYPE 61 WEARING COURSE MIXTURE	TON	366		366								
2411.507	CONCRETE STAIRS	EACH	1		1								
0411.601	CONCRETE RETAINING WALL	L.S.	1		1								
0411.603	MASONRY UNIT RETAINING WALL	S.F.	2788		1042		1746						
2451.601	STRUCTURE EXCAVATION	C.Y.	863		226		637						
2503.541	12" RCP STORM SEWER DES 3006 CL 3	L.F.	260								260		
2503.541	15" RCP STORM SEWER DES 3006 CL 3	L.F.	591								591		
2503.541	18" RCP STORM SEWER DES 3006 CL 3	L.F.	68								68		
0504.602	F&I 1" CORPORATION STOP	EACH	5						5				
0504.602	F&I 1" CURB STOP & BOX	EACH	5						5				
0504.602	F&I HYDRANT W/6" GATE VALVE & BOX	EACH	3		3								
0504.602	CONNECT TO EXISTING 8" WATER MAIN	EACH	8		3				5				
0504.603	F&I 1" COPPER WATER SERVICE	L.F.	125						125				
0504.605	2" RIGID INSULATION	S.F.	128		128								
2506.506	CONSTRUCT MANHOLES, DES. B	L.F.	28.96								28.96		
2506.507	CONSTRUCT CATCH BASINS, LP-4	L.F.	23.47								23.47		
2506.507	CONSTRUCT CATCH BASINS, X	L.F.	20.34								20.34		
2506.516	CASTING ASSEMBLIES	EACH	13								13		
2506.522	ADJUST FRAME AND RING CASTING	EACH	9								9		
0506.602	CONSTRUCT SPECIAL STRUCTURE NO. 1	EACH	1</										

CITY OF NEW BRIGHTON
NON-PARTICIPATING

EARTHWORK SUMMARY	
EXCAVATION (C.Y.)	S.A.P. 62-646-09
COMMON EXCAVATION, P	2944
SUBGRADE EXCAVATION, P	5032
SALVAGED TOPSOIL	300
SELECT GRANULAR BORROW, C.V. (MOD. 7%)	643
STRUCTURE EXCAVATION	863
EMBANKMENT (C.Y.)	
REGULAR EMBANKMENT	452
SUBGRADE EMBANKMENT	6542
TOPSOIL	300

① INCLUDES 30% SHRINKAGE FACTOR.

S.A.P. 62-646-09
S.A.P. 147-020-17

[illegible]

I hereby certify that this plan was prepared by me, or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the state of Minnesota.

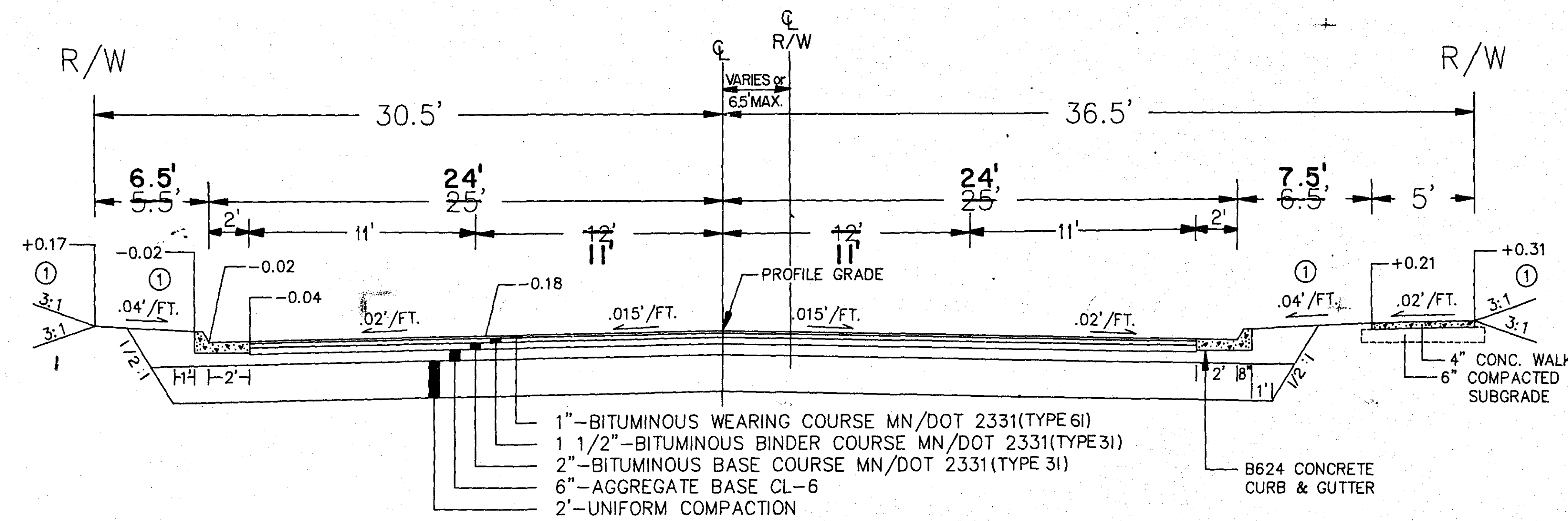
Date: 7/26/88 Req. No. 14149



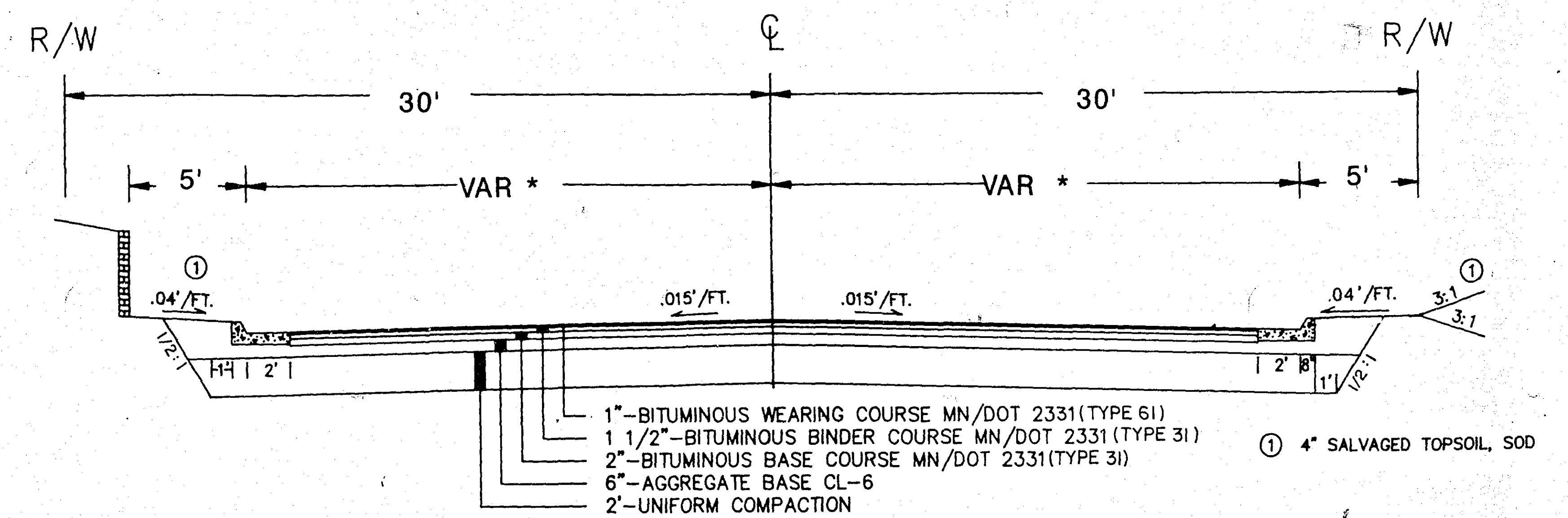
RAMSEY COUNTY, MINNESOTA

ESTIMATED QUANTITIES

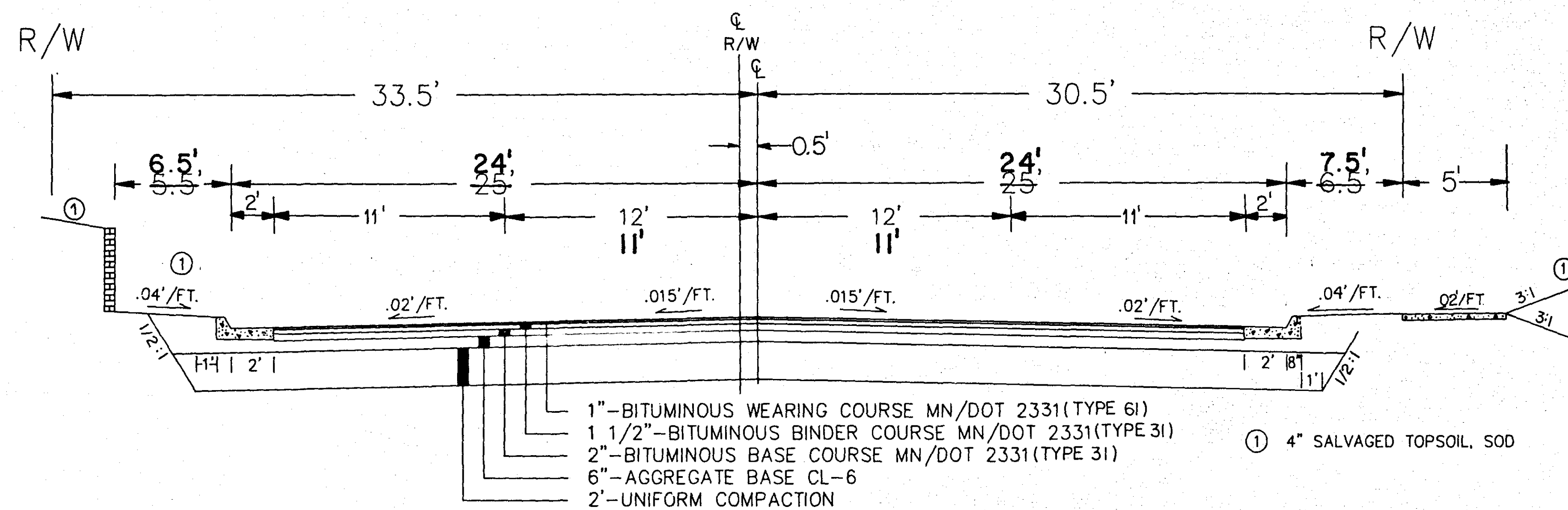
FILE NO. 89132	2 25
DATE 3/14/90	



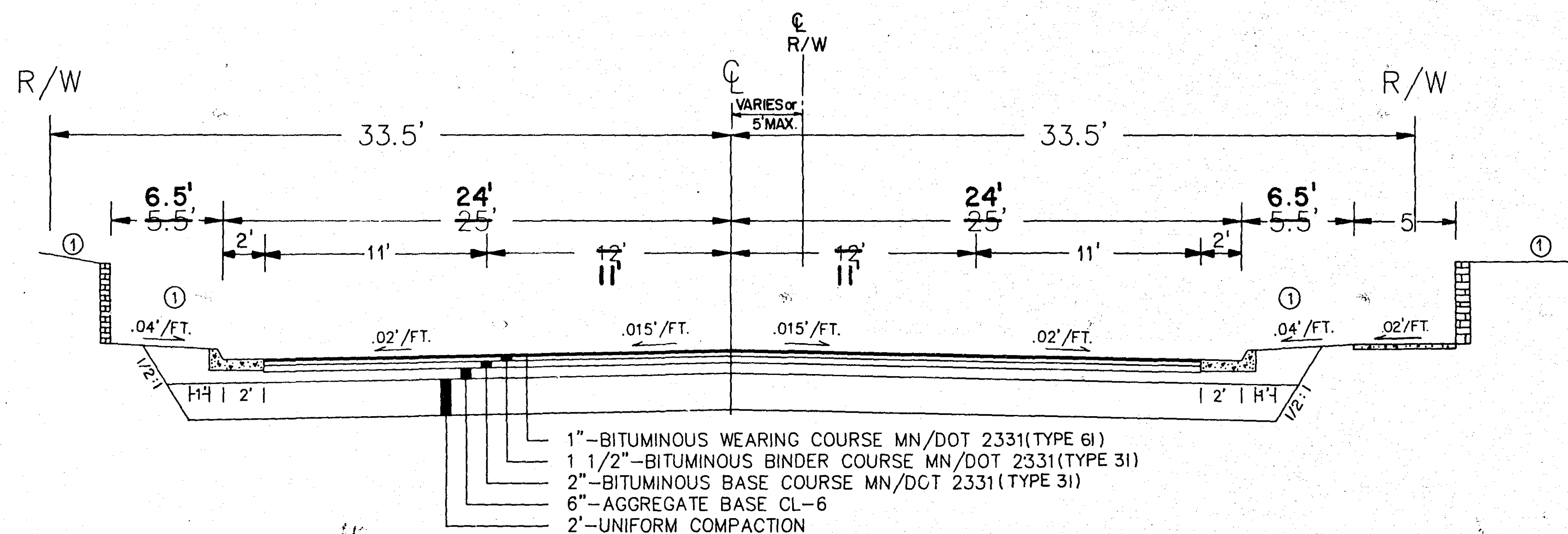
STA. 0+75 - STA. 7+30



TYPICAL SECTION INTERSECTING STREETS



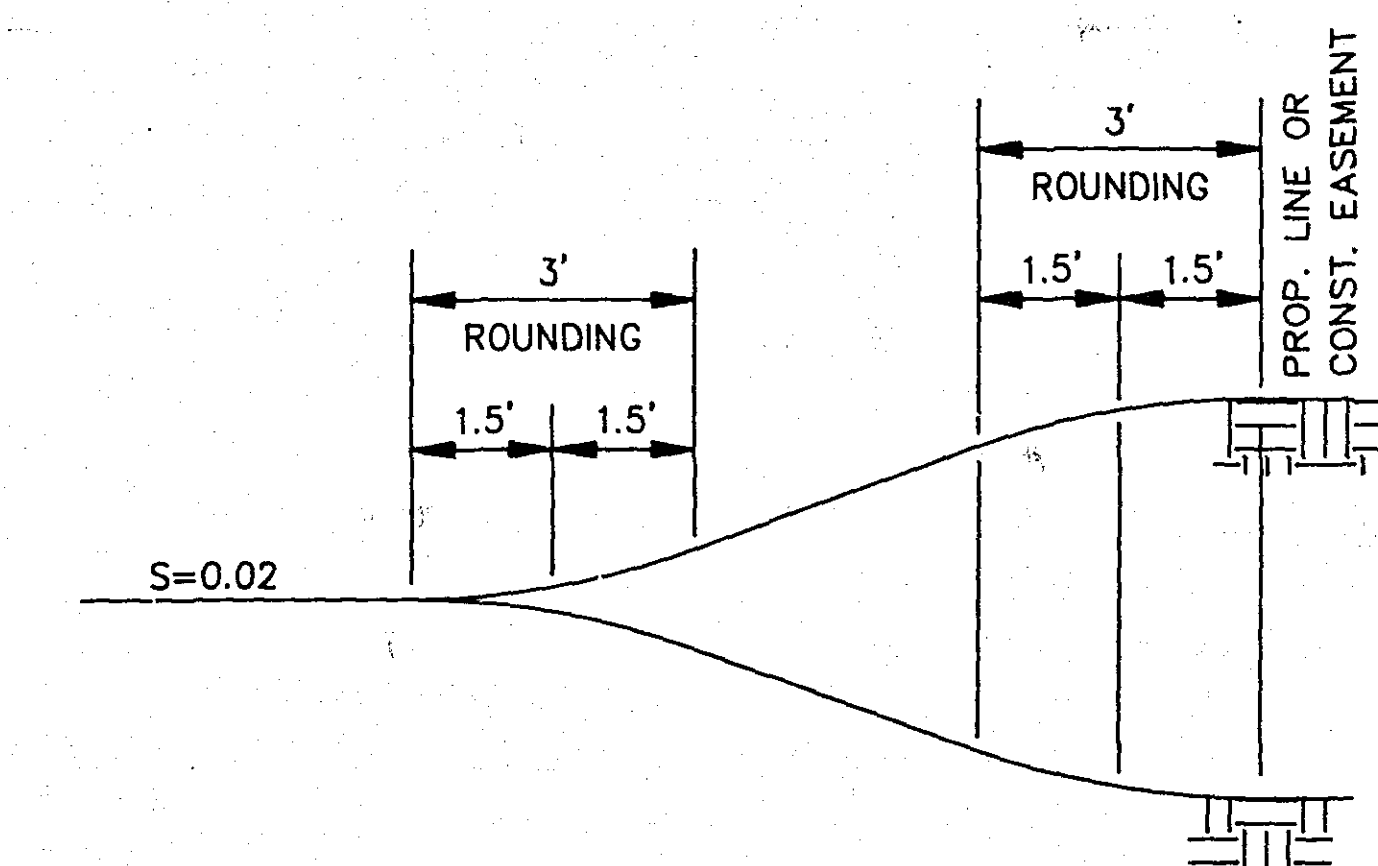
STA. 10+15 - STA. 12+15



STA. 7+30 - STA. 10+15

* 6TH ST STA 9+00 TO 10+00 14'
STA 10+00 TO 11+00 16'
5TH ST STA 10+00 TO 10+75 21'

NOTE: 2' CLEAR ZONE REQ'D
FROM CURB FACE.



SLOPE ROUNDING DETAIL

NO.	BY	DATE	REVISIONS	ITEM	DESIGN	CHECKED
1	WRL	7/12/91	50' ROADWAY to 48' ROADWAY			
			2-11-12-12-11-2 to 2-11-11-11-11-2			

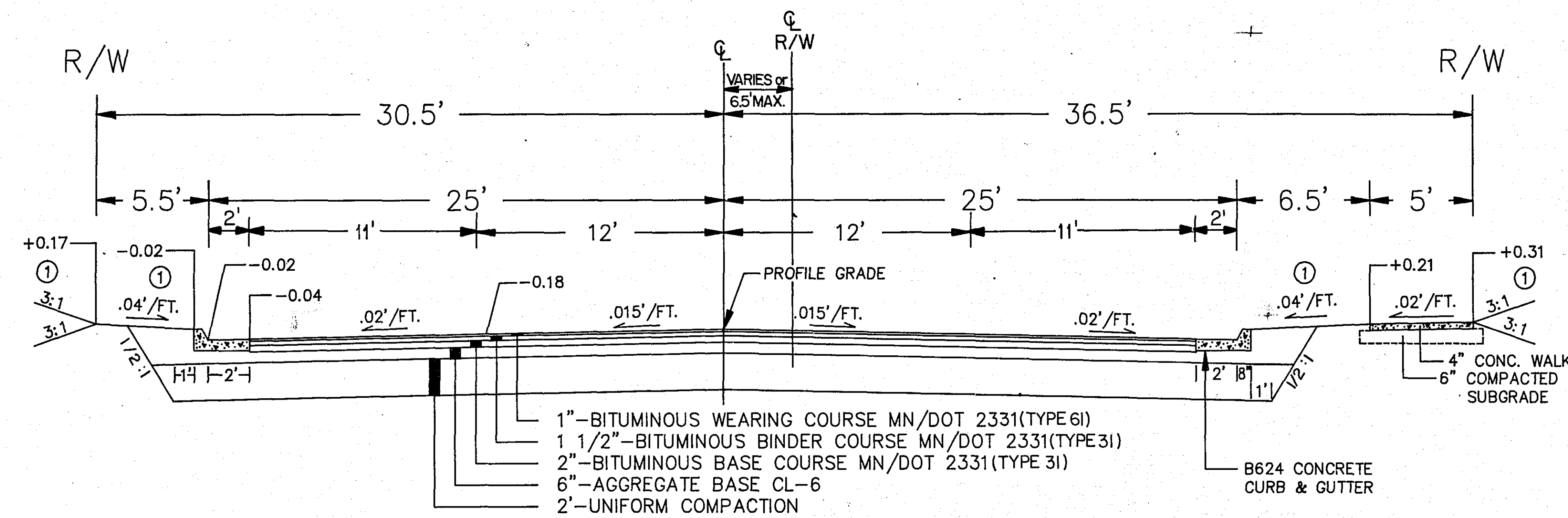
I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the state of Minnesota.



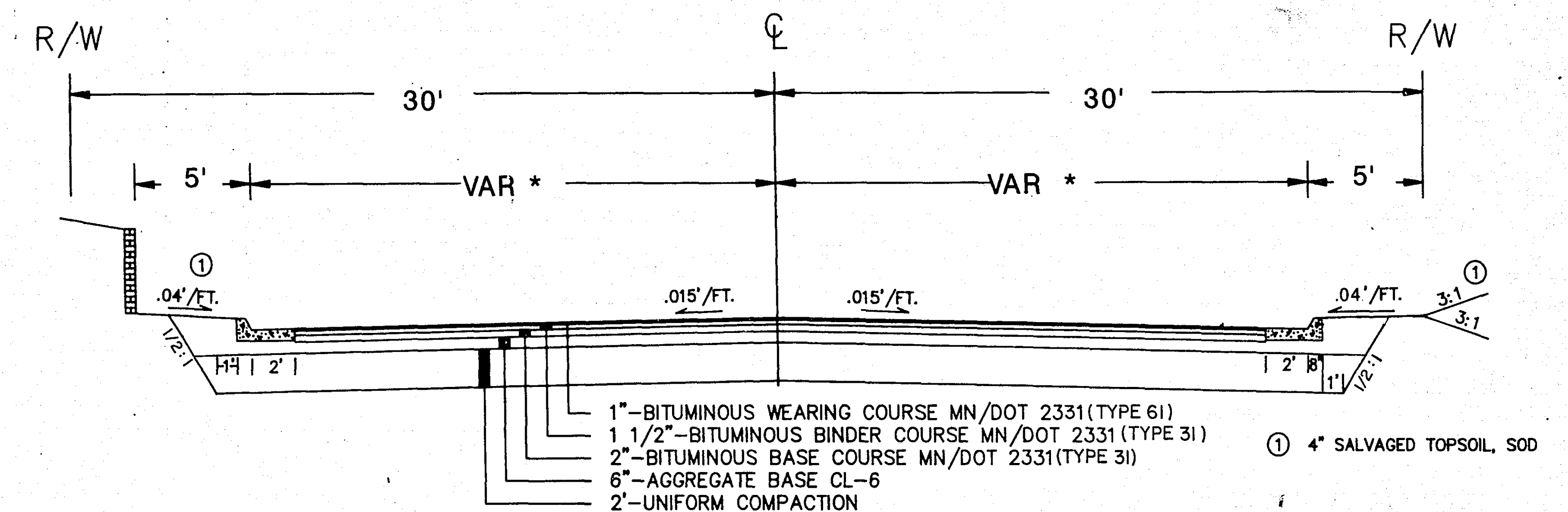
RAMSEY CO., MINNESOTA

TYPICAL SECTIONS AND DETAILS

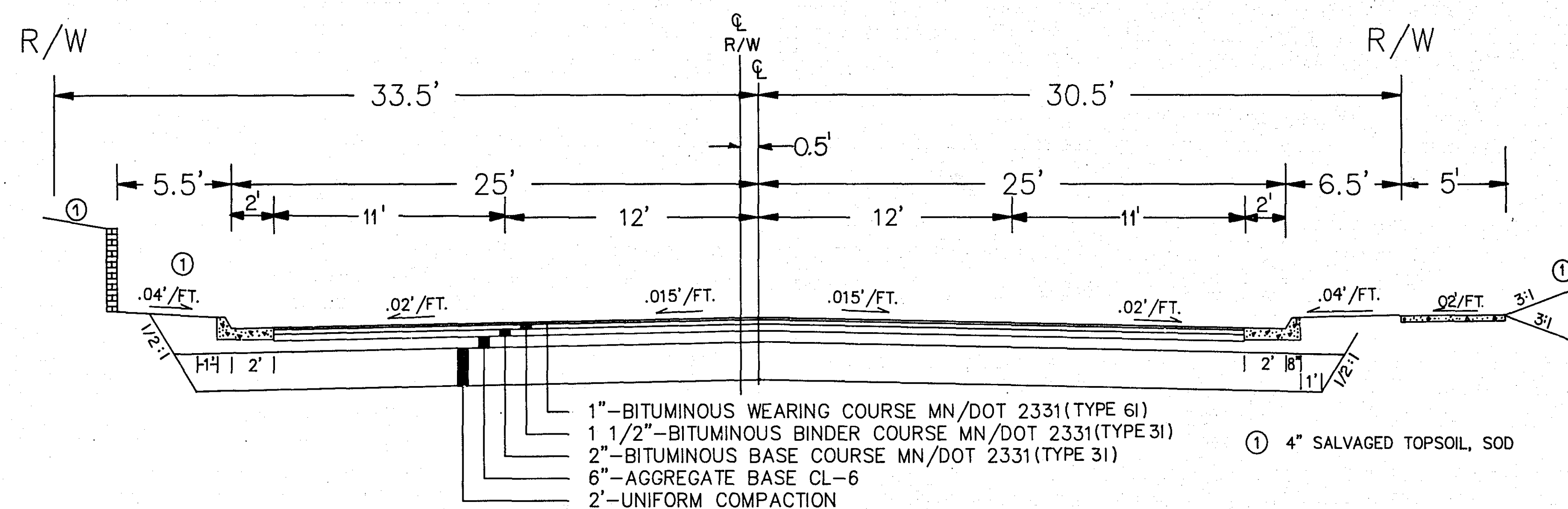
FILE NO.	89132	3
DATE	3/14/90	25



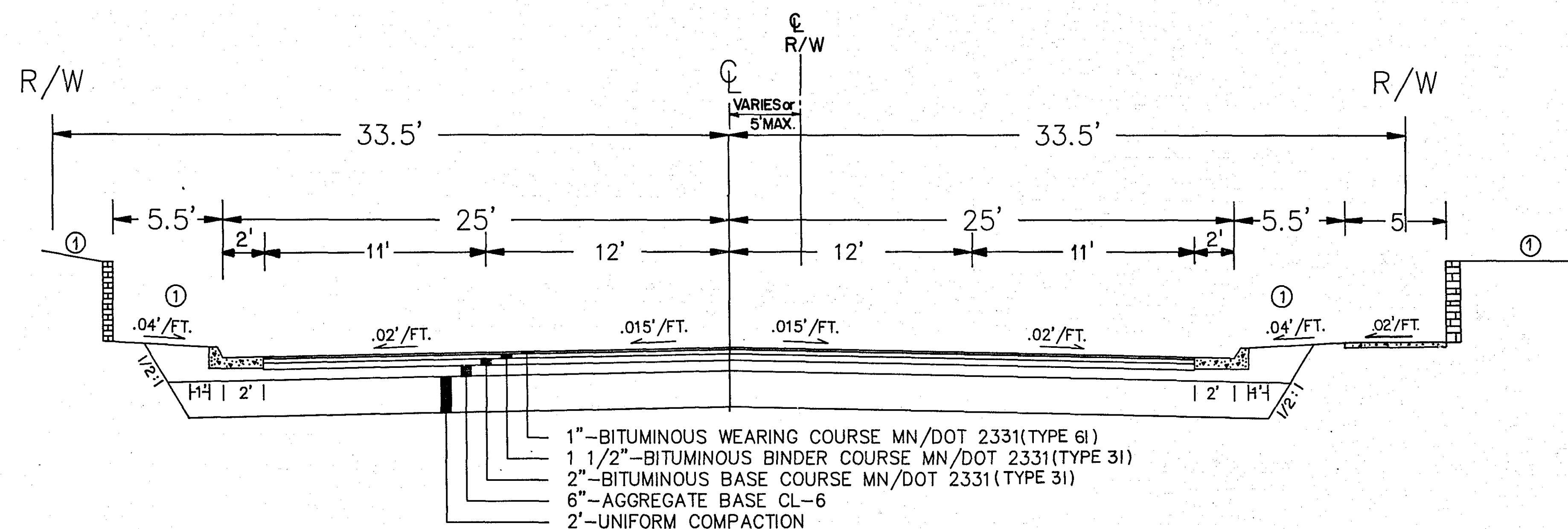
STA. 0+75 - STA. 7+30



TYPICAL SECTION INTERSECTING STREETS



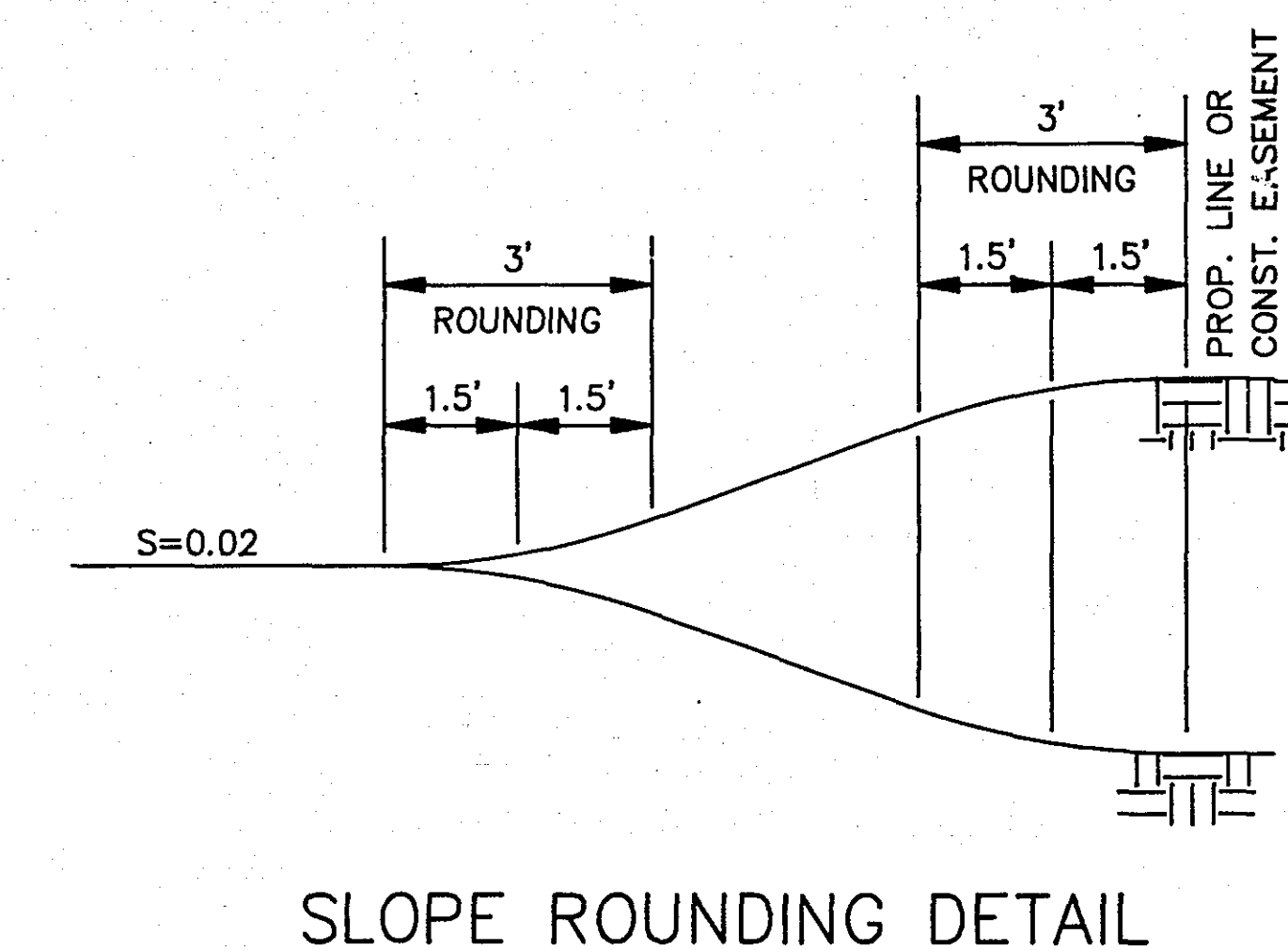
STA. 10+15 - STA. 12+15



STA. 7+30 - STA. 10+15

* 6TH ST STA 9+00 TO 10+00 14'
 STA 10+00 TO 11+00 16'
 5TH ST STA 10+00 TO 10+75 21'

NOTE: 2' CLEAR ZONE REQ'D
 FROM CURB FACE.



SLOPE ROUNDING DETAIL

NO.	BY	DATE	REVISIONS	ITEM	DESIGN	CHECKED

I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the state of Minnesota.

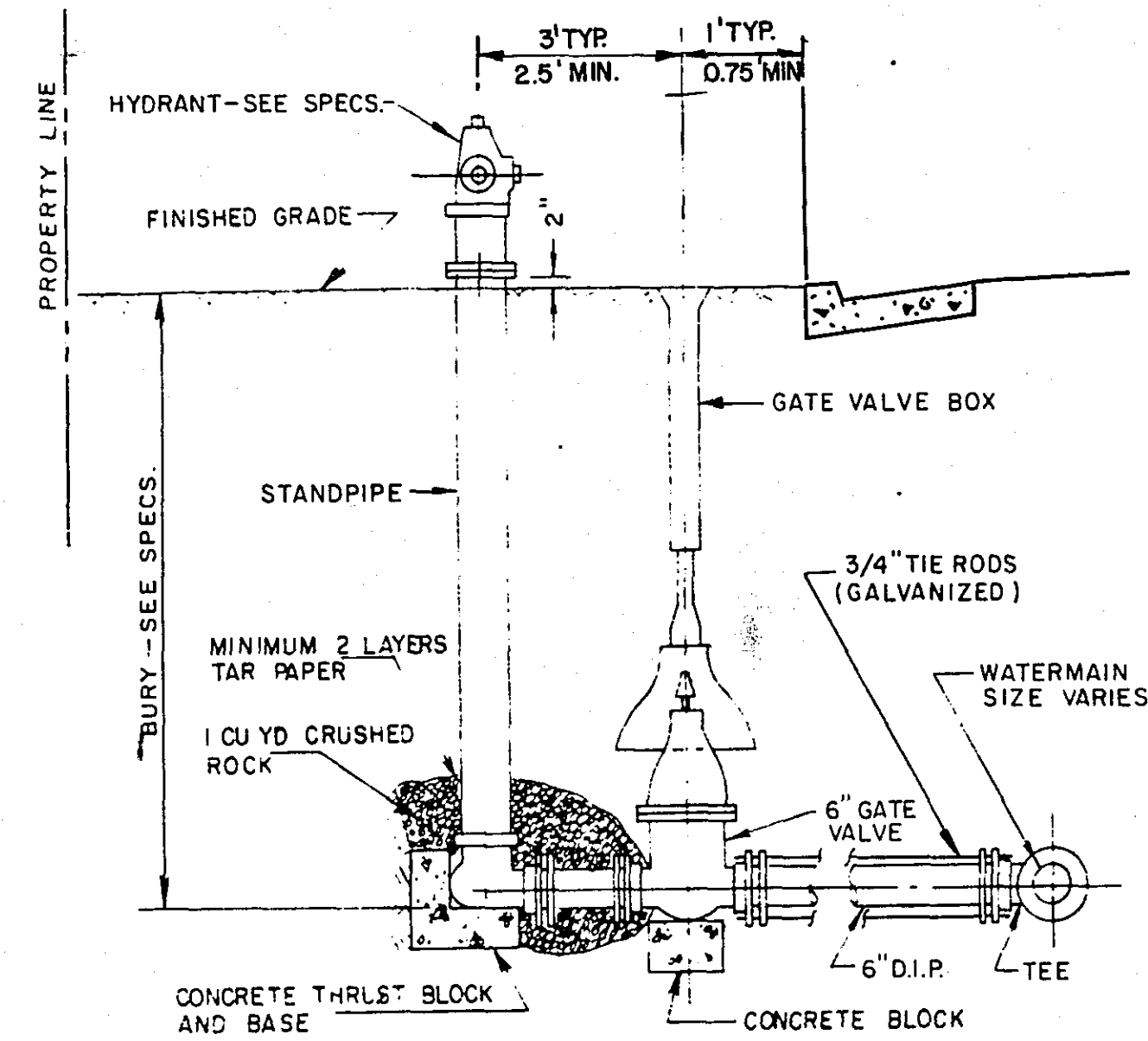
Date: _____ Reg. No. _____



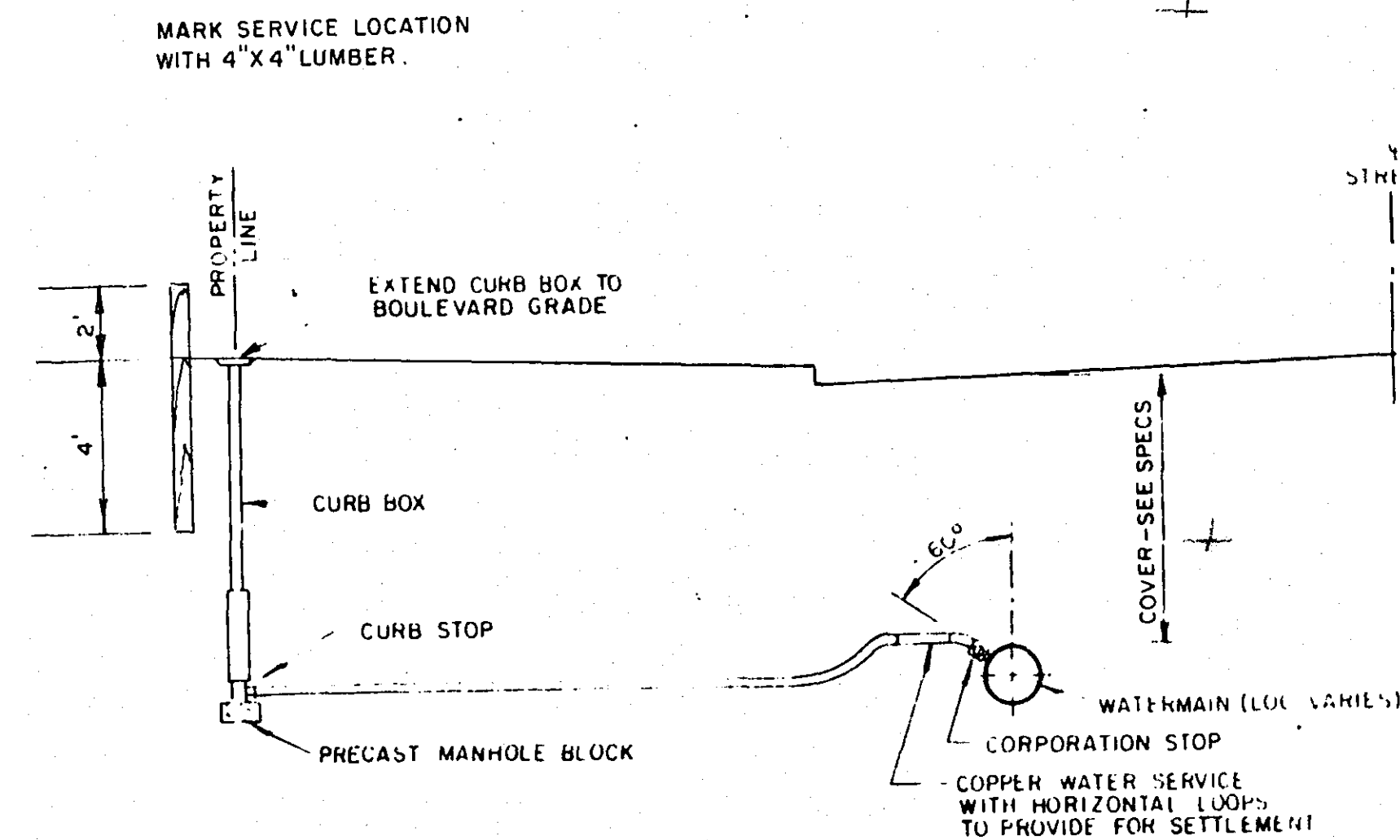
RAMSEY CO., MINNESOTA

TYPICAL SECTIONS AND DETAILS

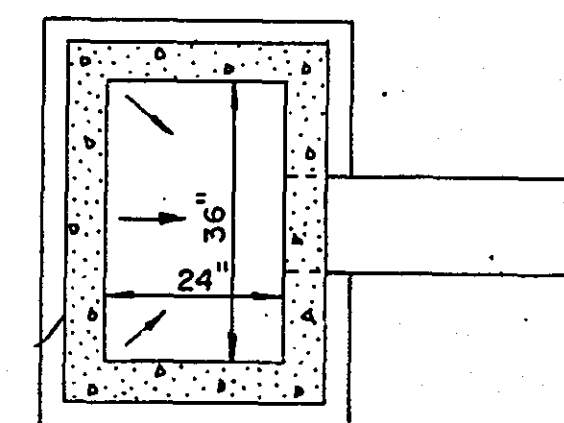
FILE NO.	89132	3
DATE	3/14/90	25



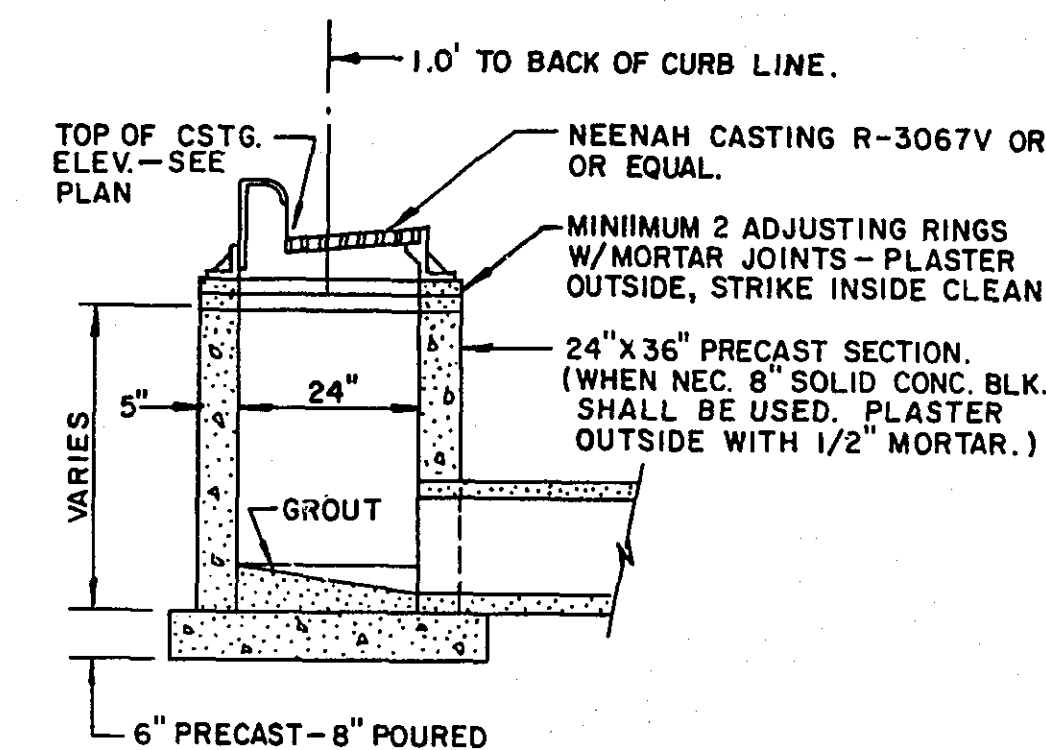
HYDRANT & GATE VALVE INSTALLATION



WATER SERVICE CONNECTION



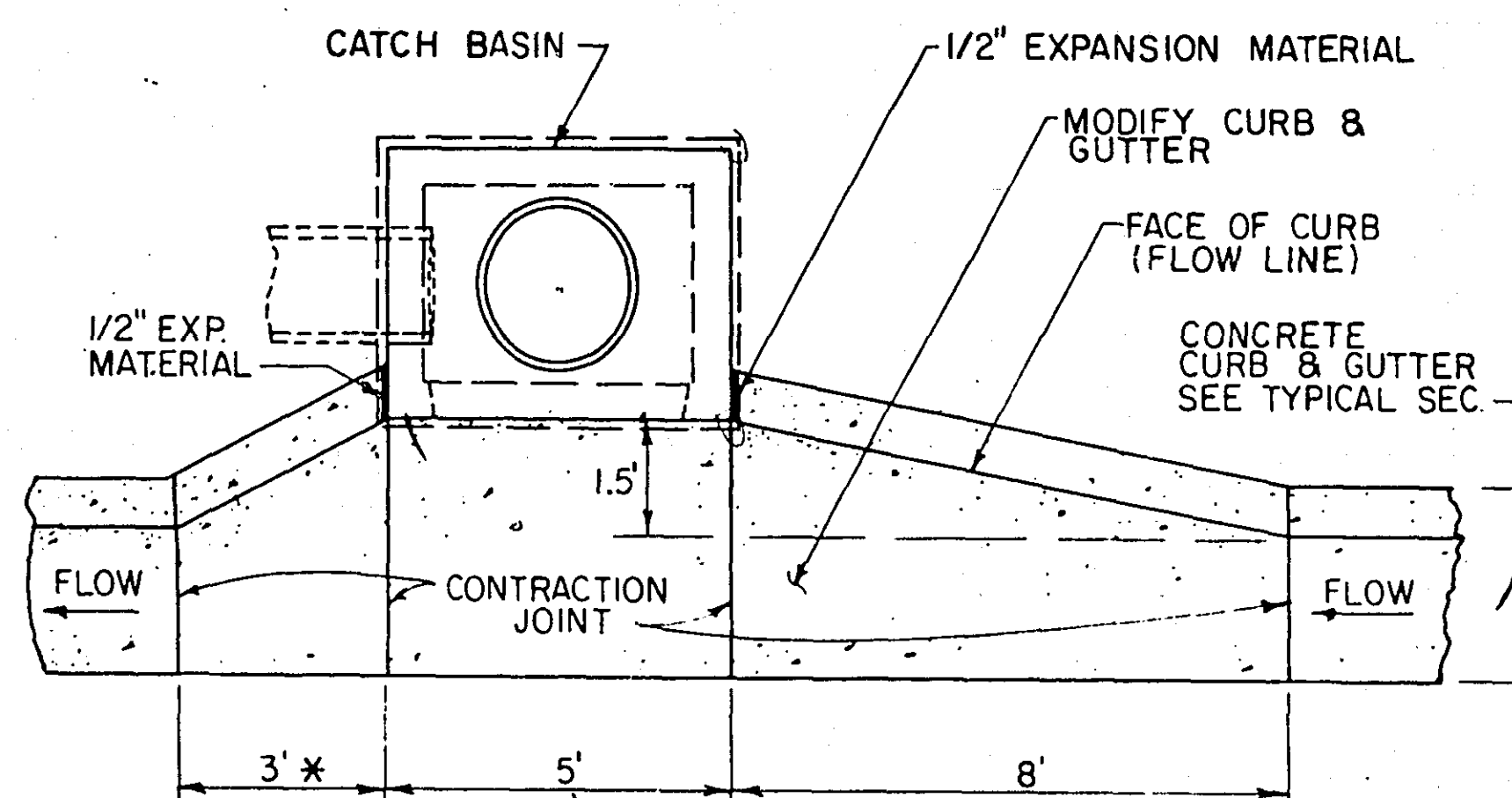
PLAN



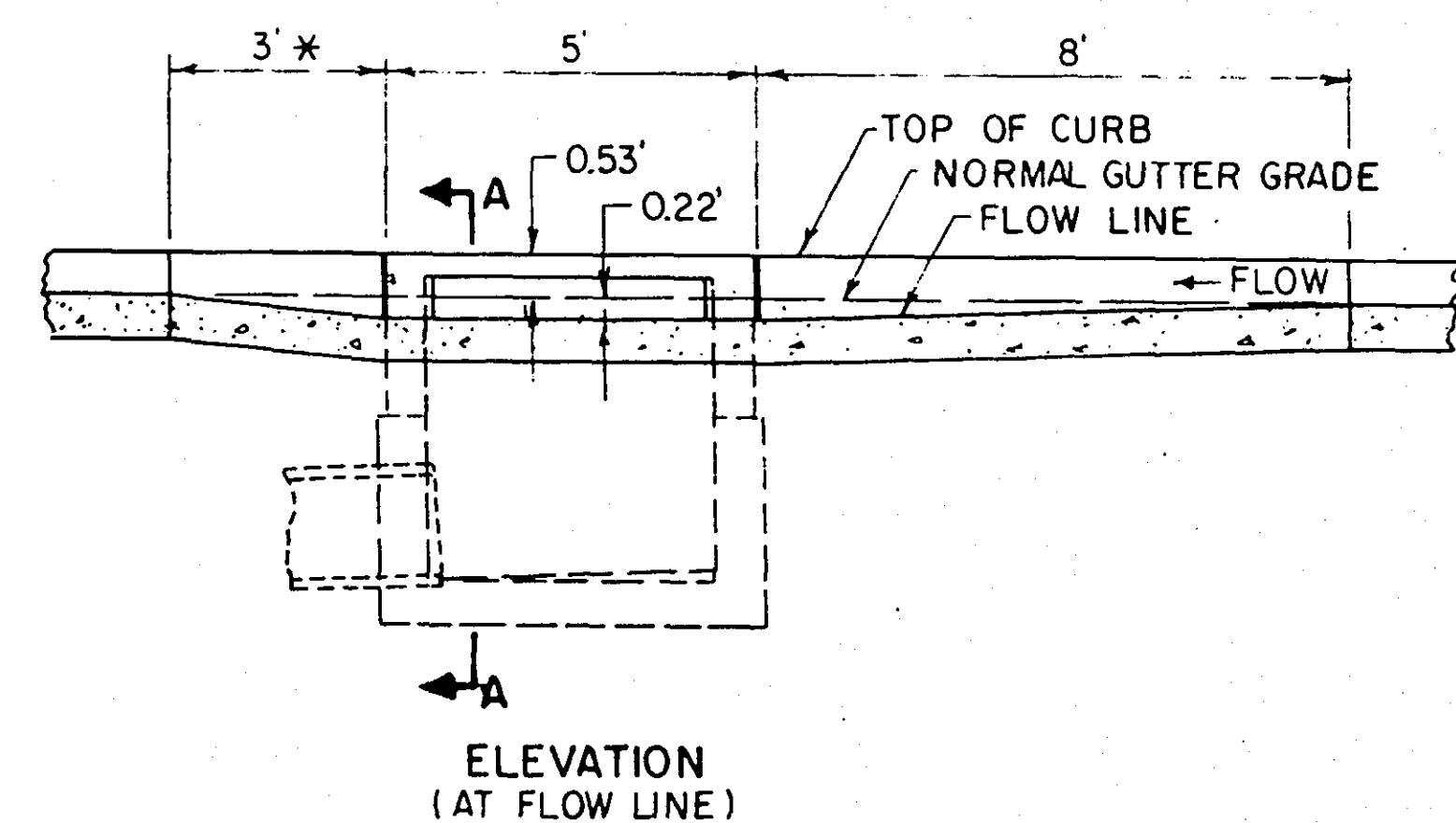
SECTION

DESIGN "X" CATCH BASIN (RECTANGULAR)

CURB OPENING CATCH BASIN-DESIGN LP INSTALLATION DETAIL

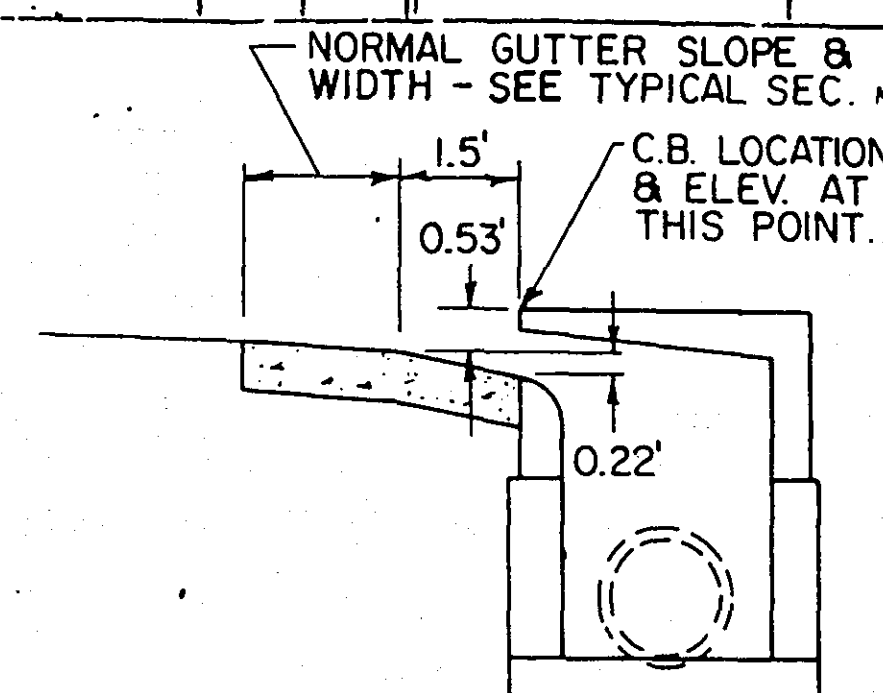


PLAN VIEW



ELEVATION (AT FLOW LINE)

REVISIONS	DATE	BY	REVISIONS	DATE	BY
MNDOT	11/23	BJ			



SECTION A-A

NOTES:

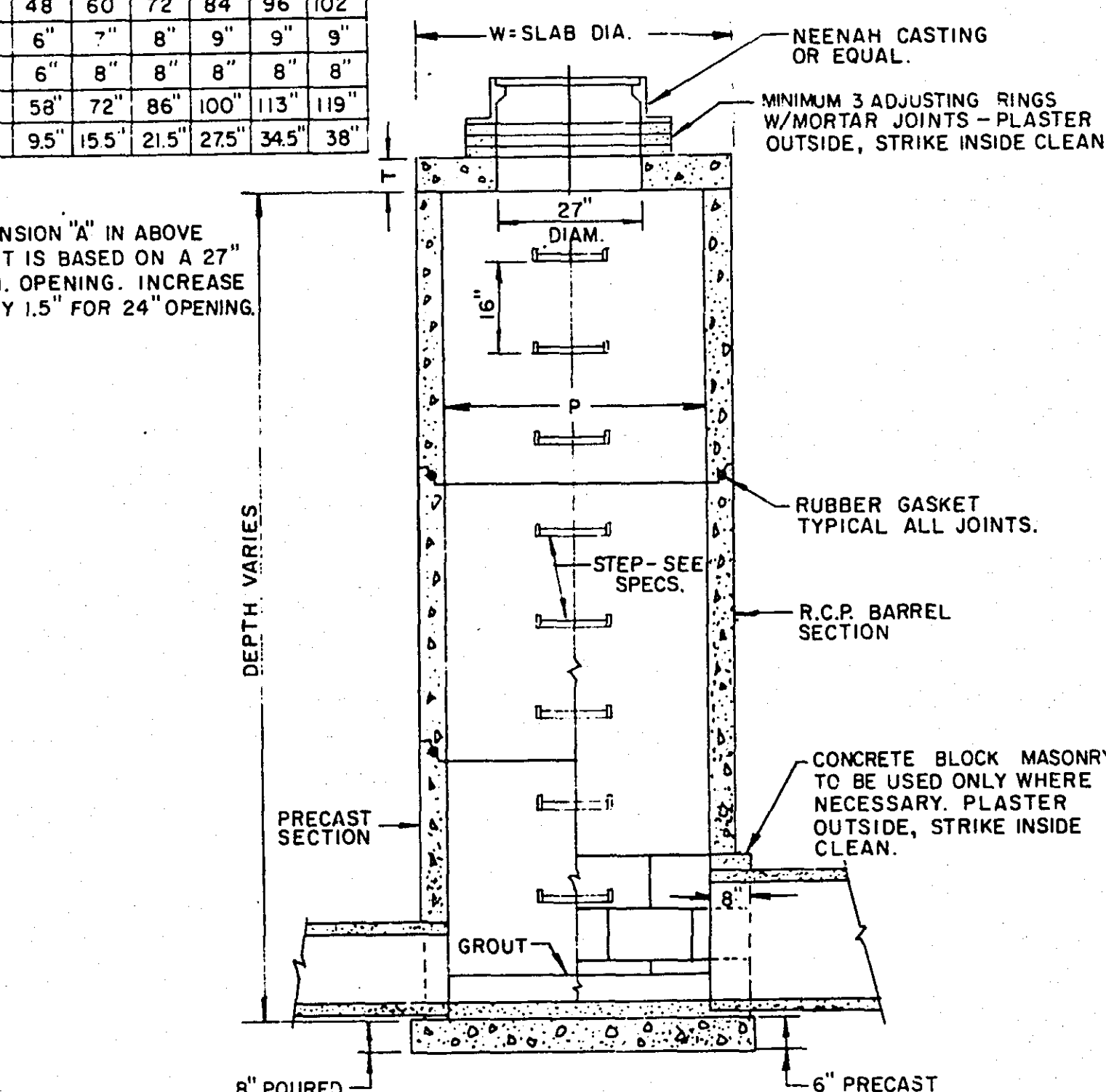
- * DIMENSION SHALL BE 8' WHEN STRUCTURE INSTALLED AT LOW POINT IN GRADE
- CATCH BASIN - DESIGN LP - SEE MN/DOT STD. PL. NO. 4021.
- TOP OF CATCH BASIN SHALL BE INSTALLED AT SAME SLOPE AS BLVD. GRADES AND TOP OF CURB GRADE EACH SIDE OF STRUCTURE.
- ELEVATION OF STRUCTURE IS COMPUTED AT LOCATION SHOWN IN SEC. A-A AT ϕ OF C.B. OPENING.

DIMENSION CHART

DIMEN.	B	C	D	E	F	G
P	48"	60"	72"	84"	96"	102"
K	6"	7"	8"	9"	9"	9"
T	6"	8"	8"	8"	8"	8"
W	58"	72"	86"	100"	113"	119"
A	9.5"	15.5"	21.5"	27.5"	34.5"	38"

NOTE: DIMENSION "A" IN ABOVE CHART IS BASED ON A 27" DIAM. OPENING. INCREASE "A" BY 1.5" FOR 24" OPENING.

COVER SLAB



MANHOLE TYPE B THRU G

28-111
S.A.P.62-646-09
S.A.P.147-020-17

NO.	BY	DATE	REVISIONS	ITEM	DESIGN	CHECKED	Date	Reg No.



RAMSEY COUNTY, MINNESOTA

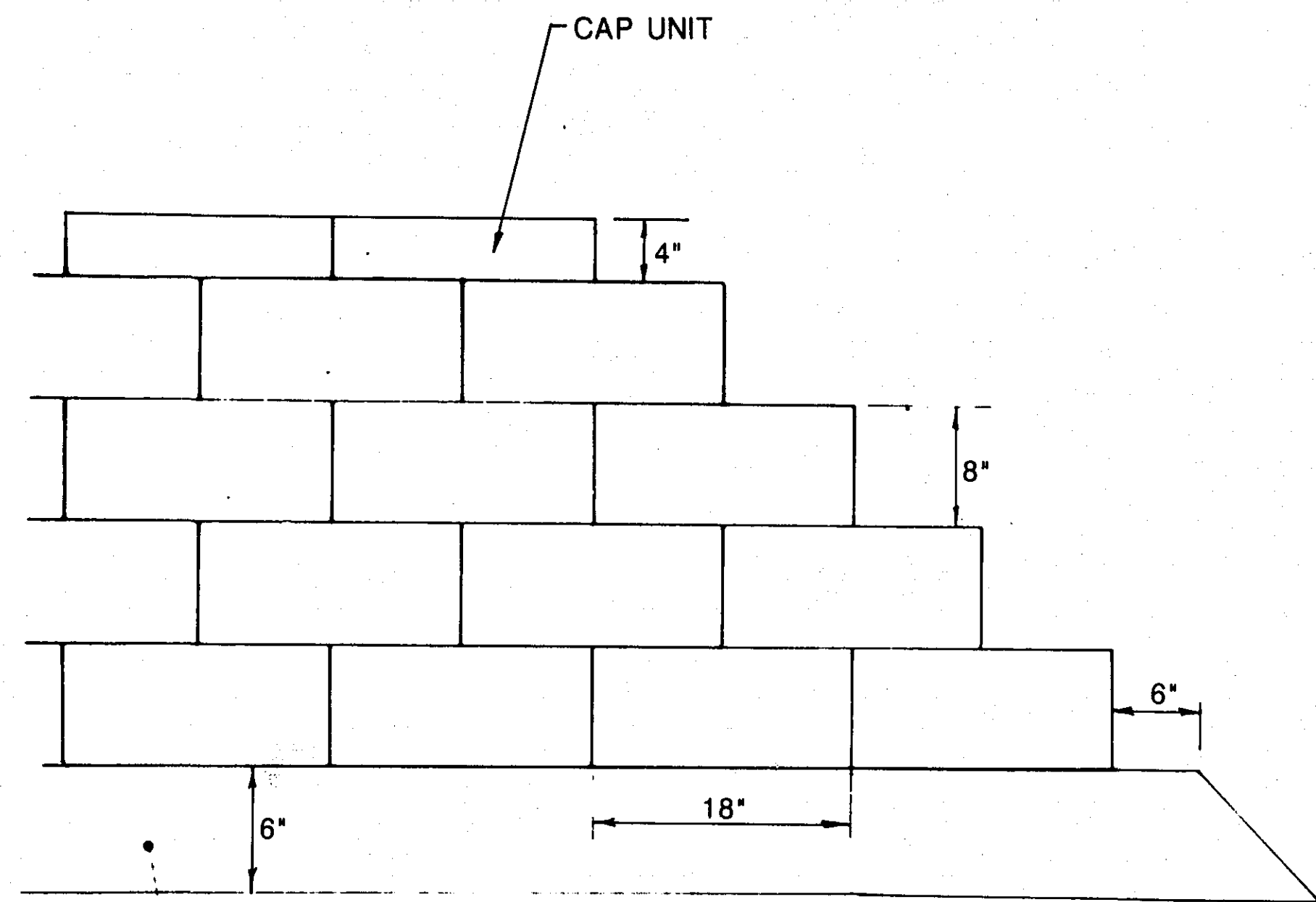
DETAILS

FILE NO.
89132
DATE
3/14/90

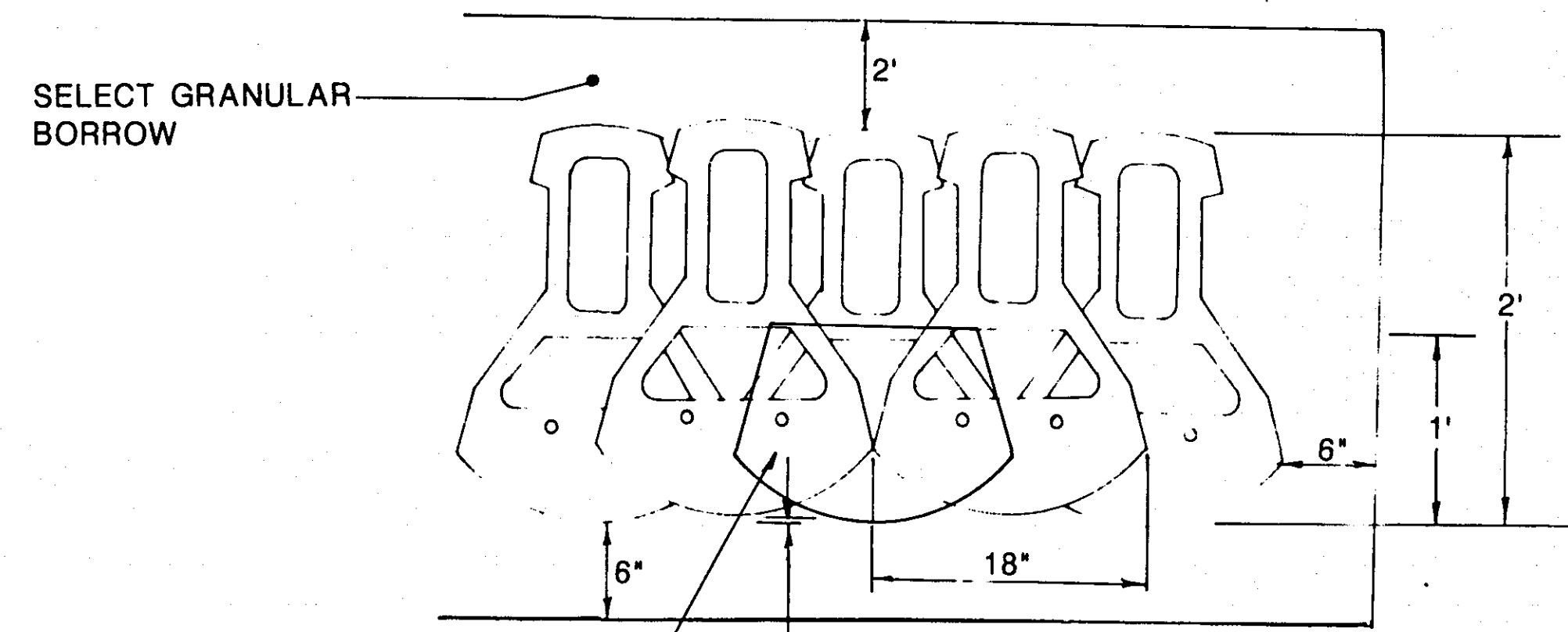
4

25

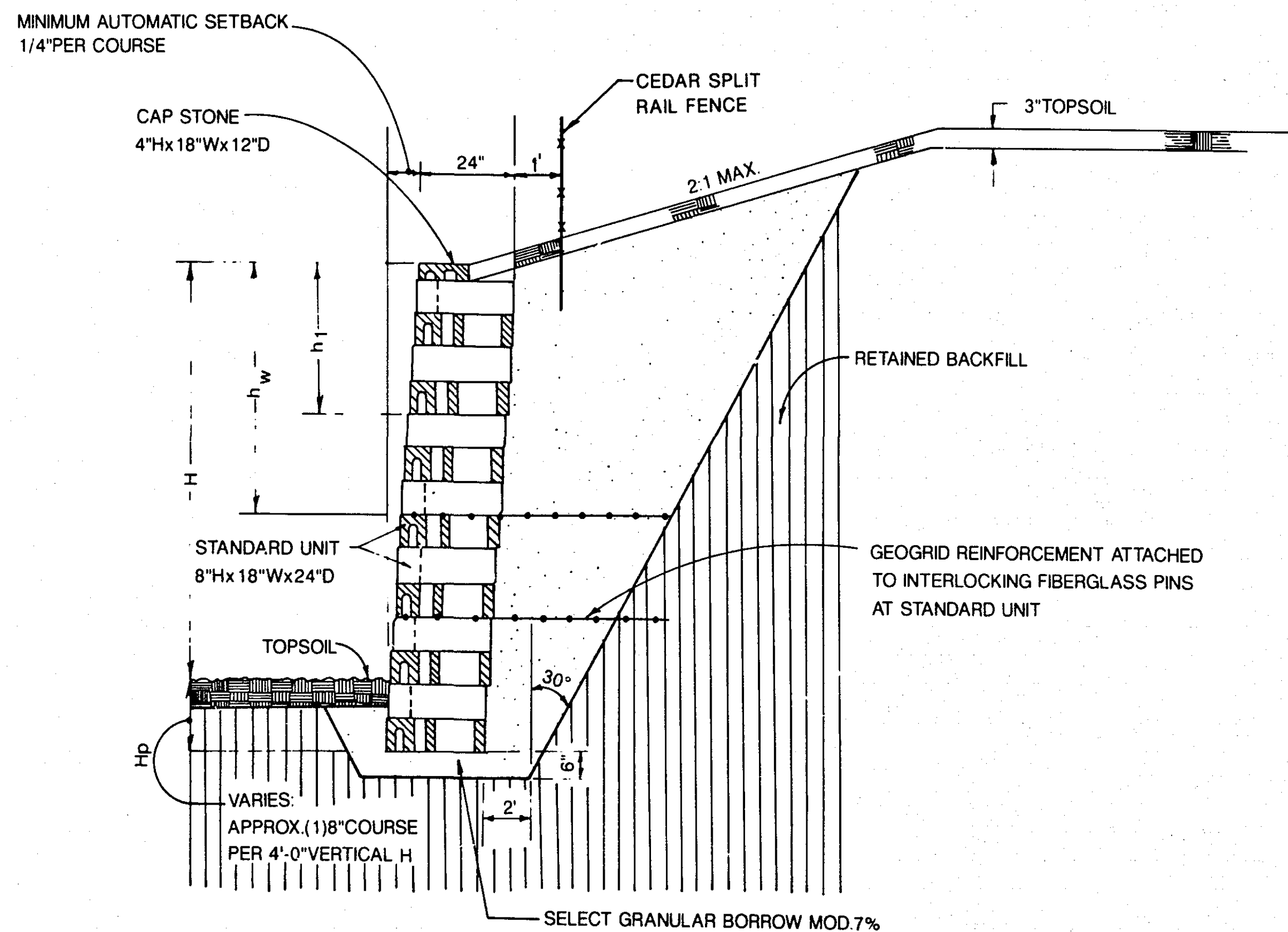
BASE	OVERLAY	DWG NO.



SELECT GRANULAR BORROW FOUNDATION



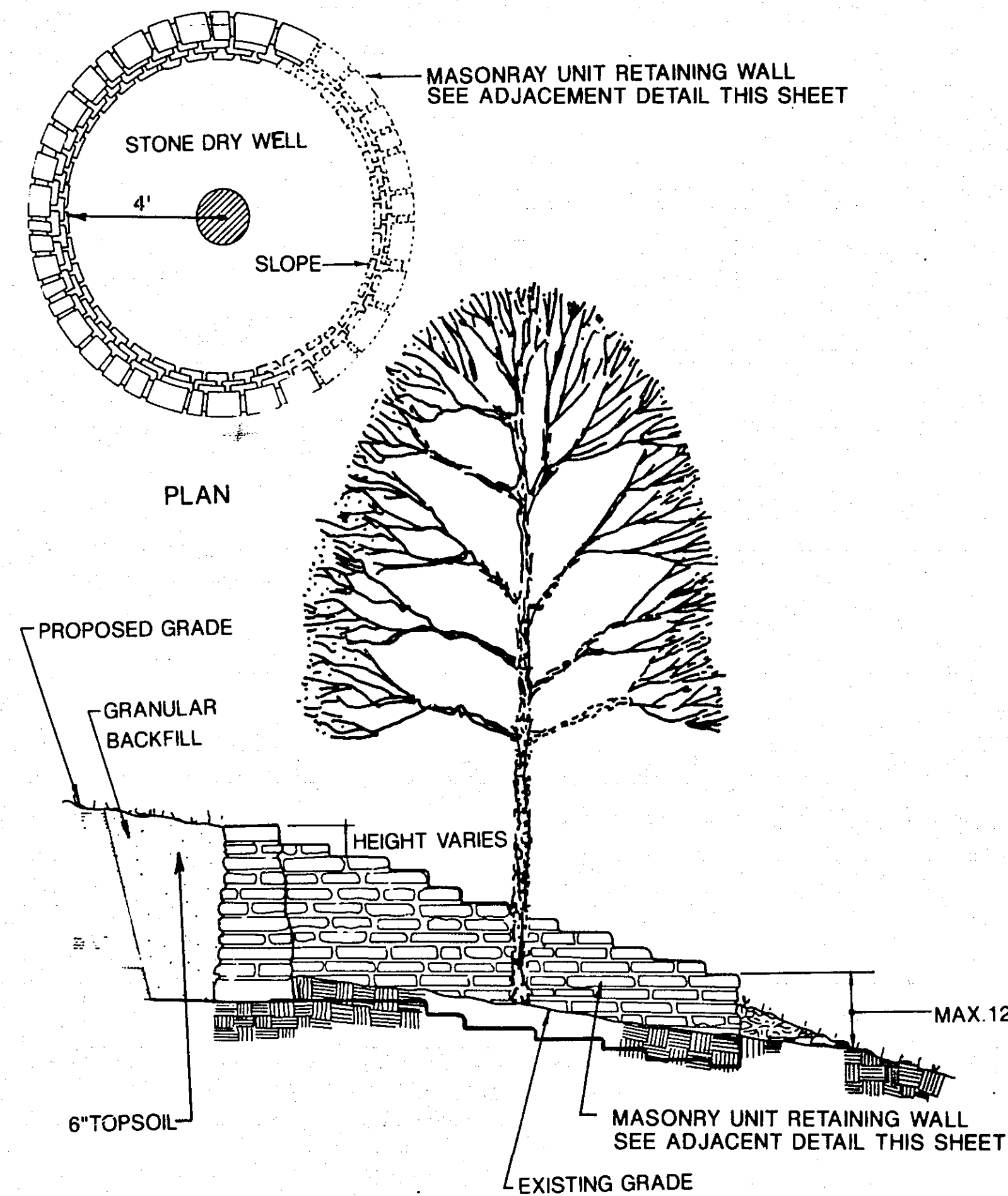
1/4" MIN. STEP BACK
CAP UNIT
MASONRY UNIT RETAINING WALL



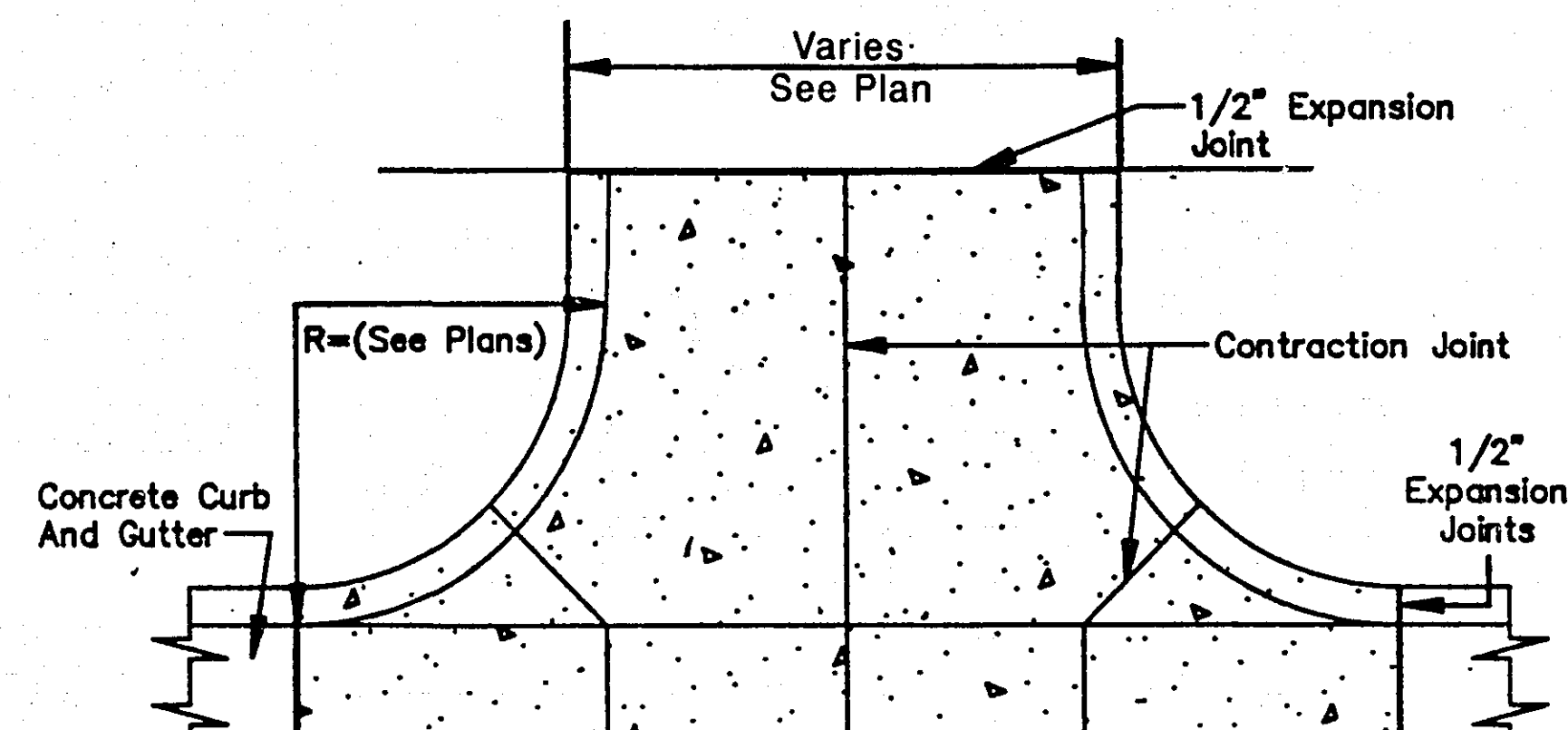
MASONRY UNIT RETAINING WALL

GEOGRID REINFORCEMENT CONTINUOUS 5' GRID		
WALL HEIGHT	*1st GRID LOCATION	*2nd GRID LOCATION
0-4'	—	—
4'-6'	2.7'	—
6'-8'	1.3'	4.0'

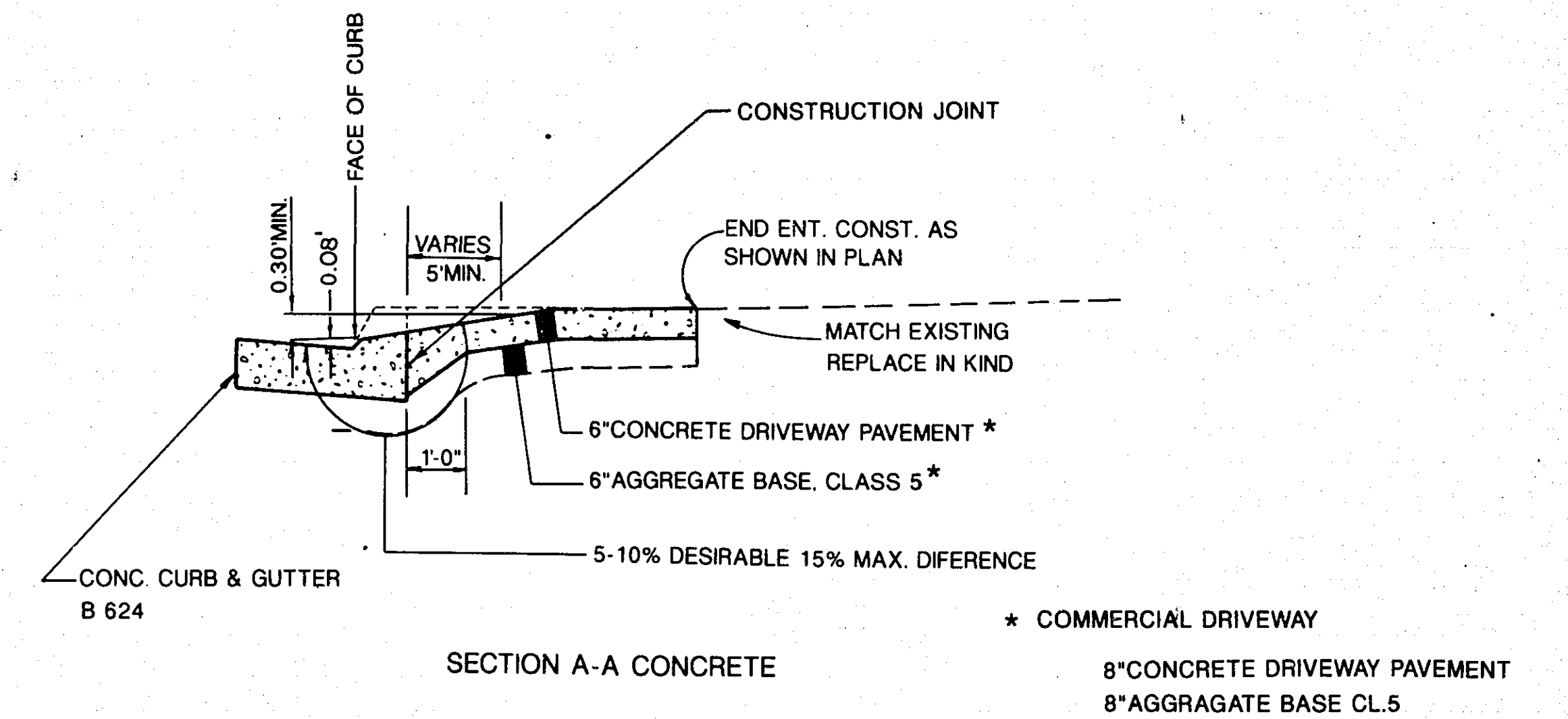
* ABOVE PROPOSED FINISHED GRADE



TREE WELL DETAIL

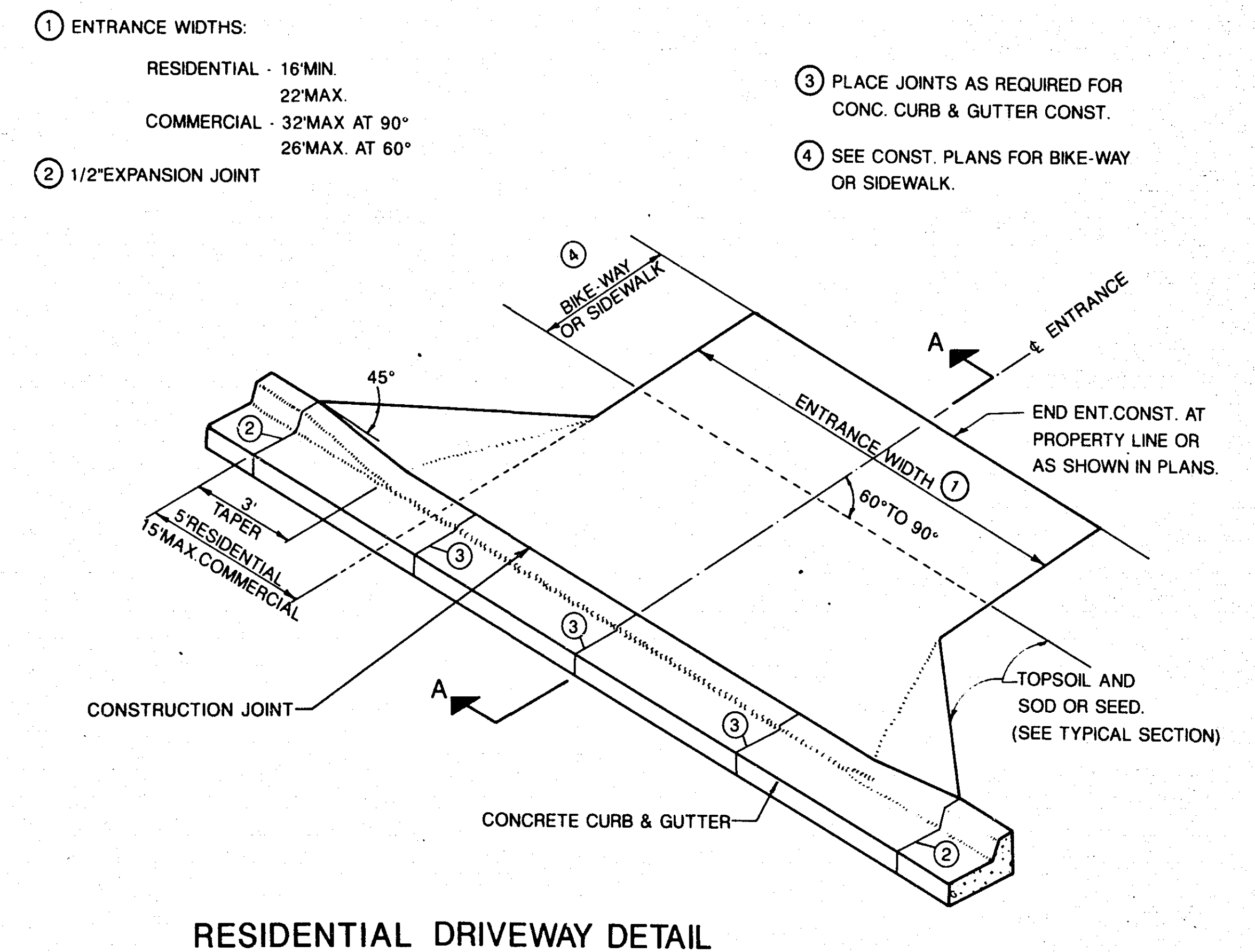


COMMERCIAL DRIVEWAY DETAIL



SECTION A-A CONCRETE
CONCRETE DRIVEWAY
(BOTH RESIDENTIAL & COMMERCIAL)

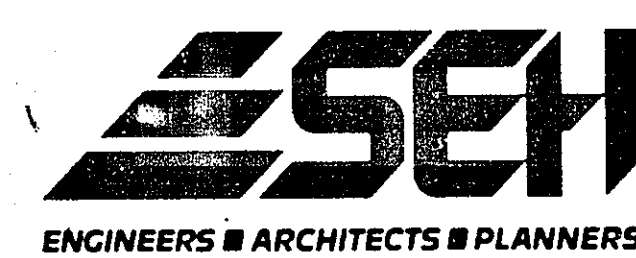
* COMMERCIAL DRIVEWAY
8" CONCRETE DRIVEWAY PAVEMENT
8" AGGREGATE BASE CL. 5



RESIDENTIAL DRIVEWAY DETAIL

NO.	BY	DATE	REVISIONS	ITEM	DESIGN	CHECKED

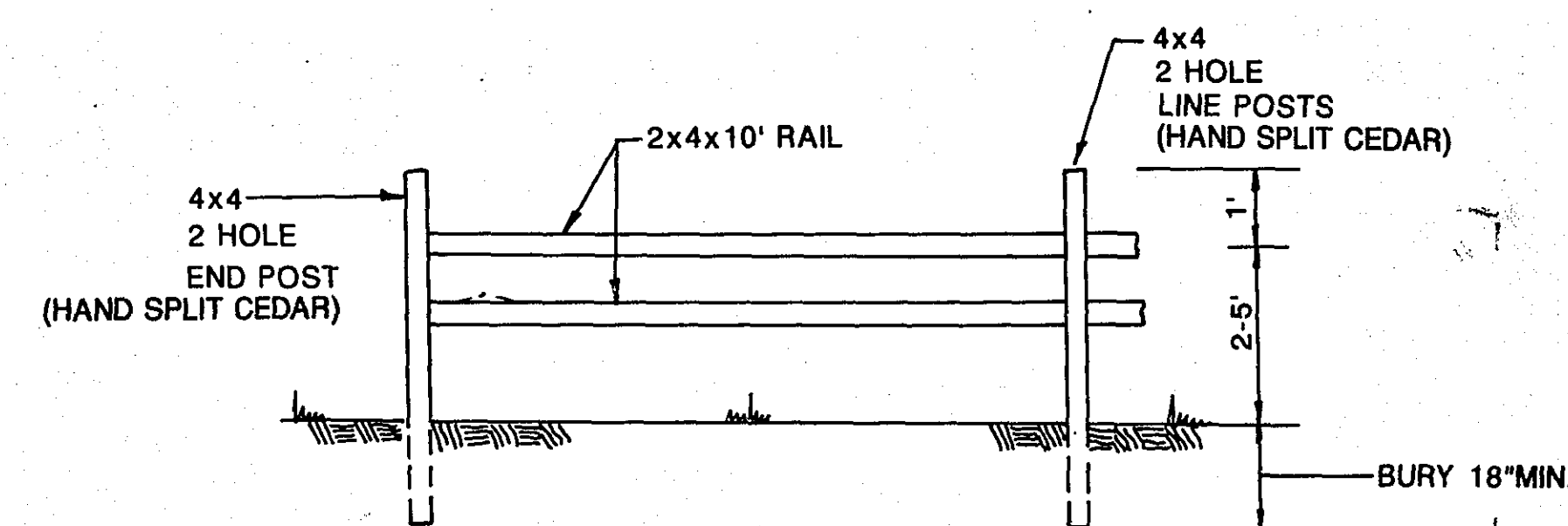
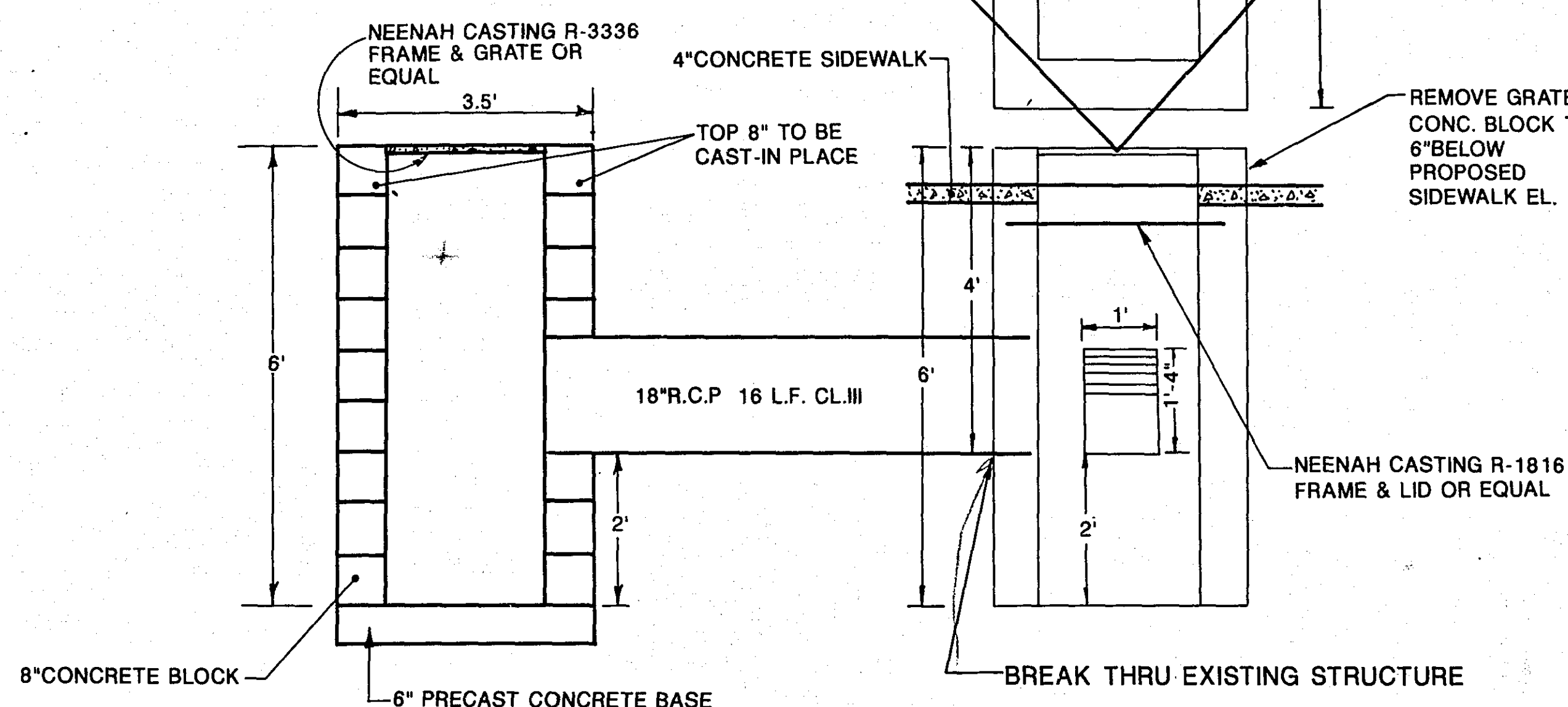
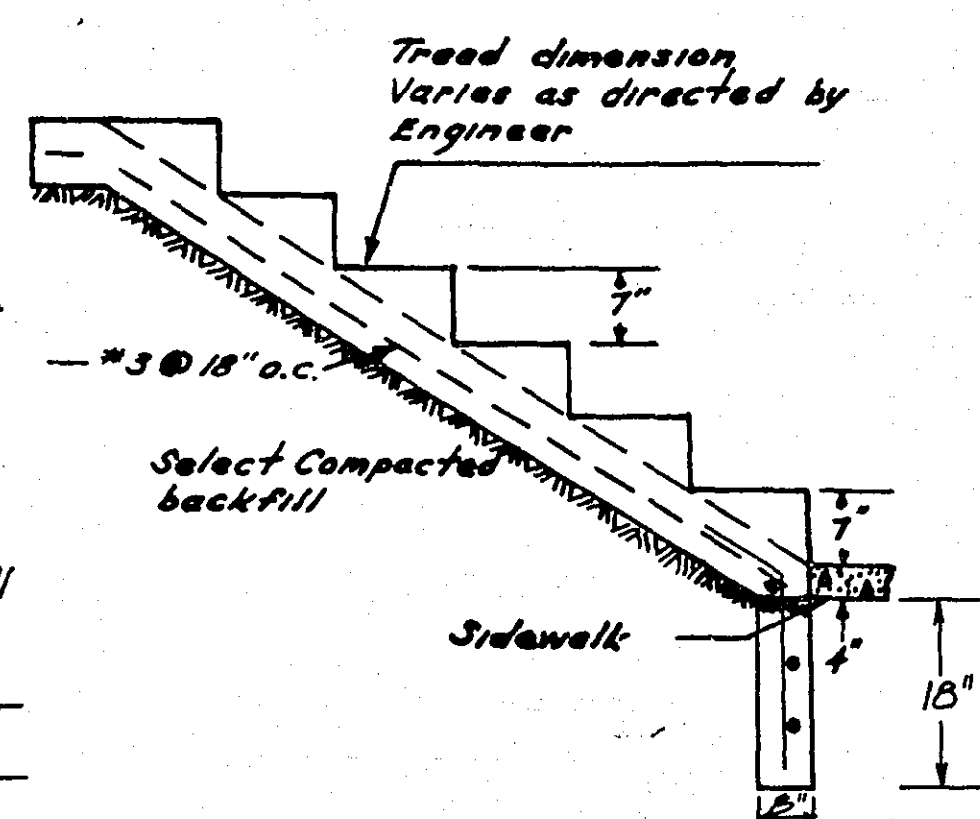
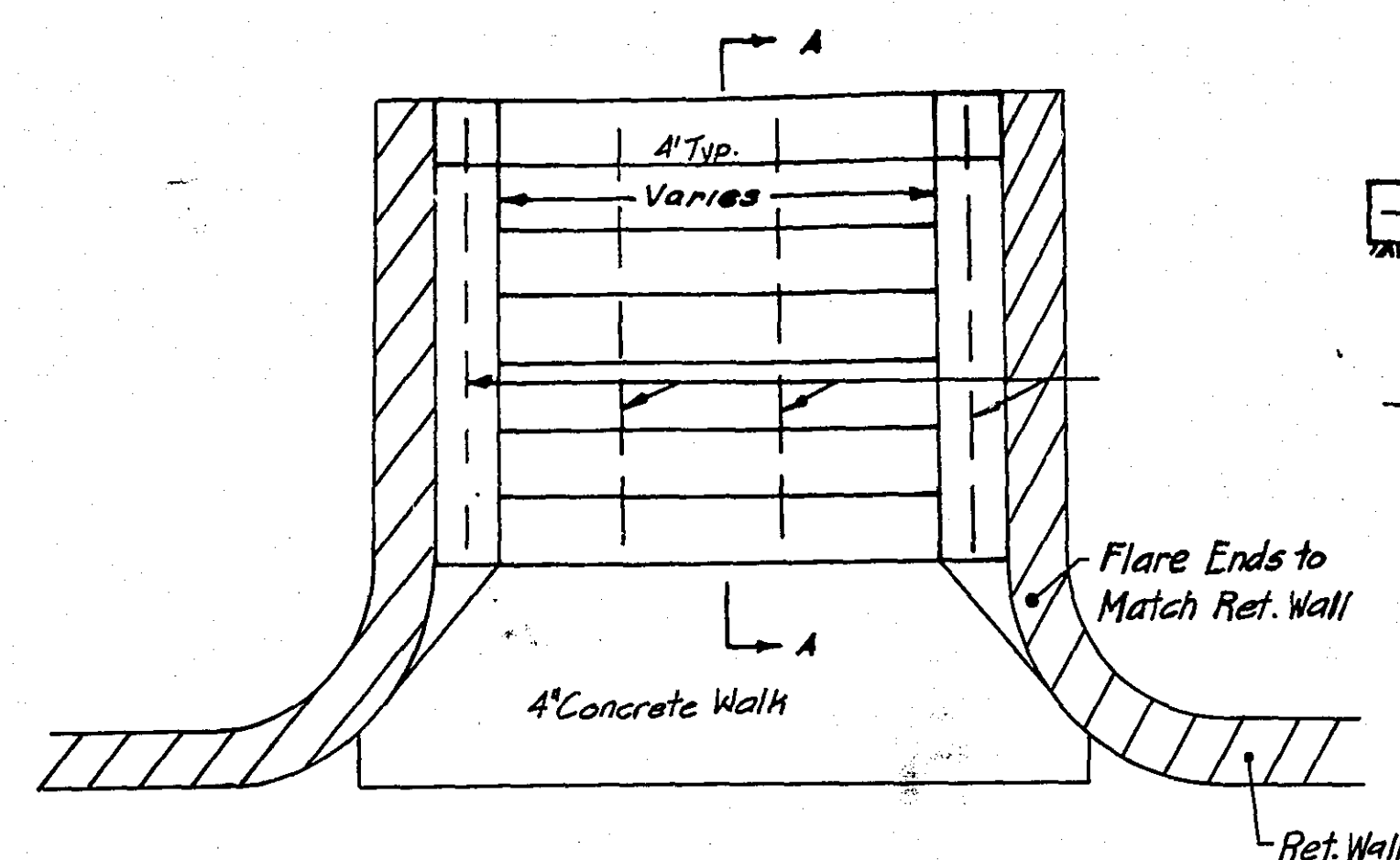
I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota
Date _____ Reg. No. _____



RAMSEY COUNTY, MINNESOTA

DETAILS

FILE NO.	89132	5
DATE	3/14/90	25



Note:
ALL DIM. NOMINAL

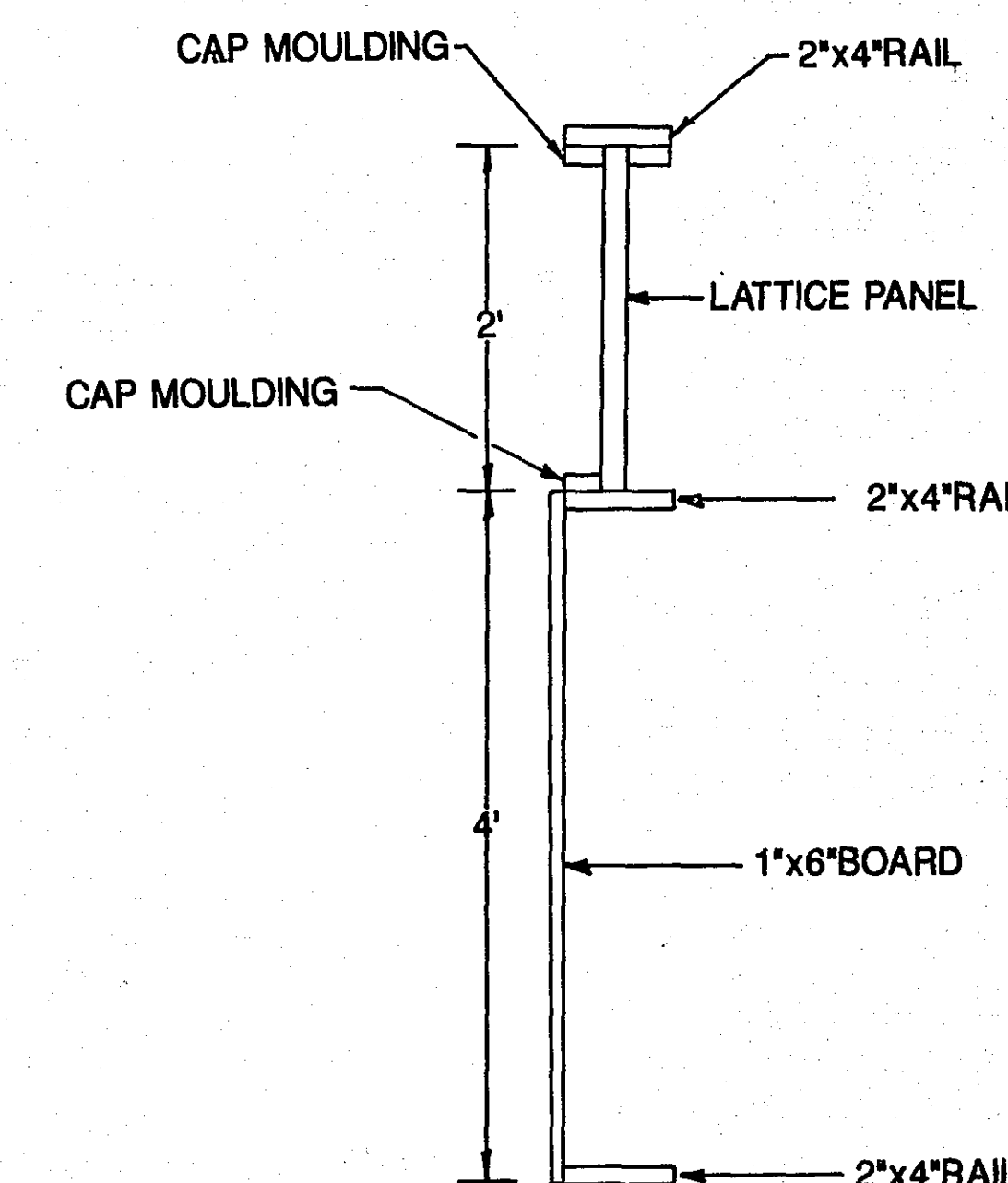
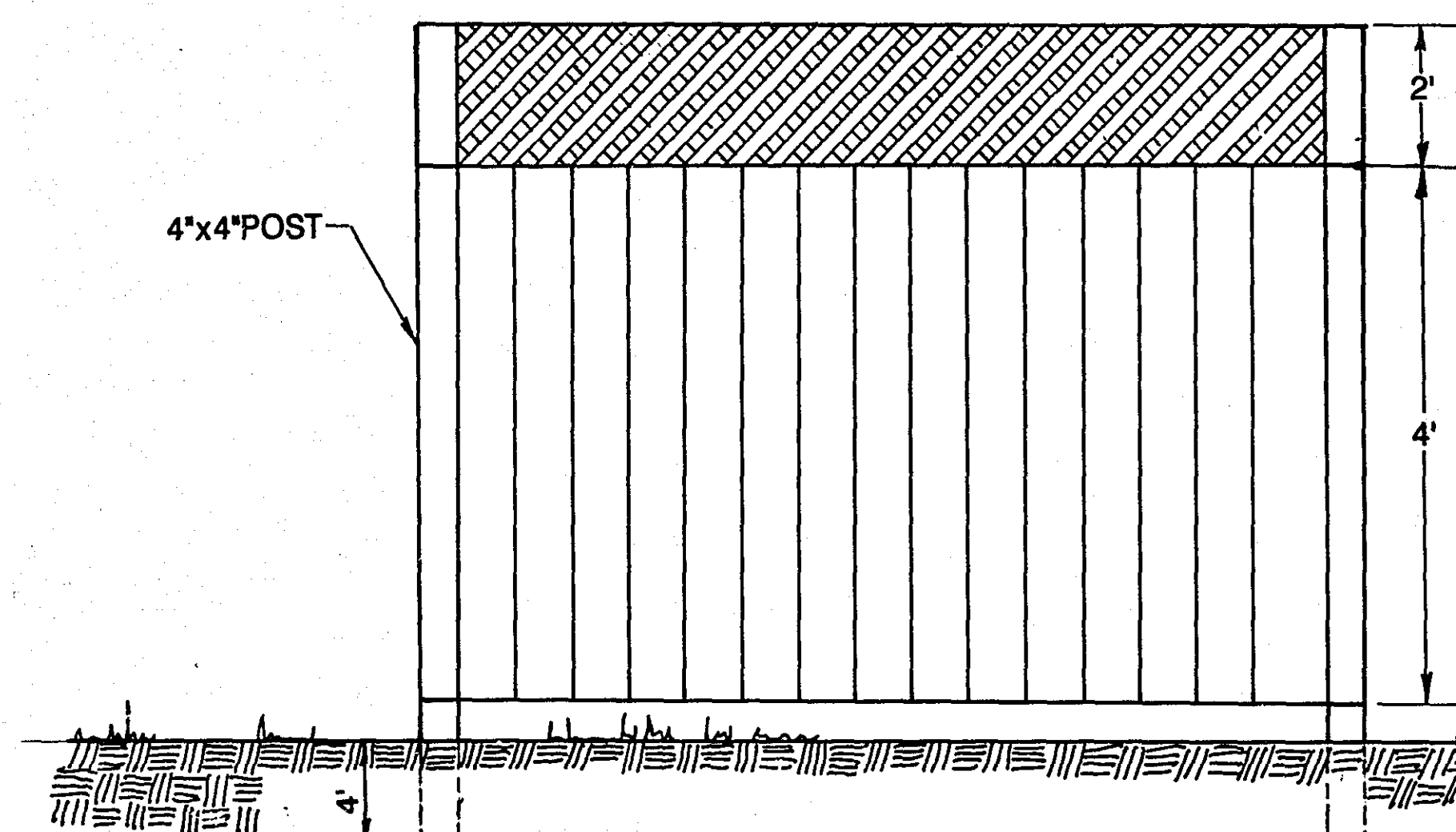
CASTING ASSEMBLY	NEENAH CASTING or EQUAL
A	R-1678
B	R-3067V
C	790-2-712

THE FOLLOWING STANDARD PLATES APPROVED BY THE FEDERAL HIGHWAY
ADMINISTRATION SHALL APPLY ON THIS PROJECT.

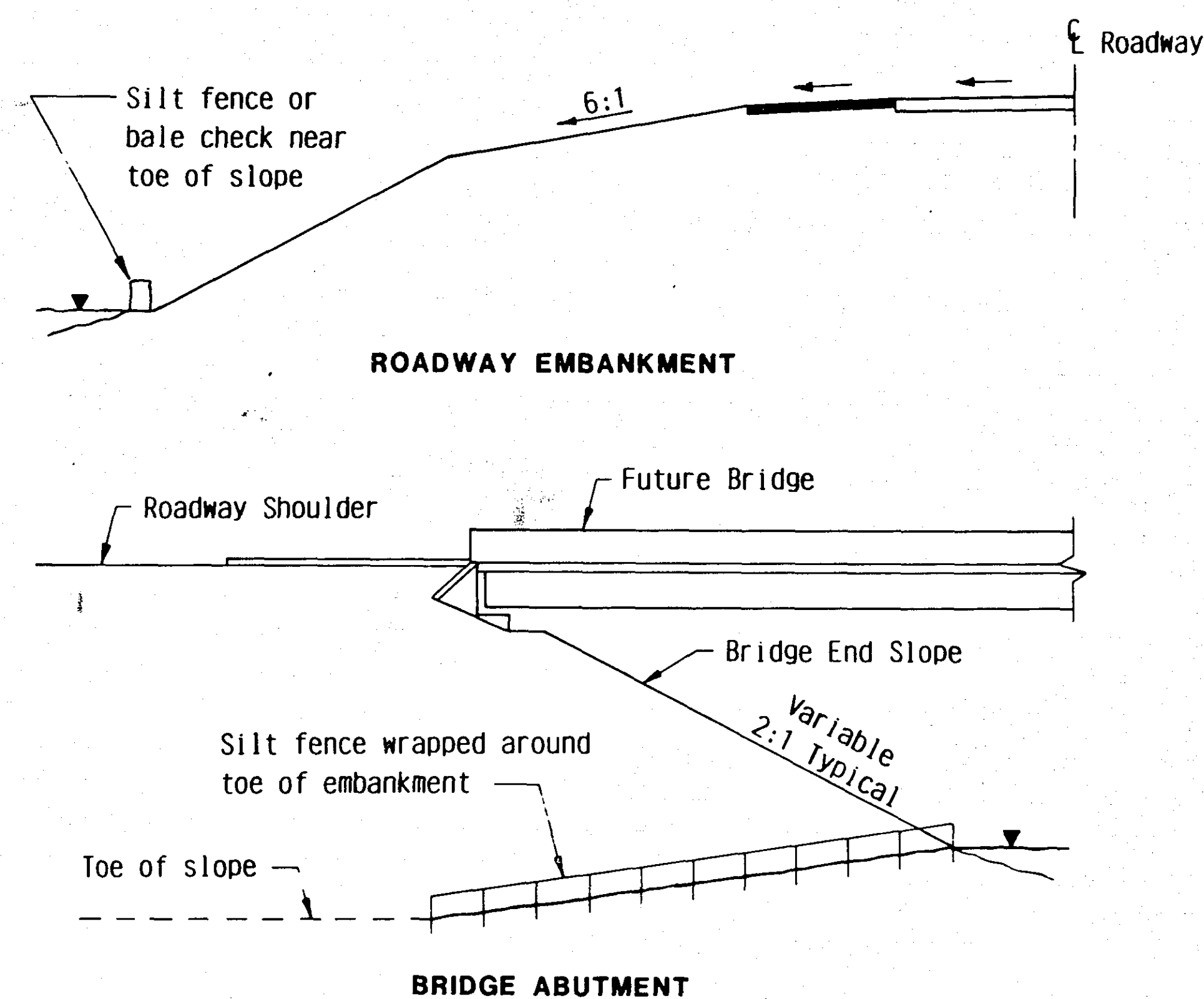
Mn/DOT	STANDARD PLATES
PLATE NO.	DESCRIPTION
0005A	SPECIFICATION REFERENCE TO STANDARD PLATES
3000K	REINFORCED CONCRETE PIPE
3006F	GASKET JOINT FOR REINFORCED CONCRETE PIPE
3145E	CONCRETE PIPE TIES
4011D	PRECAST CONCRETE BASE
4021C	PRECAST CURB OPENING CATCH BASIN
4101C	RING CASTING FOR MANHOLE OR CATCH BASIN
4180H	MANHOLE OR CATCH BASIN STEP
7035J	CONCRETE WALK & CURB RETURNS AT ENTRANCES
7036C	PEDESTRIAN CURB RAMP
7100F	CONCRETE CURB & GUTTERS
7111G	INSTALLATION & REINFORCEMENT OF CATCH BASIN CASTINGS
8000 I	STANDARD BARRICADES
9322 I	CHAIN LINK FENCE
8400D	PIPE RAILING
8401B	PEDESTRIAN PIPE RAILING

STATION	LOCATION	NO.	TYPE	DESIGN	CONST. HEIGHT	CASTING ASSEMBLY	ELEVATION		FURNISH AND INSTALL RCP			DRAINS TO		REMARKS
					LF		GRATE or RING	CB or MH INVERT	12"	15"	18"	STRUCT #	INVERT EL.	
1+66	±	1	MH	B	6.22	A	903.74	897.65						CONNECTS TO EXIST.18" STORM SEWER.
2+35	±	2	MH	B	5.43	A	903.45	898.02			68	1	897.52	
2+44	26.5'LT.	3	CB	LP-4	5.0	C	903.70	898.70	28			2	898.02	
2+44	26.5'RT.	4	CB	LP-4	5.0	C	903.70	898.70	28			2	898.02	
4+95	±	5	MH	B	6.67	A	906.32	899.5		260		2	898.02	
5+00	26.5'LT.	6	CB	LP-4	6.78	C	906.44	899.66	28			5	899.65	
5+00	26.5'RT.	7	CB	LP-4	6.69	C	906.44	899.75	28			5	899.65	
9+65 6th ST.	19.55'RT.	8	CB	X	5.0	B	916.78	911.78	38			10	911.39	
10+40 6th ST.	17.2'RT.	9	CB	X	4.61	B	916.77	912.16	36			12	911.80	
9+65 6th ST.	18.43'LT	10	CB	X	5.61	B	917.00	911.39	16			11	911.02	
8+83	18'LT.	11	MH	B	6.71	A	917.73	911.02		331		13	908.90	
10+40 6th ST.	18.06'LT.	12	CB	X	5.12	B	916.92	911.80	58			11	911.02	
12+14	18'LT.	13	MH	B	3.93	A	912.83	908.90						CONNECTS TO EXIST.15" STORM SEWER.

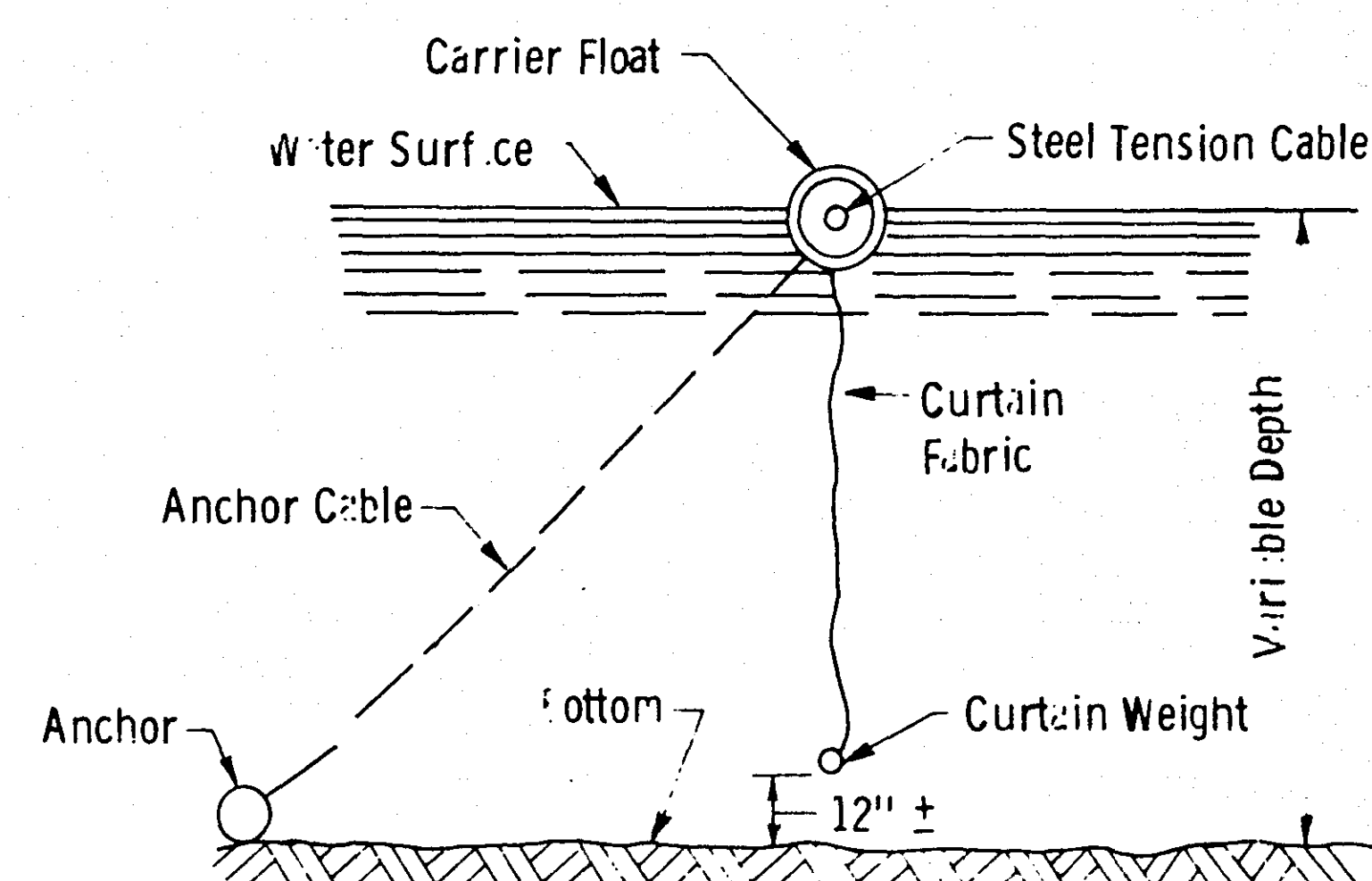
MISCELLANEOUS REMOVALS					
STATION	LOCATION	BITUMINOUS CURB L.F.	CONCRETE CURB L.F.	CONCRETE C & G L.F.	CONCRETE DRIVEWAY S.Y.
1+45 - 1+75	RT	200			
10+55 - 12+05	5th ST. LT	150			
8+80 - 9+70	LT	100			
9+70 - 11+75	LT		205		
8+75 - 12+00	RT		325		
0+75 - 1+45	RT			80	
1+20	DRIVEWAY LT			50	
4+70	DRIVEWAY LT			80	
10+35 - 11+00	6th ST. RT. & LT.			130	
11+75 - 12+15	LT			45	
6+15	LT				53
7+05	RT				34
10+20	RT				21
11+85	RT				5
TOTALS		450	530	385	113



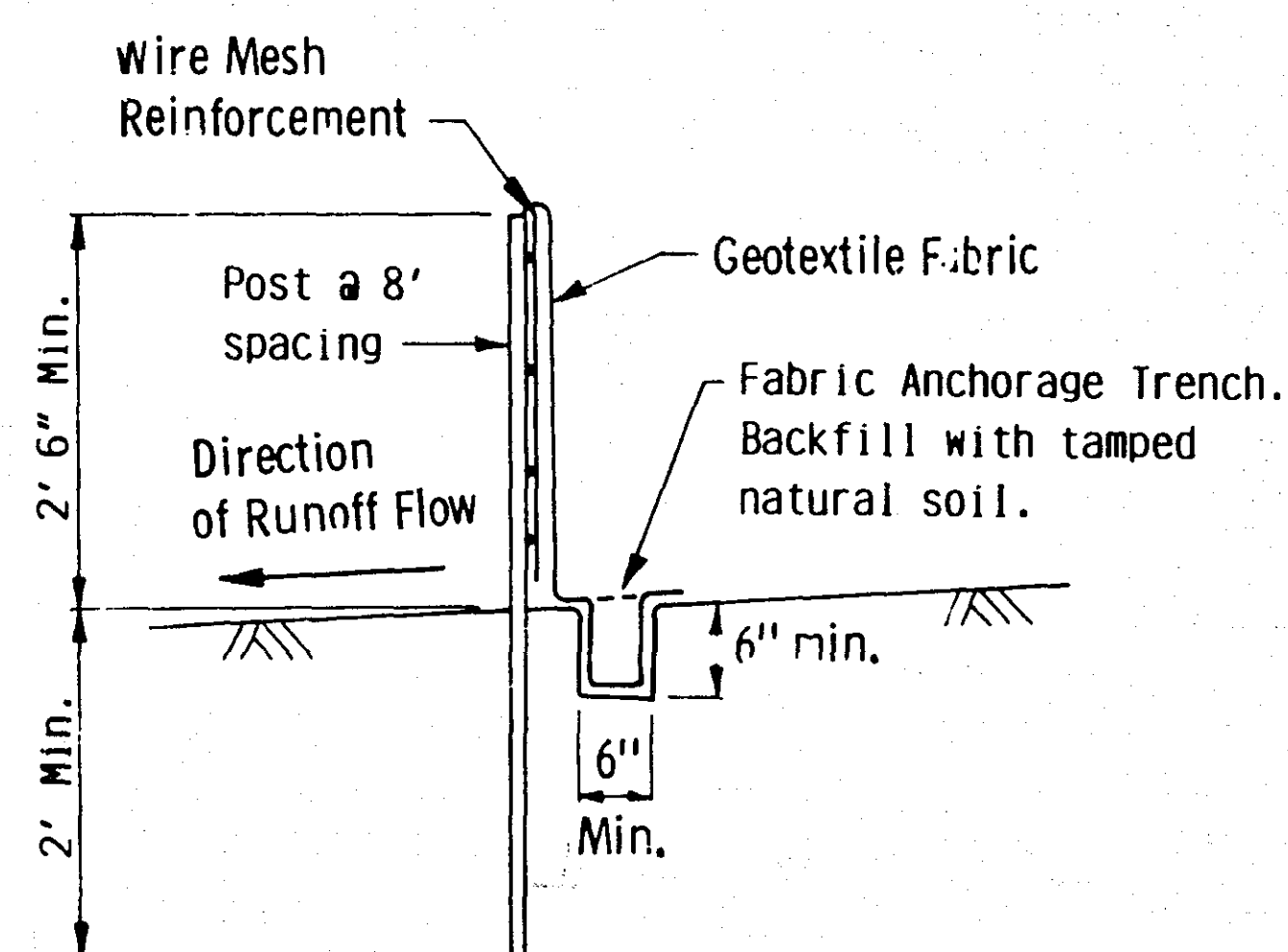
																		I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota
NO.	BY	DATE	REVISIONS						ITEM	DESIGN	CHECKED	Date _____	Reg No. _____					



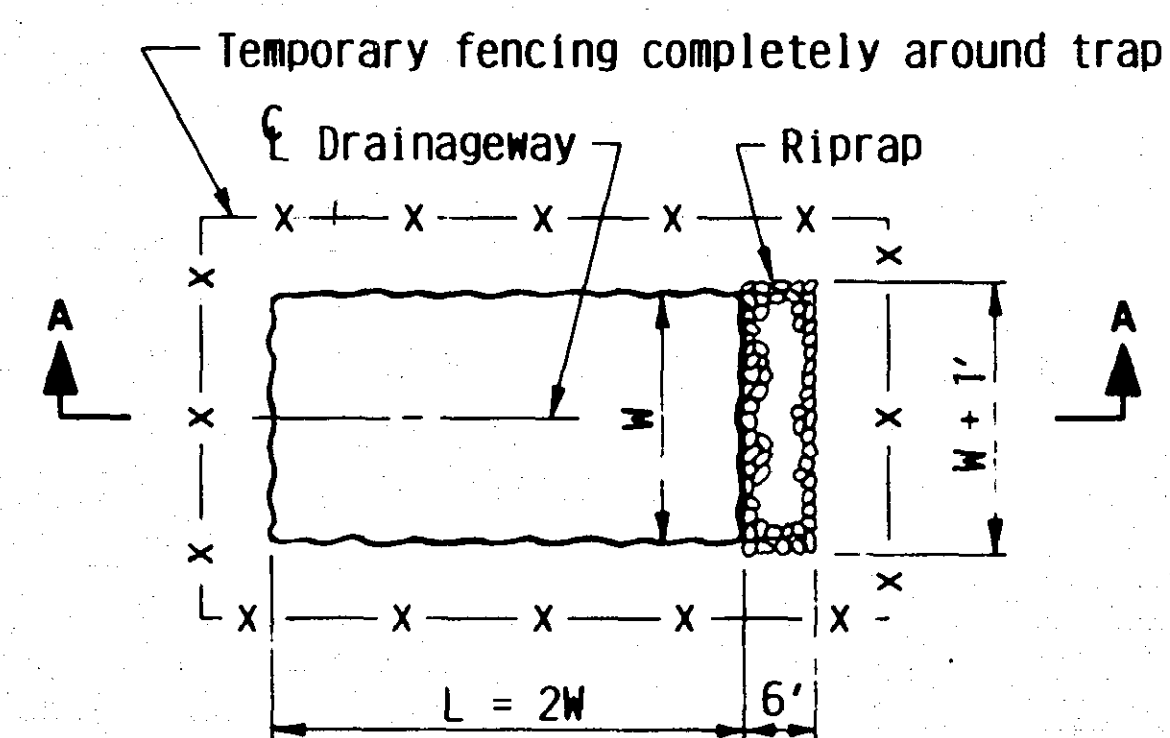
**SILT FENCE OR BALE CHECK
TO PROTECT ADJACENT CRITICAL AREAS**



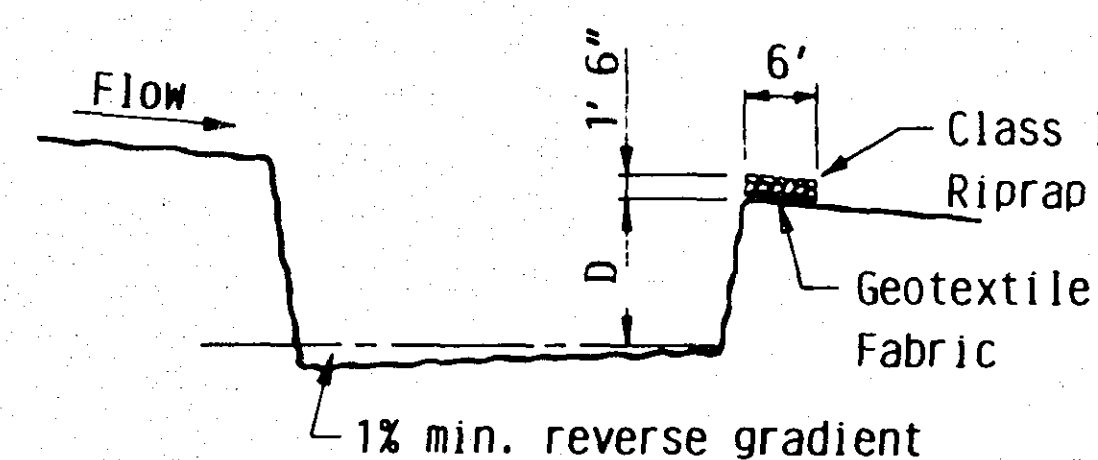
FLOATATION SILT CURTAIN



SILT FENCE DETAIL



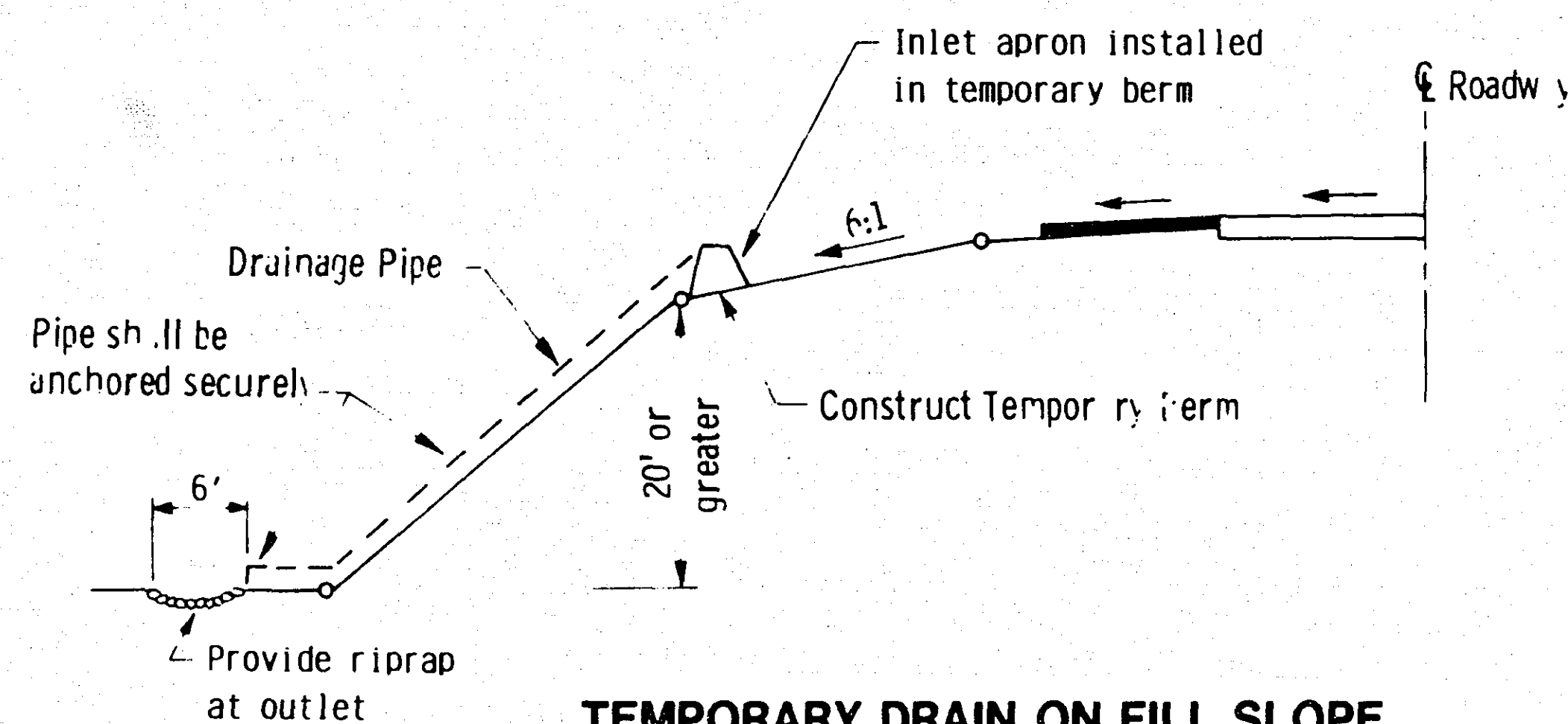
PLAN



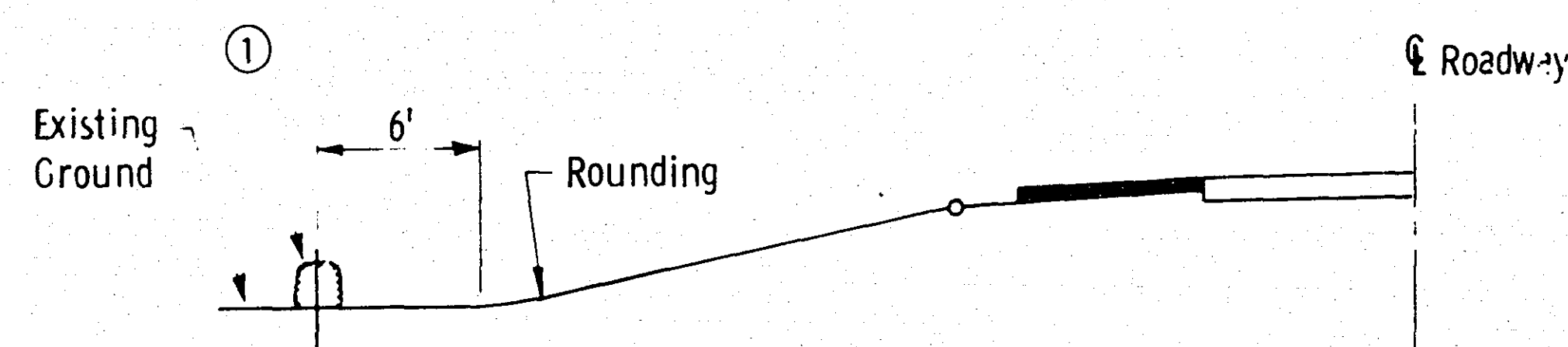
SECTION A-A

NOTE:
D = 3' min., 6' max.
W = 10' min., 20' max.

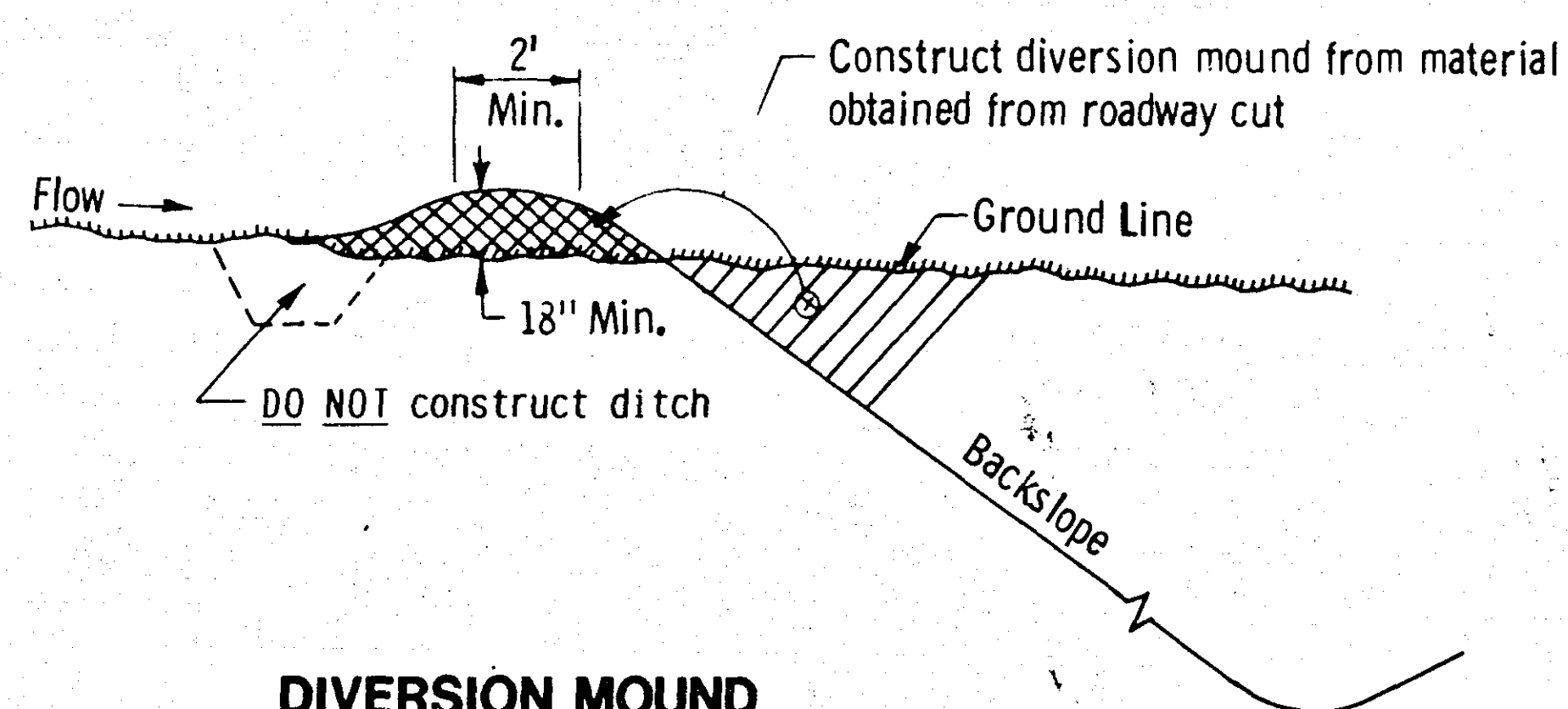
TEMPORARY SEDIMENT TRAP



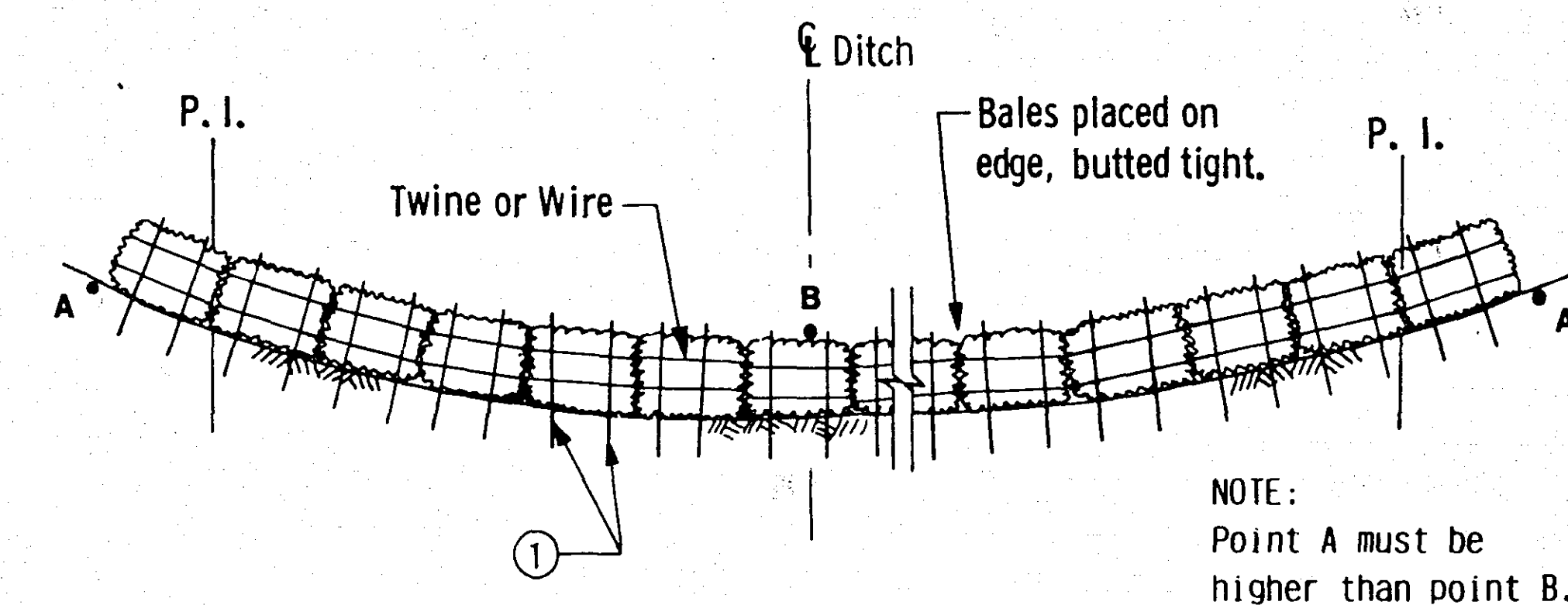
TEMPORARY DRAIN ON FILL SLOPE



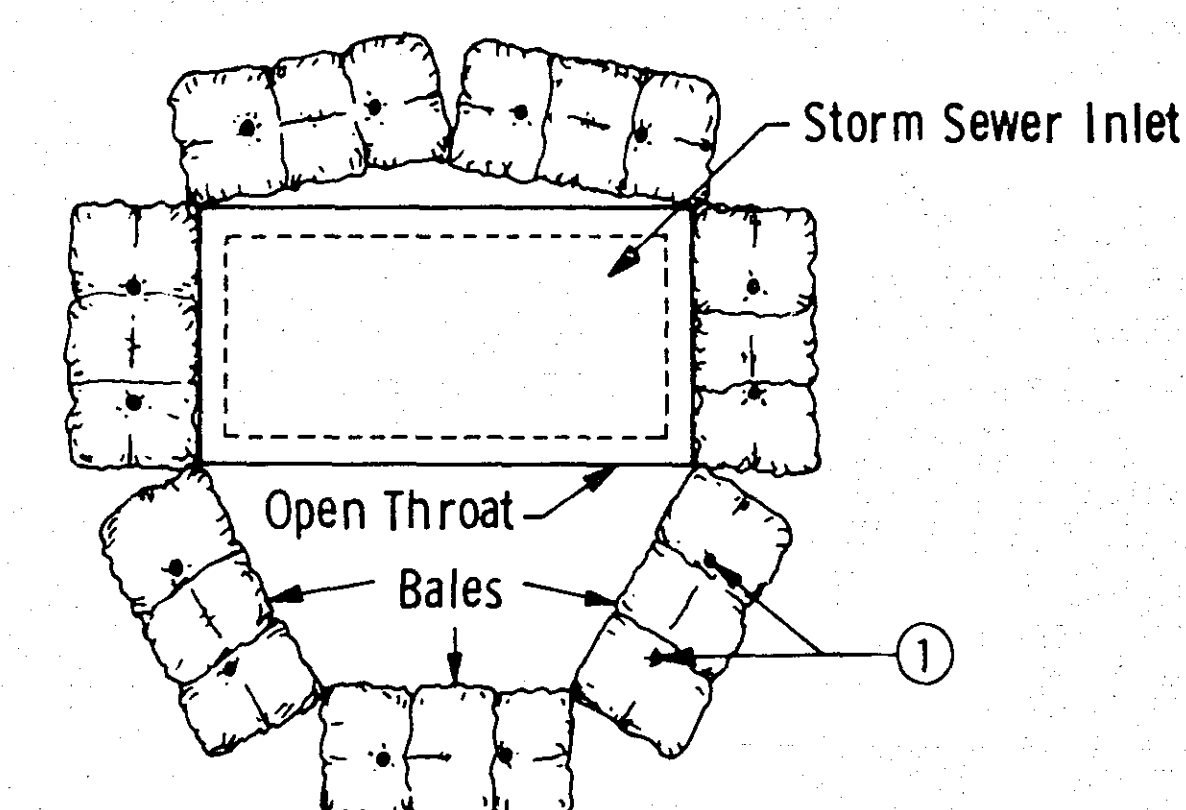
BALE DIVERSION



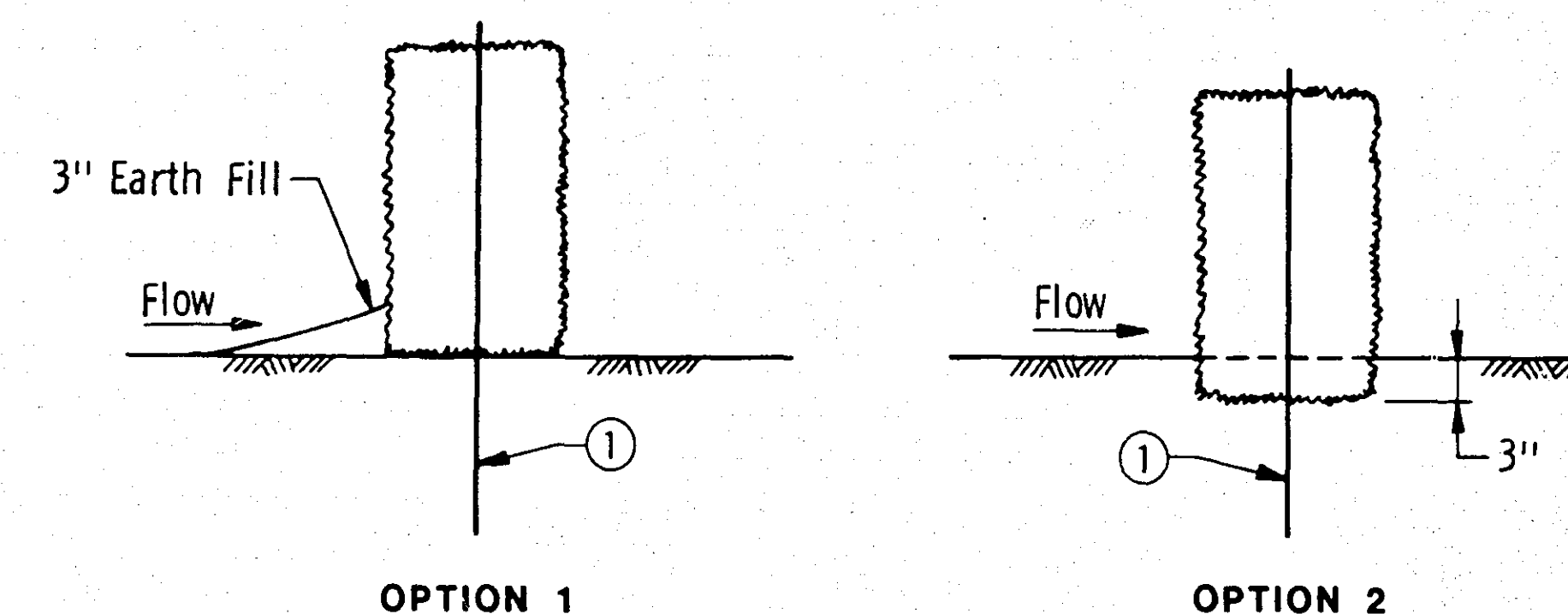
DIVERSION MOUND



BALE DITCH CHECK

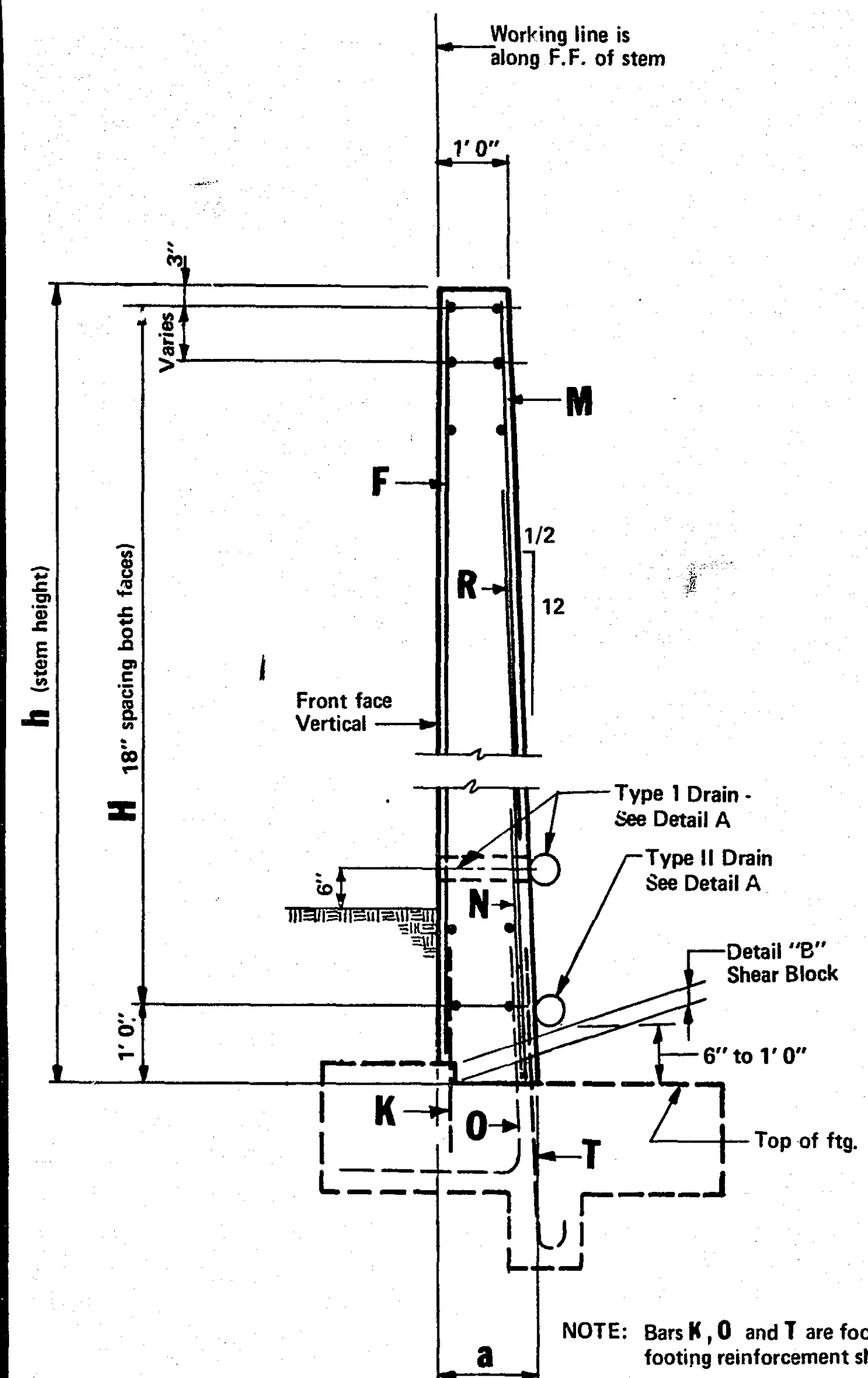


**BALE CHECK
TO PROTECT STORM SEWER INLETS**



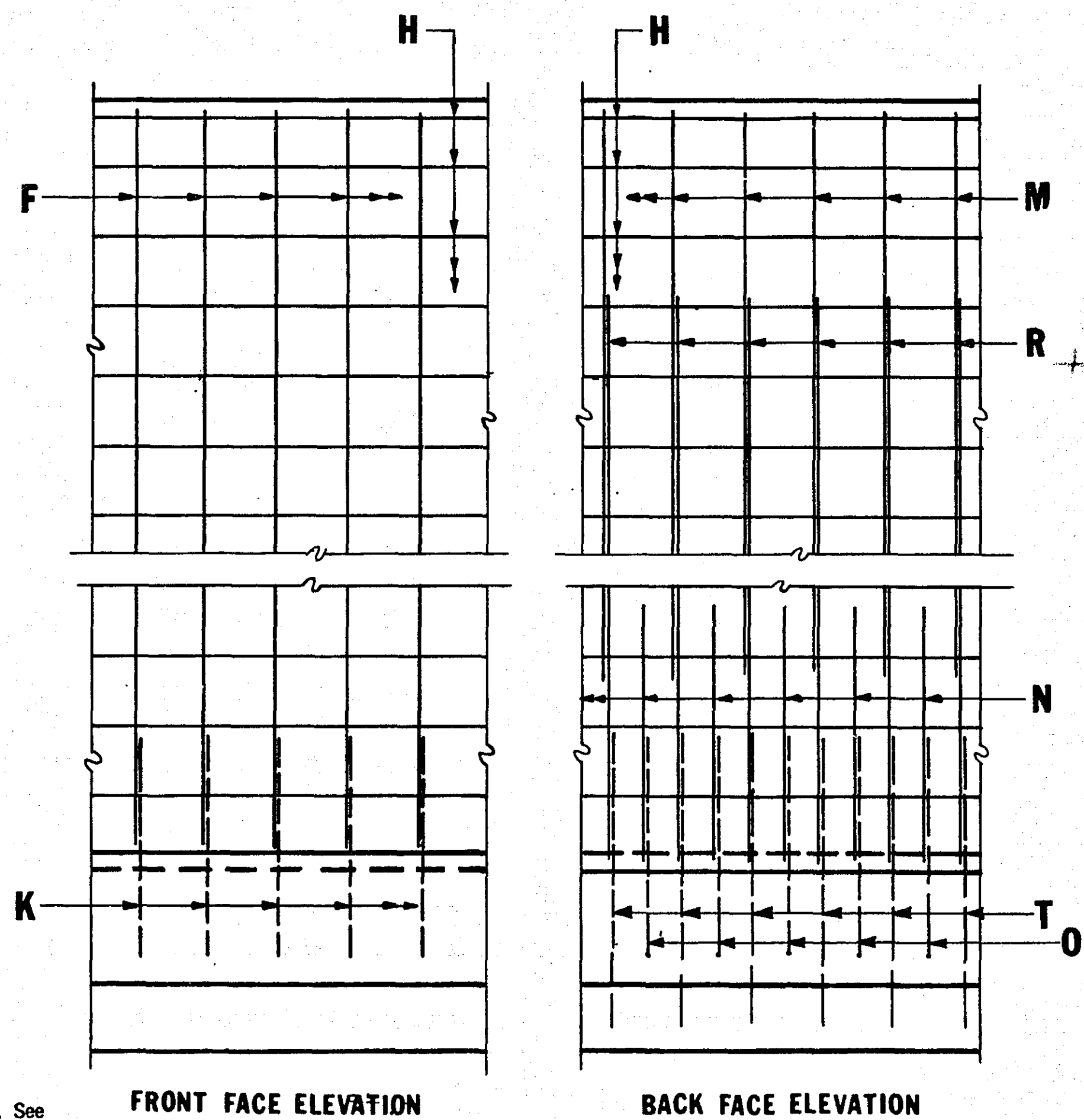
BALE CHECK DETAILS

NOTE:
① Two 2" x 2" Wood Stakes or Reinforcing Bars in each bale and embedded in the ground 10" minimum.

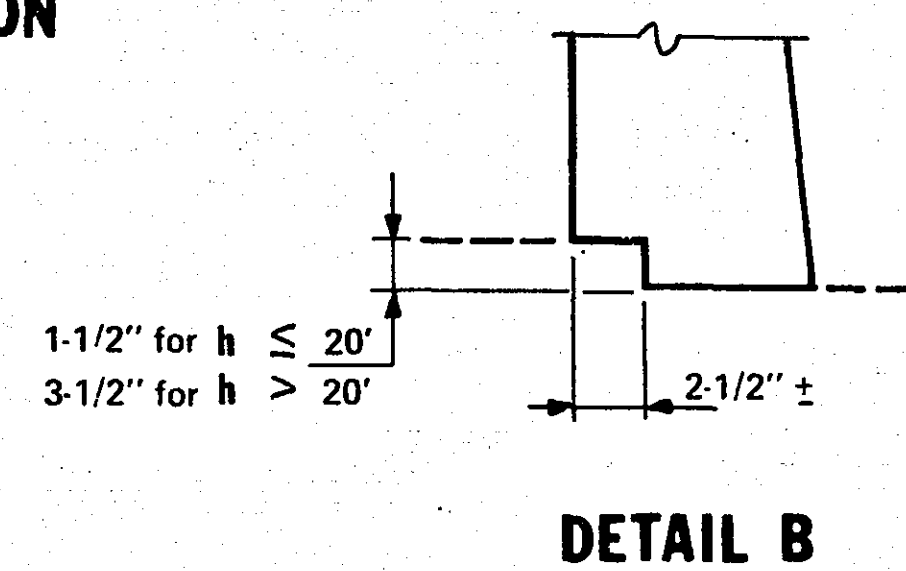


TYPICAL SECTION THRU STEM

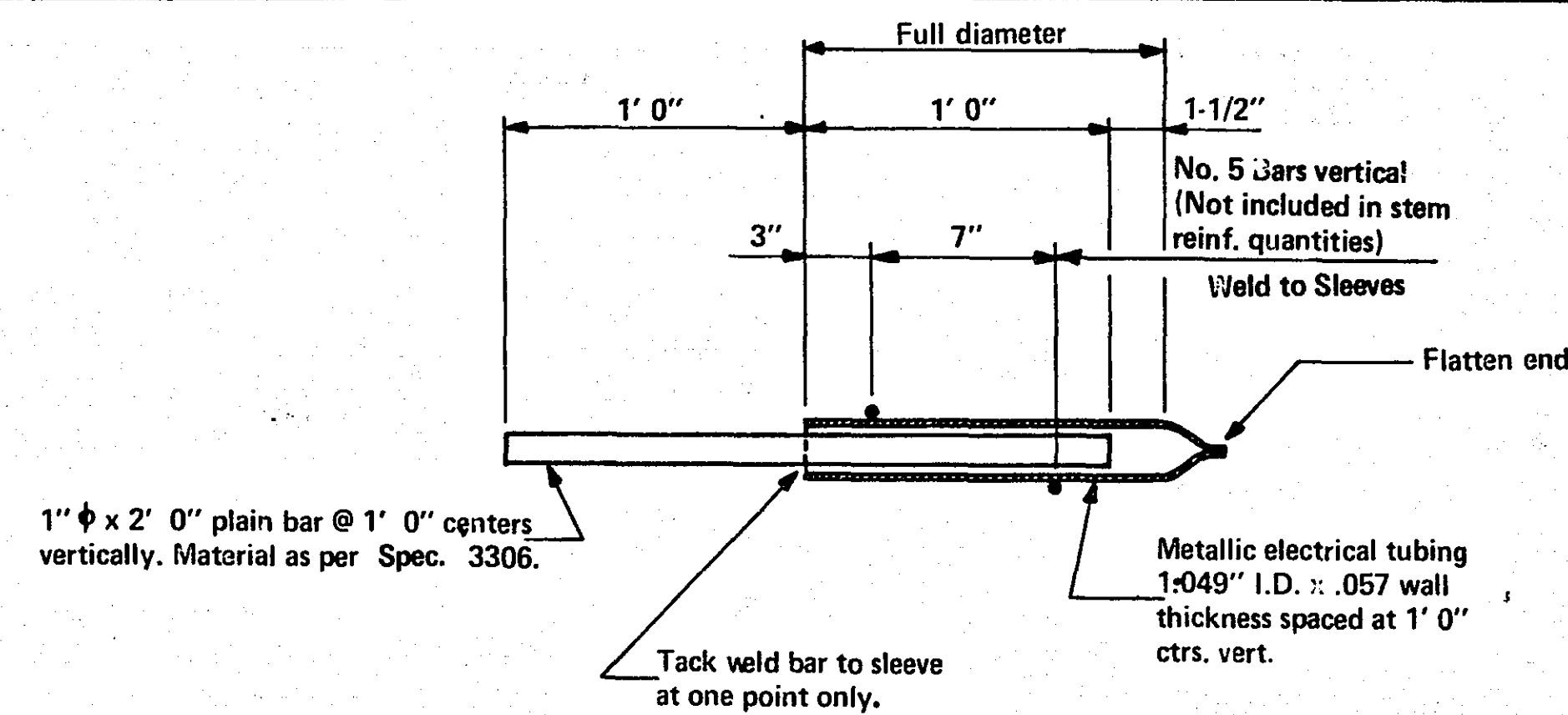
- The smallest "C" dimension bar to be placed at the top of wall and increase downward with wall depth.
- Use "J" Bars and 4 additional "F" Bars at dowel joints. These bars are not included in quantities per lineal foot of stem. (See stem joint detail)
- Weight includes "J" bars and four "F" bars per stem joint.



STEM ELEVATION

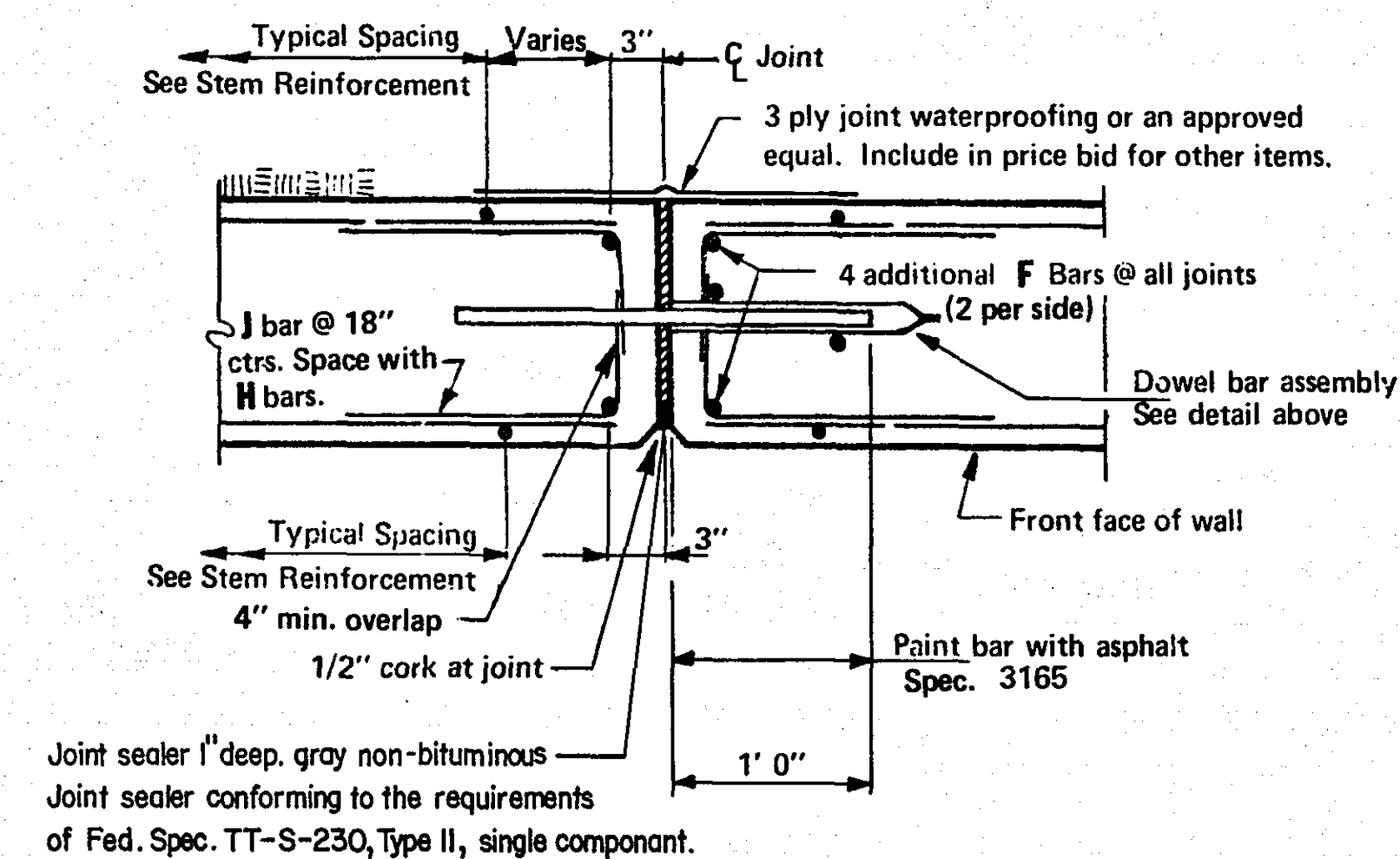


DETAIL B

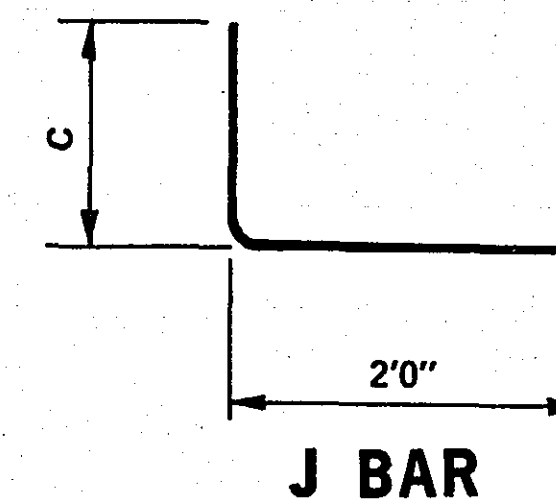


DOWEL BAR ASSEMBLY

Material and placing to be included in price bid for other items



TYPICAL SECTION THRU STEM JOINT

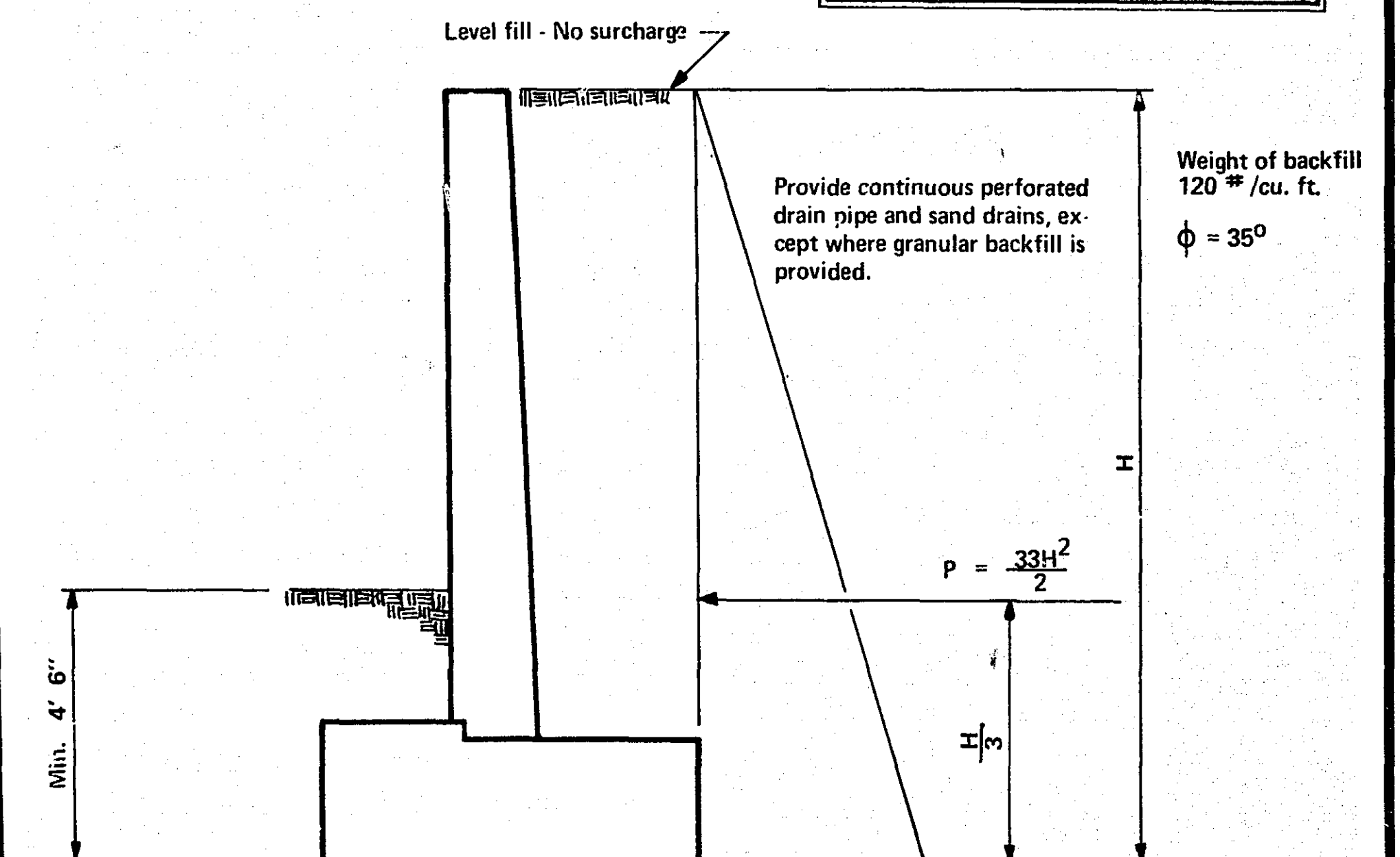


J BAR

APPROVED Feb. 27, 1980
John J. Stauder
 Director
 OFFICE OF ENGINEERING STANDARDS

Fed. Proj. No.

A.A.S.H.T.O. DESIGN SPECIFICATIONS
 $f_c = 1600$ p.s.i. $n = 8$ Concrete
 $f_s = 24,000$ p.s.i. Reinforcement



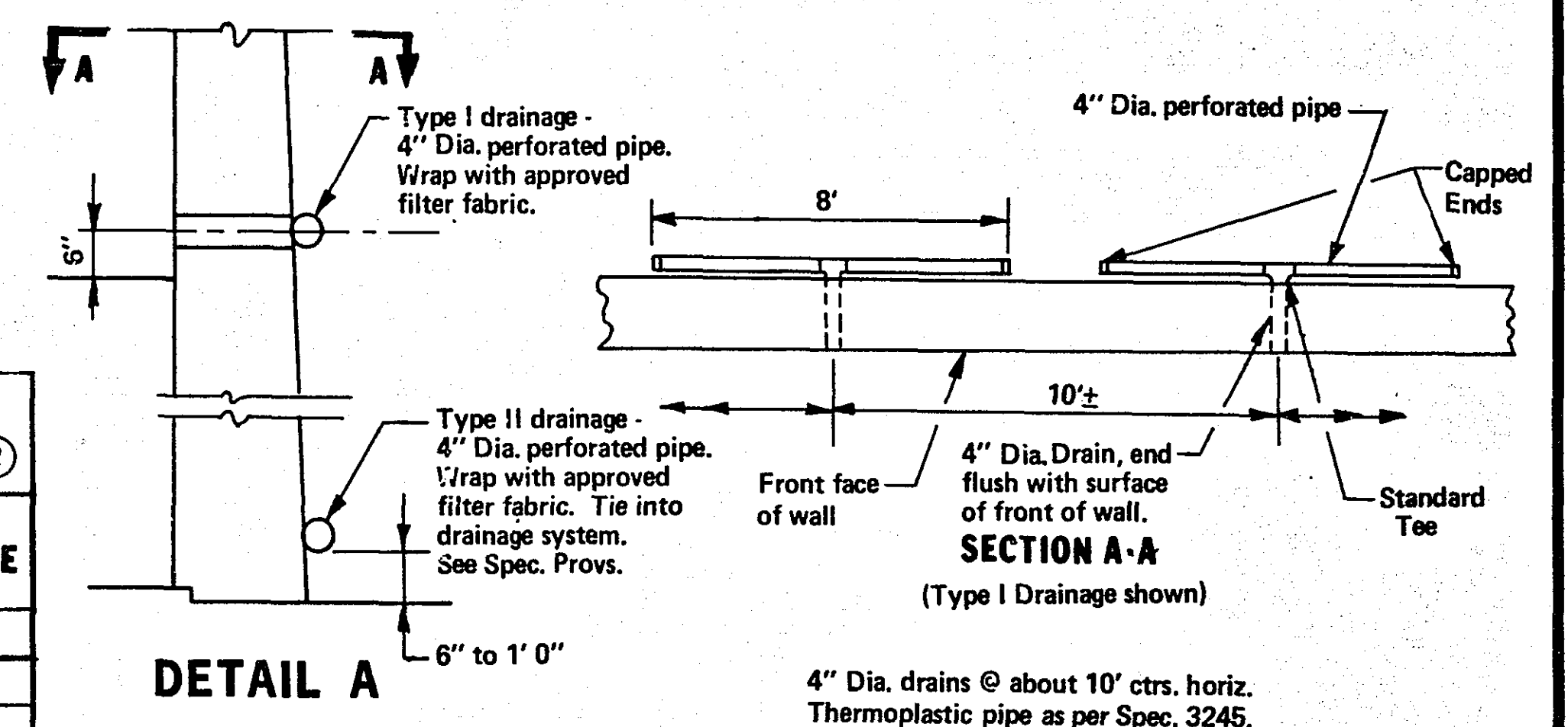
DRAINAGE: For Type II drainage provide drainage through stem every 200' ± 50' with appropriate outlet. Contact Materials Engineering Section for recommendations on the type of drainage system required.

SPREAD FTGS: If soil studies indicate that the in-place soils below the footing cannot support the base pressures shown this design shall not be used.

PILE FTGS: Lateral resistance is equal to horizontal component of battered piles plus bending resistance of:
 6.0k per pile for timber with a vertical load of 24 tons.
 7.5k per pile for timber with a vertical load of 30 tons.
 9.0k per pile for cast-in-place with a vertical load of 40 tons.
 13.0k per pile for cast-in-place with a vertical load of 60 tons.
 12.0k per pile for steel with a vertical load of 55 tons.

If soil studies indicate that material in place below footing cannot offer the lateral resistance required this design shall not be used.

DESIGN CRITERIA



DETAIL A

STEM NOTES

- Maximum spacing of stem joints (panels) is 32 feet. Use dowel assemblies at all joints. No reinf. thru joint.
- Concrete in stems to be Concrete Mix No. 3Y43.
- Reinforcement bars shall be deformed billet steel bars conforming to ASTM A615 Grade 60.
- Bar lap at authorized splices: 36 diameters for No. 4 to No. 7 bars and 40 diameters for No. 8 to No. 11 bars except as noted.
- All reinforcement bars to have a 2" minimum cover. When 1" or less rustication is used, move front face reinf. bars in to maintain 2" cover. For rustication over 1" in depth, increase stem width to depth of rustication to maintain minimum reinforcement cover.
- Edges of concrete on all exposed joints and top of stem wall shall be formed with 1/2" vee unless otherwise noted.
- Construction to be in accordance with Spec. 2411 except as noted.
- When stem heights vary by less than four feet in any panel, the rebar shall be sized and spaced for the maximum height in the panel.
- When stem heights at the ends of any panel differ by more than four feet, but less than eight feet, the panel shall be divided into two approximately equal parts (or on some other logical basis) for rebar design. The bars for each portion of the panel shall be sized and spaced for the maximum stem height in that portion.
- When stem heights vary by more than eight feet, the panel shall be divided into 3 parts for rebar design. The maximum stem height in each portion shall be used for determining rebar sizing and spacing in that portion.
- When stem heights are five feet or less, the rebar shall be sized and spaced as required for h = 5 feet.
- Vertical bars F and M in stems or varying heights and transverse bars O, P, and Q in footings of varying widths shall vary in length in accordance with the dimensions of the structure.

RETAINING WALL - LEVEL FILL
 (STEM DETAILS)

STEM GEOMETRICS			STEM REINFORCEMENT BARS																					QUANTITIES / LIN. FT. OF STEM②					
h	a		J (BARS) ①②						F ② (VERTICAL)			H (HORIZONTAL)			M (VERTICAL)			N (VERTICAL)			R (VERTICAL)						REINF.	CONCRETE	
HT.	WIDTH		SIZE	LENGTH	7"	10"	13"	16"	TOTAL WEIGHT③	SIZE	LENGTH	SPAC.	SIZE	NO.	MAX. SP.	SIZE	LENGTH	SPAC.	SIZE	LENGTH	SPAC.	SIZE	LENGTH	SPAC.				POUND	CU. YDS.
5'	1'	2-1/2"	6	2' + C	16				74.6	4	4' 8"	12"	5	8	18"	4	4' 10"	14 1/2"										14.1	.203
6	1	3	6	2' + C	20				92.7	4	5' 8	12	5	10	18	4	5' 10	14-1/2										17.4	.249
7	1	3-1/2	6	2' + C	20				95.4	4	6' 8	12	5	10	18	4	6' 10	14-1/2										18.7	.296
8	1	4	6	2' + C	20	4			115.1	4	7' 8	12	5	12	18	4	7' 10	14-1/2										22.0	.345
9	1	4-1/2	6	2' + C	20	8			134.8	4	8' 8	12	5	14	18	4	8' 10	14-1/2										25.3	.395
10	1	5	6	2' + C	20	8			137.5	4	9' 8	12	5	14	18	4	9' 10	14-1/2										26.5	.446
11	1	5-1/2	6	2' + C	20	12			157.2	4	10' 8	12	5	16	18	4	10' 10	14-1/2										29.8	.500
12	1	6	6	2' + C	20	16			176.9	4	11' 8	12	5	18	18	5	11' 10	14-1/2										36.8	.555
13	1	6-1/2	6	2' + C	20	16			179.5	4	12' 8	12	5	10	18	5	12' 0	14-1/2	5	5' 0"	14-1/2"							41.9	.611
14	1	7	6	2' + C	20	20			199.2	4	13' 8	12	5	20	18	5	12' 0	14-1/2	6	5' 0	14-1/2							46.6	.669
15	1	7-1/2	6	2' + C	20	24			210.9	4	14' 8	12	5	22	18	5	12' 0	14-1/2	7	5' 0	14-1/2							51.6	.728
16	1	8	6	2' + C	20	24			221.6	4	15' 8	12	5	22	18	5	12' 0	14-1/2	7	6' 0	14-1/2							53.9	.789
17	1	8-1/2	6	2' + C	20	28			241.3	4	16' 8	12	5	24	18	5	12' 0	14-1/2	8	7' 0	14-1/2							62.0	.851
18	1	9	6	2' + C	20	32			261.0	4	17' 8	12	5	26	18	5	12' 0	13	8	8' 0	13							72.2	.916
19	1	9-1/2	6	2' + C	20	32			263.7	4	18' 8	12	5	26	18	5	12' 0	13	6	9' 0	13							74.6	.981
20	1	10	6	2' + C	20	32	4		284.9	4	19' 8	12	5	28	18	5	12' 0	13	7	8' 0	13"							82.8	1.049
21	1	10-1/2	6	2' + C	20	32	8		305.6	4	20' 6	12	5	30	18	5	12' 0	13	7	7' 0	13							90.5	1.116
22	1	11	6	2' + C	20	32	8		308.3	4	21' 6	12	5	30	18	5	12' 0	13	7	8' 0	13							94.9	1.186
23	1	11-1/2	6	2' + C	20	32	12		329.5	4	22' 6	12	5	32	18	5	12' 0	13	8	9' 0	13							106.7	1.257
24	2	0	6	2' + C	20	32	16		350.7	4	23' 6	12	5	34	18	5	12' 0	13	8	10' 0	13							113.8	1.331
25	2	0-1/2	6	2' + C	20	32	16		353.3	4	24' 6	12	5	34	18	5	12' 0	13	8	9' 0	13							122.5	1.406
26	2	1	6	2' + C	20	32	20		374.6	4	25' 6	12	5	30	18	5	12' 0	14-1/2	9	10' 0	14-1/2							138.1	1.482
27	2	1-1/2	6	2' + C	20	32	24		395.7	4	26' 6	12	5	38	18	5	12' 0	14-1/2	10	10' 0	14-1/2							151.1	1.560
28	2	2	6	2' + C	20	32	24		398.4	4	27' 6	12	5	38	18	5	12' 0	13	10	11' 0	13							169.7	1.639
29	2	2-1/2	6	2' + C	20	32	28		419.6	4	28' 6	12	5	40	18	5	12' 0	12	10	11' 0	12							185.2	1.720
30'	2'	3"	6	2' + C	20	32	32		440.8	4	29' 6"	12"	5	42	18"	5	12' 0"	11"	10	11' 0"	11"							203.3	1.803

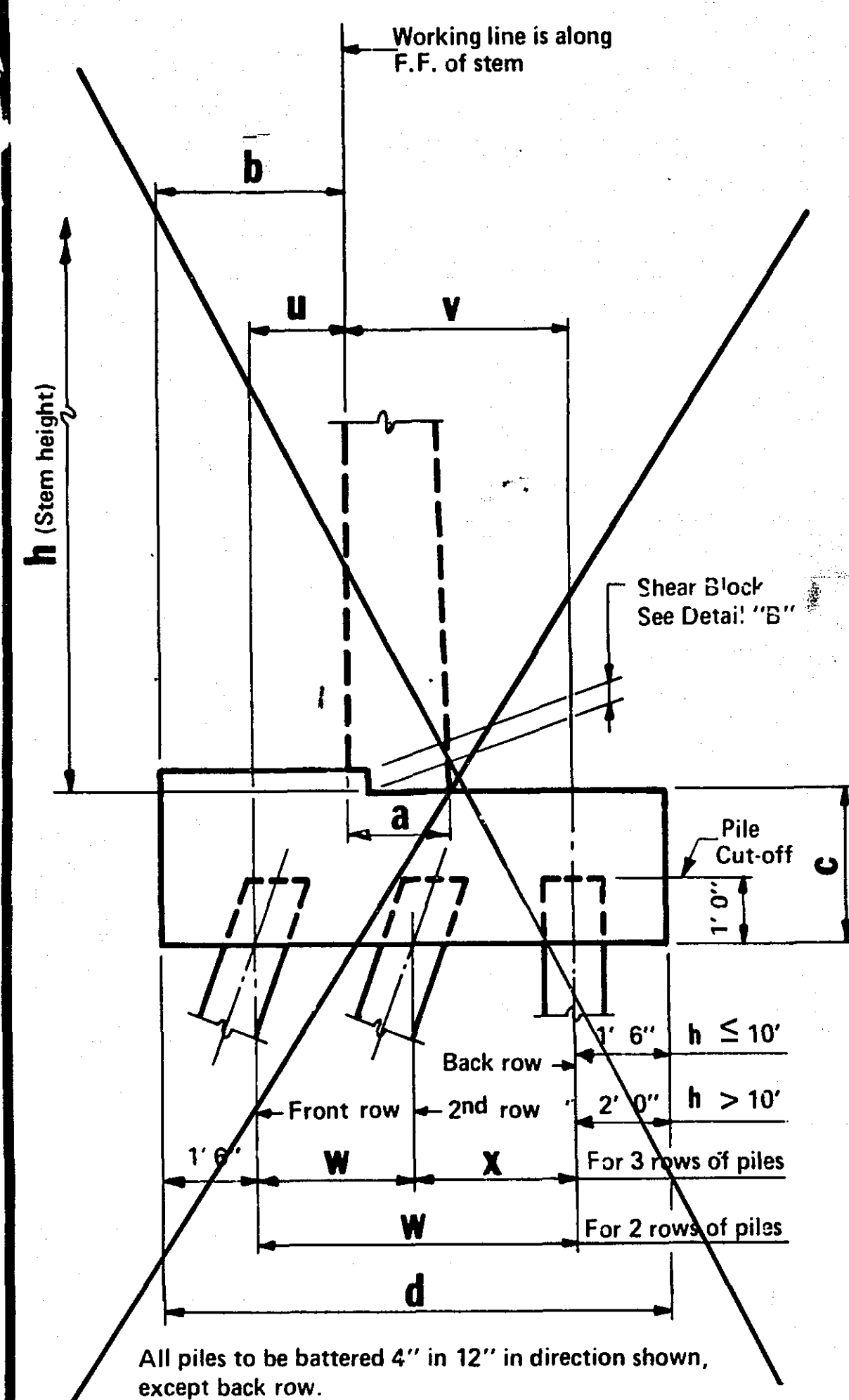
State Proj. No. S.A.P.62-646-09
 S.A.P.147-020-17

Sheet No. 8 of 25 Sheets

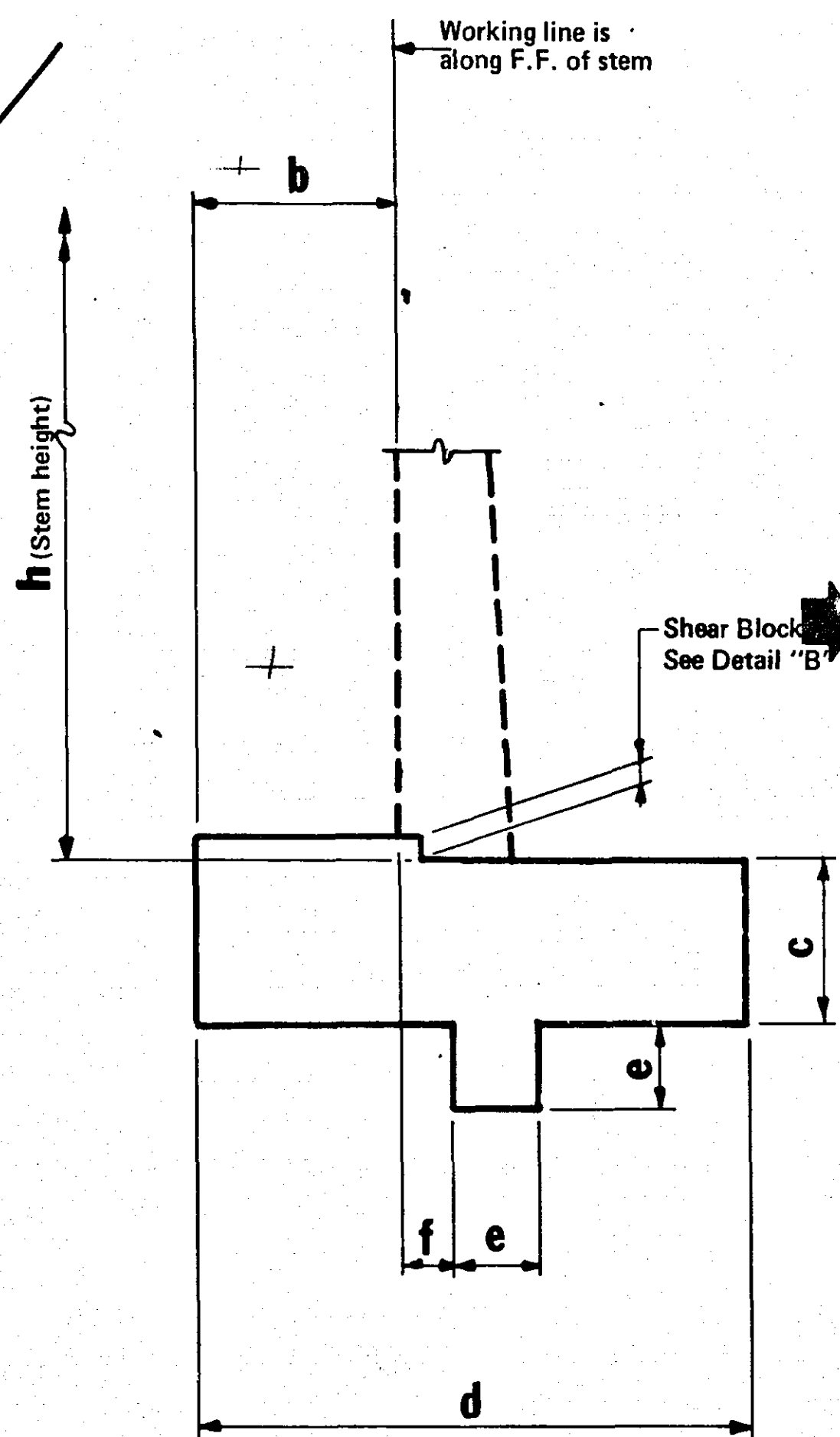
Fed. Proj. No.

FOOTING NOTES

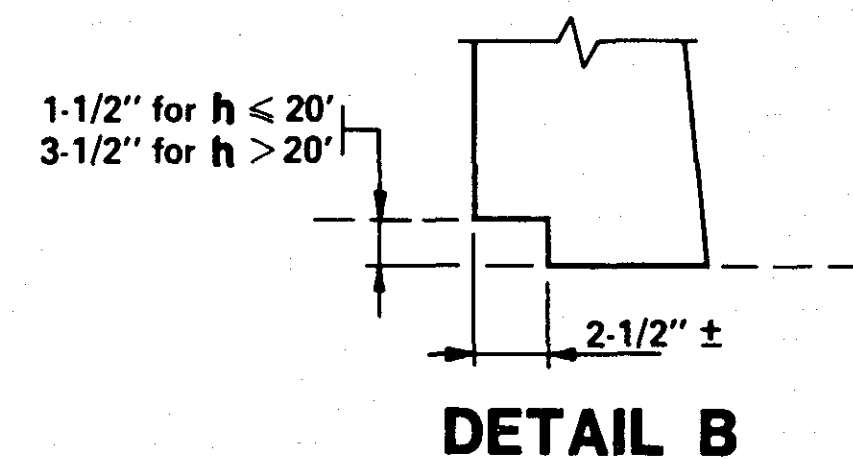
- Construction joints in footing are permissible. Construction joints shall be located a min. of 2' away from stem joints. A keyway is required.
- Pile spacing is at bottom of footing.
- Pile spacing shown is based on a design loading of:
24 tons per pile - timber piling
30 tons per pile - timber piling
See Spec. 2452.3E1
- Concrete in footings to be Concrete Mix No. 1A 43
- Eliminate shear key on spread footing where footing is 6" or more into rock.
- Where sound very hard rock is encountered the footing shall be keyed into rock as directed by the Engineer.
- Reinforcement bars shall be deformed Billet Steel bars conforming to ASTM A615 Grade 60.
- Bar lap at authorized splices: 36 diameters for No. 4 to No. 7 bars and 40 diameters for No. 8 to No. 11 bars.
- All reinforcement bars to have a 3" minimum cover unless noted otherwise. When rustication is used, move front face vertical dowel K in to maintain 2" cover. For rustication over 1" in depth increase stem width to depth of rustication to maintain reinforcement cover.
- Maximum longitudinal slope on bottom of footing shall be 10 to 1. Steps shall be used for steeper slopes.
- Pile per foot quantities listed are approximate figures.
- Footing reinforcement to continue through joints.

TYPICAL SECTION THRU
PILE FOOTING

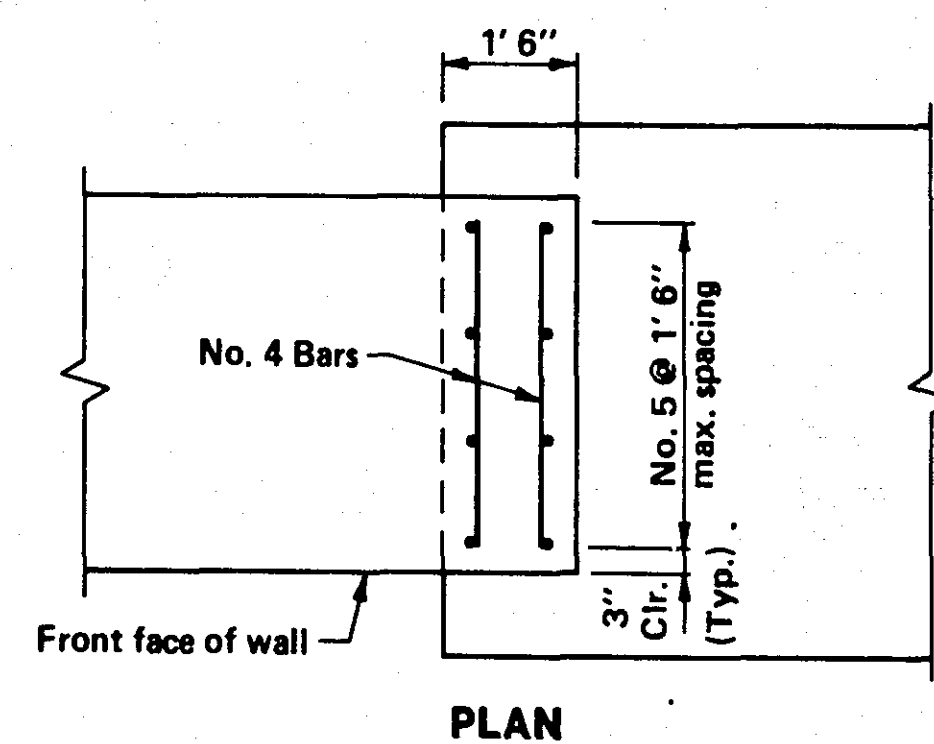
PILE FOOTING GEOMETRICS						
h	a	b	c	d	u	v
HT.	WIDTH	OFFSET	DEPTH	WIDTH	OFFSET	OFFSET
5'	1' 2-1/2"	1' 3-1/2"	1' 11"	4' 0"	-2-1/2"	1' 2-1/2"
6	1 3	1 5-1/2	2 0	4 5	-0-1/2	1 5-1/2
7	1 3-1/2	1 7-1/2	2 0	4 10	+1-1/2	1 8-1/2
8	1 4	1 9-1/2	2 1	5 3	+3-1/2	1 11-1/2
9	1 4-1/2	1 11-1/2	2 1	5 8	5-1/2	2 2-1/2
10	1 5	2 1-1/2	2 2	6 1	7-1/2	2 5-1/2
11	1 5-1/2	2 2-1/2	2 2	6 6	9-1/2	2 2-1/2
12	1 6	2 5-1/2	2 3	6 11	11-1/2	2 5-1/2
13	1 6-1/2	2 7-1/2	2 3	7 4	1 1-1/2	2 8-1/2
14	1 7	2 9-1/2	2 4	7 9	1 3-1/2	2 11-1/2
15	1 7-1/2	2 11-1/2	2 4	8 2	1 5-1/2	3 2-1/2
16	1 8	3 1-1/2	2 5	8 7	1 7-1/2	3 5-1/2
17	1 8-1/2	3 3-1/2	2 5	9 0	1 9-1/2	3 8-1/2
18	1 9	3 5-1/2	2 6	9 5	1 11-1/2	3 11-1/2
19	1 9-1/2	3 7-1/2	2 6	10 2	1 1-1/2	4 2-1/2
20	1 10	3 9-1/2	2 7	10 3	2 3-1/2	4 5-1/2
21	1 10-1/2	3 11-1/2	2 7	10 8	2 5-1/2	4 8-1/2
22	1 11	4 1-1/2	2 8	11 1	2 7-1/2	4 11-1/2
23	1 11-1/2	4 3-1/2	2 8	11 6	2 9-1/2	5 2-1/2
24	2 0	4 5-1/2	2 9	11 11	2 11-1/2	5 5-1/2
25	2 0-1/2	4 7-1/2	2 9	12 4	3 1-1/2	5 8-1/2
26	2 1	4 9-1/2	2 10	12 9	3 3-1/2	5 11-1/2
27	2 1-1/2	4 11-1/2	2 10	13 2	3 5-1/2	6 2-1/2
28	2 2	5 1-1/2	2 11	13 7	3 7-1/2	6 5-1/2
29	2 2-1/2	5 3-1/2	2 11	14 0	3 9-1/2	6 8-1/2
30'	2' 3"	5' 5-1/2"	3' 0"	14' 5"	3' 11-1/2"	6' 11-1/2"

TYPICAL SECTION THRU
SPREAD FOOTING

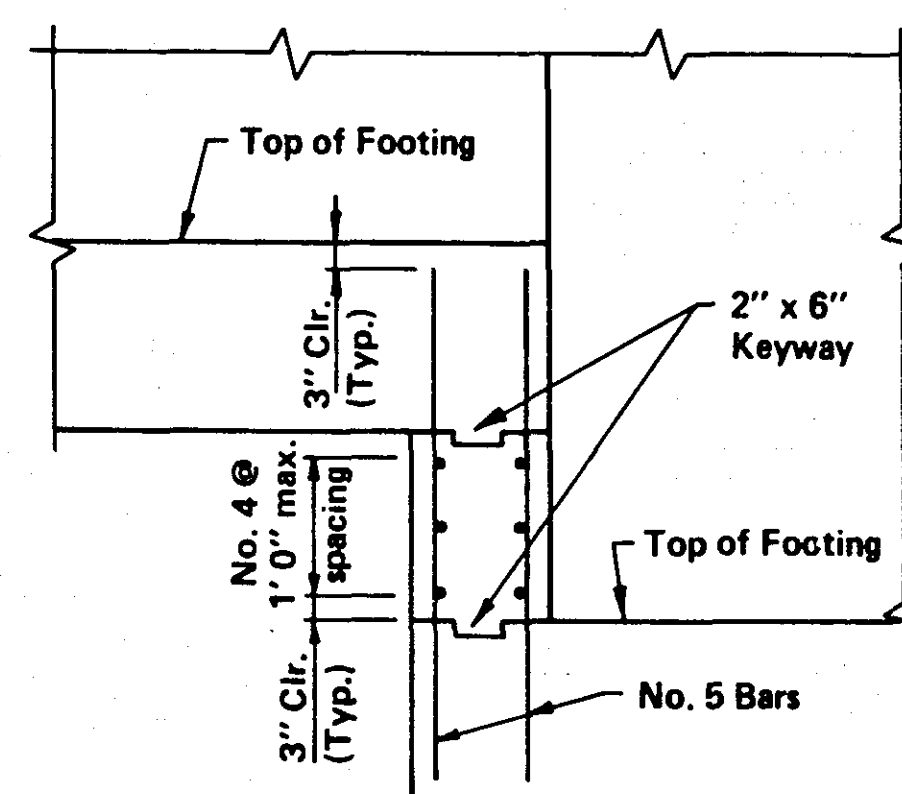
SPREAD FOOTING GEOMETRICS						BASE PRESSURE		QTY./LIN. FT. OF FOOTING
h	b	c	d	e	f	(KIPS/SQ. FT.)	CONCRETE	
HT.	OFFSET	DEPTH	WIDTH	BLOCK	OFFSET	AT TOE	AT HEEL	CU. YDS.
5'	9-1/2"	1' 2"	3' 0"	1' 0"	0' 9-1/2"	1.35	0.27	.172
6	11-1/2	1 3	3 6-1/2	1 0	10	1.50	.28	.207
7	1 1-1/2	1 3	4 1	1 0	10-1/2	1.65	.29	.233
8	1 3-1/2	1 4	4 7-1/2	1 0	11	1.82	.30	.273
9	1 5-1/2	1 4	5 2	1 0	11-1/2	2.00	.32	.300
10	1 7-1/2	1 5	5 8-1/2	1 0	1 0	2.15	.34	.346
11	1 9-1/2	1 5	6 3	1 0	1 0-1/2	2.30	.37	.375
12	1 11-1/2	1 6	6 9-1/2	1 0	1 1	2.46	.39	.425
13	2 1-1/2	1 6	7 4	1 0	1 1-1/2	2.61	.41	.456
14	2 3-1/2	1 7	7 10-1/2	1 2	1 2	2.77	.43	.524
15	2 5-1/2	1 7	8 5	1 2	1 2-1/2	2.94	.48	.557
16	2 7-1/2	1 8	8 11-1/2	1 2	1 3	3.09	.51	.617
17	2 9-1/2	1 8	9 6	1 2	1 3-1/2	3.23	.54	.652
18	2 11-1/2	1 9	10 0-1/2	1 2	1 4	3.39	.57	.717
19	3 1-1/2	1 9	10 7	1 2	1 4-1/2	3.54	.60	.753
20	3 3-1/2	1 10	11 1-1/2	1 2	1 5	3.68	.63	.823
21	3 5-1/2	1 10	11 8	1 2	1 5-1/2	3.82	.68	.883
22	3 7-1/2	1 11	12 2-1/2	1 4	1 6	4.00	.71	.976
23	3 9-1/2	1 11	12 9	1 4	1 6-1/2	4.12	.74	1.016
24	3 11-1/2	2 0	13 3-1/2	1 4	1 7	4.25	.78	1.097
25	4 1-1/2	2 0	13 10	1 4	1 7-1/2	4.35	.80	1.139
26	4 3-1/2	2 1	14 4-1/2	1 4	1 8	4.50	.87	1.225
27	4 5-1/2	2 1	14 11	1 4	1 8-1/2	4.64	.92	1.269
28	4 7-1/2	2 2	15 5-1/2	1 4	1 9	4.77	.96	1.361
29	4 9-1/2	2 2	16 0	1 4	1 9-1/2	4.88	1.00	1.406
30'	4' 11-1/2"	2' 3"	16' 6-1/2"	1' 4"	1' 10"	5.00	1.03	1.502



DETAIL B



PLAN



ELEVATION

TYPICAL STEP FOOTING DETAIL
(Footing reinforcement not shown)

PILE SPACING					QTY./LIN. FT. OF FOOTING	
h	TRANSVERSE		LONGITUDINAL		PILES NO.	CONCRETE CU. YDS.
	W	X	FRONT ROW	2nd ROW BACK ROW		
5'	1' 0"		12' 0"		.167	.291
6	1 5		11 1		.173	.336
7	1 10		10 2		.181	.367
8	2 3		9 3		.192	.415
9	2 8		8 4		.203	.448
10	3 1		5		.218	.500
11	3 0		6 10		.230	.534
12	3 5		6 3		.243	.590
13	3 10		5 8		.260	.625
14	4 3		5 1		.280	.685
15	4 8		4 6		.306	.722
16	5 1		4 2		.323	.785
17	5 6		3 10		.344	.823
18	5 11		3 6		.369	.890
19	6 4		3 2		.399	.930
20	6 4		3 7		.493	1.001
21	7 2		3 6		.517	1.067
22	7 7		3 5		.546	1.143
23	3 0	5 0	3 4	5 0	.583	1.186
24	3 0	5 5	3 3	4 1	.636	1.266
25	3 0	5 10	3 3	3 3	.699	1.310
26	3 0	6 3	3 1	3 1	.740	1.394
27	3 0	6 8	2 11	3 0	.776	1.439
28	3 0	7 1	2 9	2 10	.828	1.527
29	3 0	7 6	2 7	2 9	.876	1.574
30'	3' 0"	7' 11"	2' 6"	2' 8"	.918	1.665

TIMBER PILE SPACING
DESIGN LOAD 24 TONS/PILE
(See Spec. 3471 for diameter of piles)

SUMMARY OF QUANTITIES CONCRETE RETAINING WALL		
ITEM	UNIT	QUANTITY
① RETAINING WALLS	LUMP SUM	1
③ THREE-PLY JOINT WATERPROOFING	LIN. FT.	40
③ DOWEL BAR ASSEMBLIES	LIN. FT.	36
② JOINT FILLER		

QUANTITY NOTES:

- THE APPROXIMATE CONCRETE & REINFORCEMENT QUANTITIES ARE:
STRUCTURE CONCRETE (1A43) CU. YD. 45
STRUCTURE CONCRETE (3Y43) CU. YD. 57
REINFORCEMENT BARS (EPOXY COATED) POUND 4830
REINFORCEMENT BARS POUND 2050
- SEE TABLE FOR JOINT FILLER LIST.
- ESTIMATED QUANTITY IS FOR CONTRACTORS CONVENIENCE ONLY AND ARE INCIDENTAL TO PRICE BID FOR RETAINING WALLS.
- CORK SHALL COMPLY TO MN/DOT SPEC. 3702 AND AASHTO M153, TYPE 1, 2 OR 3, OR M213.

③④ PREFORMED JOINT FILLER LIST

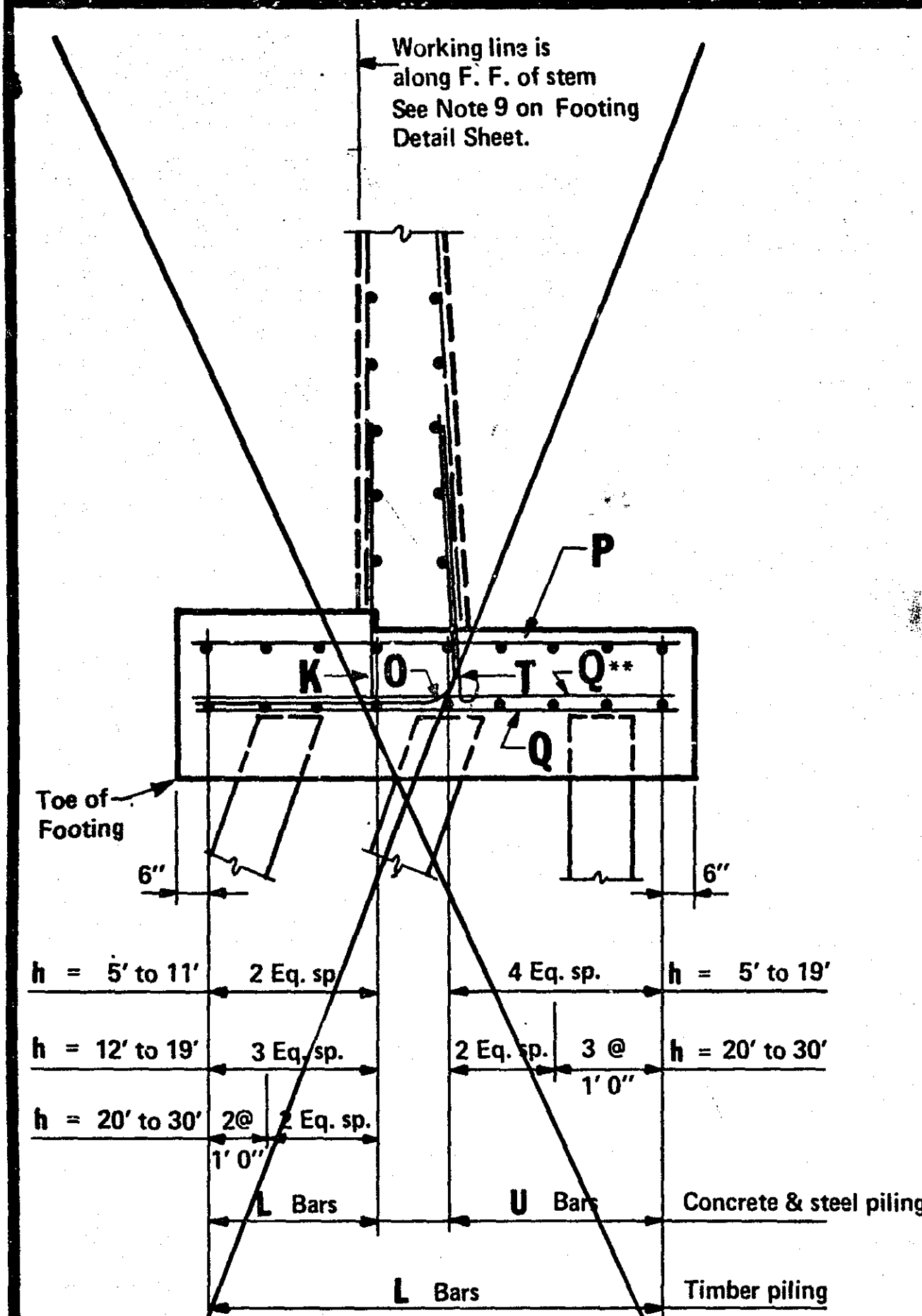
TYPE	NO.	SIZE	LOCATION
CORK	2	1/2"x2'-5"x10'-7"	VERT. WALL JTS(CUT 2 FROM 1)

RETAINING WALL - LEVEL FILL

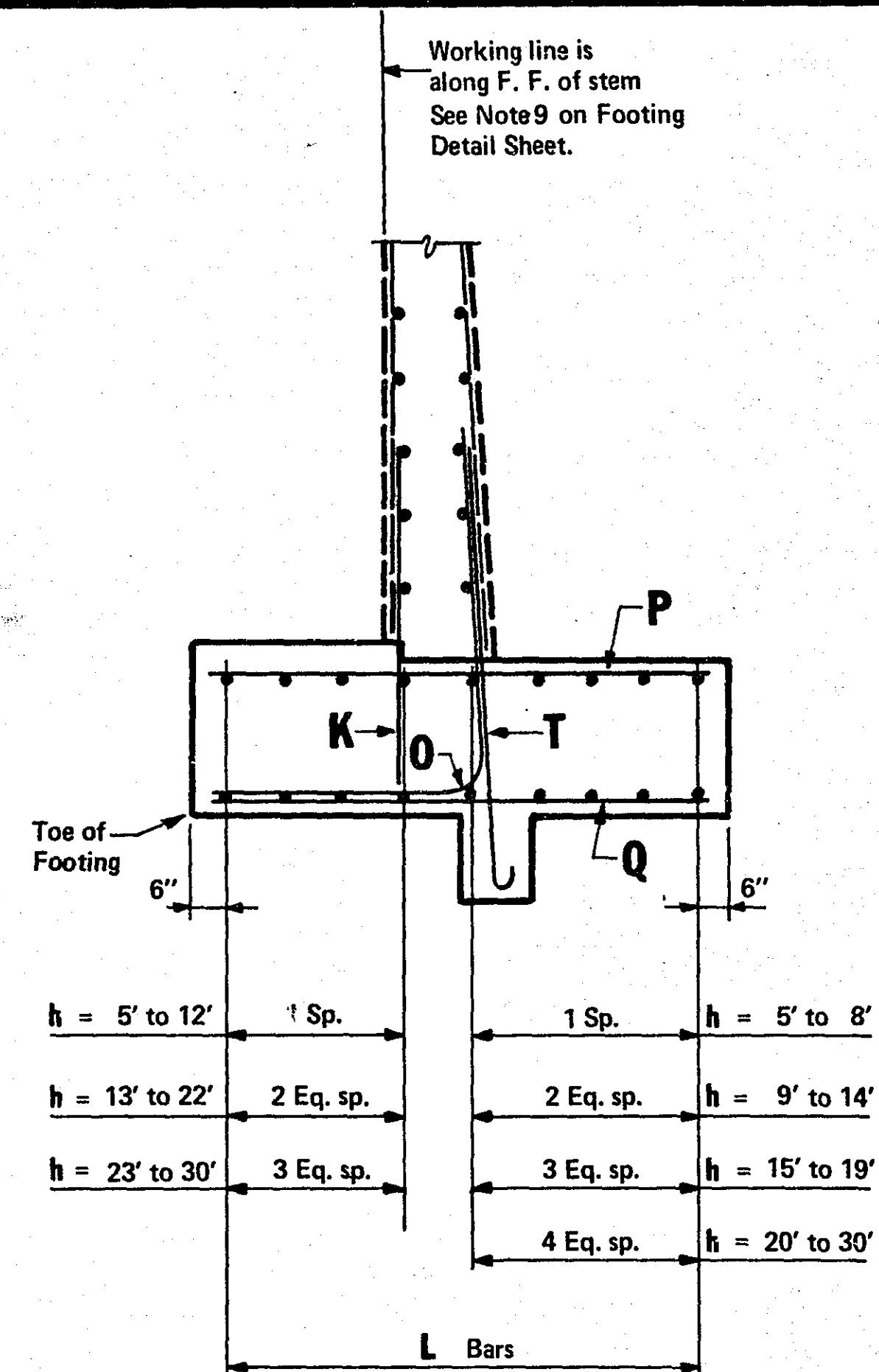
(FOOTING DETAIL - SPREAD FOOTING & TIMBER PILING)
(SUMMARY OF QUANTITIES)

(MODIFIED)

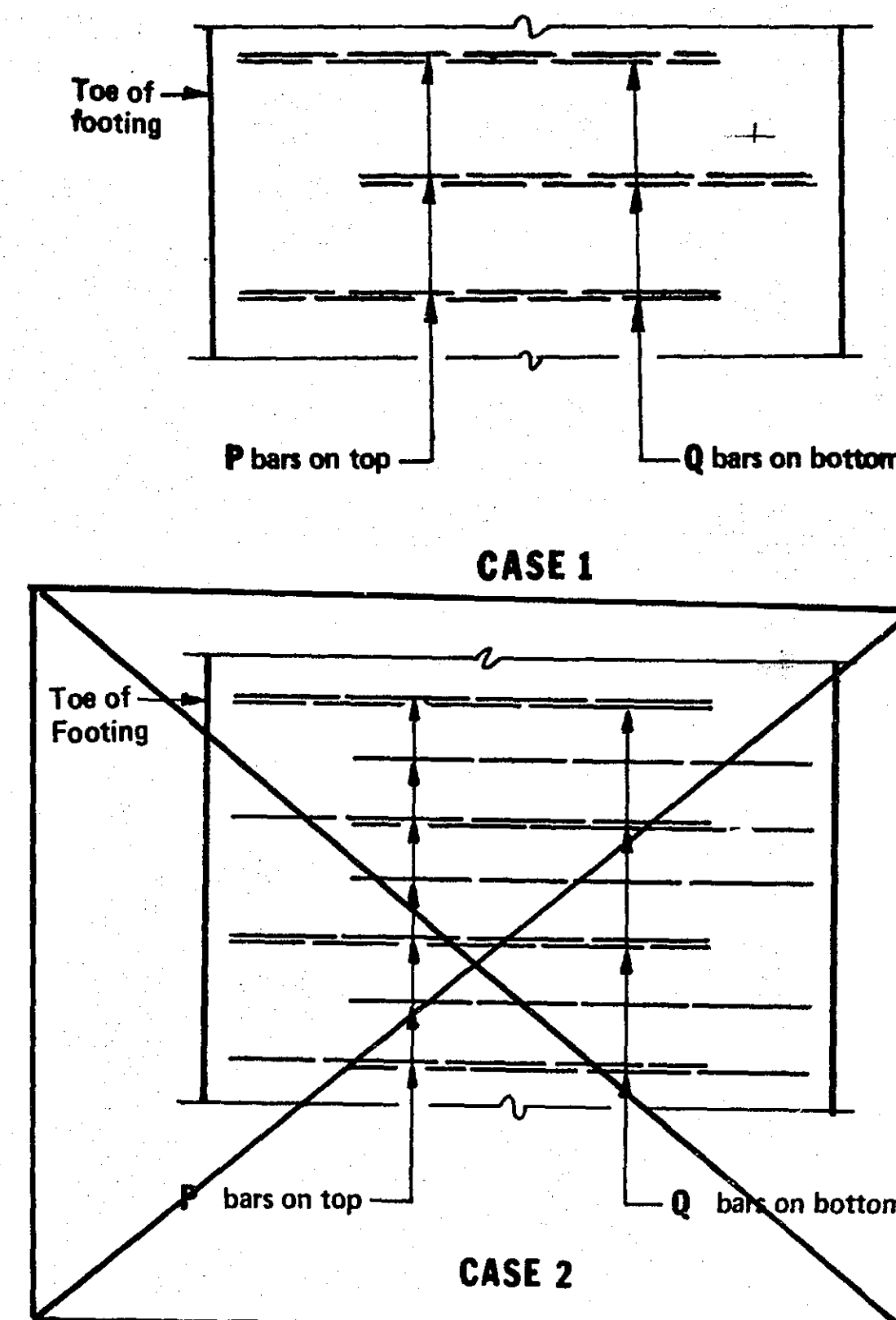
Fed. Proj. No.



TYPICAL SECTION THRU PILE FOOTING



TYPICAL SECTION THRU SPREAD FOOTING

PART FOOTING PLAN
(SHOWING STAGGERED P AND Q BARS ONLY)

TYPE OF FOOTING	CASE 1	CASE 2
TIMBER PILING	h = 5' to 22'	h = 23' to 30'
CONCRETE PILING	h = 5' to 24'	h = 25' to 30'
STEEL PILING	h = 5' to 24'	h = 25' to 30'
SPREAD	h = 5' to 18'	h = 19' to 30'

P bars and Q bars are spaced according to wall heights

BAR T*

* Hook bars in Spread Footing from bar size #8 and up.

SPREAD FOOTING REINFORCEMENT BARS																						
h	K (FRONT DOWELS)			L (LONGIT.)		O (TOE)				P (TRANSVERSE)				Q (TRANSVERSE)				T (BACK DOWELS)				WEIGHT /LIN. FT. OF WALL POUNDS
	SIZE	LENGTH	SPAC.	SIZE	NO.	SIZE	LENGTH	SPAC.	B	SIZE	LENGTH	SPAC.	SIZE	LENGTH	SPAC.	SIZE	LENGTH	SPAC.				
5'	# 4	3' 0"	12"	# 5	8					# 4	2' 6"	14-1/2"	# 4	2' 6"	14-1/2"	# 4	3' 5"	14-1/2"	15.35			
6	4	3 0	12	5	8					4	2 11	14-1/2	4	2 11	14-1/2	4	3 6	14-1/2	15.86			
7	4	3 0	12	5	8					4	3 4	14-1/2	4	3 4	14-1/2	4	3 6	14-1/2	16.32			
8	4	3 0	12	5	8					4	3 9	14-1/2	4	3 9	14-1/2	4	3 7	14-1/2	16.83			
9	4	3 0	12	5	10					4	4 2	14-1/2	4	4 2	14-1/2	4	3 7	14-1/2	19.45			
10	4	3 0	12	5	10					4	4 7	14-1/2	4	4 7	14-1/2	5	4 1	14-1/2	21.46			
11	4	3 0	12	5	10					5	5 0	14-1/2	4	5 0	14-1/2	5	4 1	14-1/2	23.47			
12	4	3 0	12	5	10	# 4	5' 7"	14-1/2"	3' 1"	5	5 5	14-1/2	4	5 5	14-1/2	4	3 9	14-1/2	25.69			
13	4	3 0	12	5	12	5	6 3	14-1/2	3 3	6	5 10	14-1/2	4	5 10	14-1/2	4	3 9	14-1/2	32.89			
14	4	3 0	12	5	12	5	6 6	14-1/2	3 6	6	6 3	14-1/2	4	6 3	14-1/2	5	4 5	14-1/2	35.69			
15	4	3 0	12	5	14	6	7 1	14-1/2	3 8	7	6 8	14-1/2	4	6 8	14-1/2	5	4 5	14-1/2	44.71			
16	5	4 0	12	5	14	6	7 4	14-1/2	3 11	7	7 1	14-1/2	4	7 1	14-1/2	6	4 10	14-1/2	50.41			
17	5	4 0	12	5	14	7	8 0	14-1/2	4 1	8	7 6	14-1/2	4	7 6	14-1/2	6	4 10	14-1/2	59.64			
18	5	4 0	12	5	14	7	8 3	13	4 4	8	7 11	13	4	7 11	13	6	4 11	13	66.16			
19	5	4 0	12	5	14	7	8 6	13	4 6	6	8 4	6 1/2	4	8 4	13	7	5 4	13	73.73			
20	5	4 0	12	5	16	8	9 5	13	4 11	7	8 9	6 1/2	4	8 9	13	7	5 5	13	93.40			
21	5	4 0	12	5	16	8	9 8	13	5 2	7	9 2	6 1/2	5	9 2	13	8	7 0	13	106.06			
22	5	4 0	12	5	16	9	10 5	13	5 4	7	9 7	6 1/2	5	9 7	13	8	7 3	13	117.51			
23	5	4 0	12	5	18	9	10 8	13	5 7	8	10 0	6 1/2	5	10 0	13	9	8 1	13	141.49			
24	5	4 0	12	5	18	10	11 4	13	5 9	8	10 5	6 1/2	5	10 5	13	9	8 2	13	155.75			
25	5	4 0	12	5	18	10	11 7	13	6 0	8	10 10	6 1/2	5	10 10	13	10	8 9	13	168.72			
26	5	4 0	12	5	18	11	12 4	14-1/2	6 2	9	11 3	7	5	11 3	14-1/2	11	9 6	14 1/2	195.01			
27	5	4 0	12	5	18	11	12 7	14-1/2	6 5	10	11 8	7	5	11 8	14 1/2	11	9 6	14 1/2	216.96			
28	5	4 0	12	5	18	11	12 10	13	6 7	10	12 1	6 1/2	5	12 1	13	11	9 7	13	241.29			
29	5	4 0	12	5	18	11	13 1	12	6 7	10	12 6	6	5	12 6	12	11	9 7	12	264.77			
30'	# 5	4' 0"	12"	# 5	18	# 11	13' 4"	11"	6' 10"	# 9	12' 11"	5 1/2"	# 5	12' 11"	11"	# 11	9' 8"	11"	267.55			

USE WITH SPREAD FOOTING ONLY

PILE FOOTING REINFORCEMENT BARS																																																																																	
K (FRONT DOWELS)												O (TOE)				T (BACK DOWELS)				L (LONGIT.)				P (TRANSVERSE)				Q (TRANSVERSE)				WEIGHT /LIN. FT. OF WALL		① ②												L (LONGIT.)				P (TRANSVERSE)				Q (TRANSVERSE)				U (LONGIT.)		WEIGHT /LIN. FT. OF WALL		WEIGHT /LIN. FT. OF WALL		L (LONGIT.)				P (TRANSVERSE)				Q (TRANSVERSE)				U (LONGIT.)		WEIGHT /LIN. FT. OF WALL		h	
HT.	SIZE	LENGTH	SPAC.	SIZE	LENGTH	SPAC.	B	SIZE	LENGTH	SPAC.	SIZE	NO.	SIZE	LENGTH	SPAC.	SIZE	LENGTH	SPAC.	POUNDS	SIZE	NO.	SIZE	LENGTH	SPAC.	SIZE	LENGTH	SPAC.	SIZE	LENGTH	SPAC.	SIZE	NO.	POUNDS	POUNDS	SIZE	NO.	SIZE	LENGTH	SPAC.	SIZE	NO.	POUNDS	HT.																																						
5'	# 4	3' 0"	12"					# 4	3' 5"	14-1/2"	# 5	16	# 4	3' 0"	14-1/2"	# 4	3' 0"	14-1/2"	23.90	# 5	6	# 4	3' 0"	14-1/2"	# 4	3' 0"	14-1/2"	# 4	3' 0"	14-1/2"	# 6	10	28.49	28.49	# 6	6	# 4	3' 0"	14-1/2"	# 4	3' 0"	14-1/2"	# 7	10	36.67	5'																																			
6	4	3 0	12					4	3 5	14-1/2	5	16	4	3 4	14-1/2	4	3 4	14-1/2	24.27	5	6	4	3 4	14-1/2	4	3 4	14-1/2	4	3 4	14-1/2	6	10	28.86	28.86	6	6	4	3 4	14-1/2	4	3 4	14-1/2	7	10	37.03	6																																			
7	4	3 0	12					4	3 5	14-1/2	5	16	4	3 8	14-1/2	4	3 8	14-1/2	24.64	5	6	4	3 8	14-1/2	4	3 8	14-1/2	4	3 8	14-1/2	6	10	29.23	29.23	6	6	4	3 8	14-1/2	4	3 8	14-1/2	7	10	37.40	7																																			
8	4	3 0	12					4	3 5	14-1/2	5	16	4	4 0	14-1/2	4	4 0	14-1/2	25.01	5	6	4	4 0	14-1/2	4	4 0	14-1/2	5	4 0	14-1/2	6	10	29.60	30.84	6	6	4	4 0	14-1/2	4	4 0	14-1/2	7	10	37.77	8																																			
9	4	3 0	12	# 4	5' 8"	14 1/2"	2' 11"	4	3 5	14-1/2	5	16	4	4 4	14-1/2	4	4 4	14-1/2	28.51	5	6	4	4 4	14-1/2	6	4 4	14-1/2	7	4 4	14-1/2	6	10	36.09	38.04	6	6	4	4 4	14-1/2	5	4 4	14-1/2	7	10	42.62	9																																			
10	4	3 0	12	4	5 11	14-1/2	3 2	5	3 11	14-1/2	5	16	4	4 8	14-1/2	4	4 8	14-1/2	30.51	5	6	4	4 8	14-1/2	7	4 8	14-1/2	8	4 8	14-1/2	6	10	40.42	42.84	6	6	4	4 8	14-1/2	7	4 8	14-1/2	7	10	48.59	10																																			
11	4	3 0	12	4	6 1	14-1/2	3 4	5	3 11	14-1/2	5	16	4	5 0	14-1/2	5	5 0	14-1/2	32.52	5	6	4	5 0	14-1/2	8	5 0	14-1/2	8	5 0	14-1/2	6	10	43.85	43.85	6	6	4	5 0	14-1/2	7	5 0	14-1/2	7	10	49.43	11																																			
12	4	3 0	12	4	6 4	14-1/2	3 7	4	3 5	14-1/2	5	18	4	5 4	14-1/2	5	5 4	14-1/2	33.73	5	6	4	5 4	14-1/2	8	5 4	14-1/2	9	5 4	14-1/2	6	10	45.50	48.73	6	6	4	5 4	14-1/2	8	5 4	14-1/2	7	10	54.59	12																																			
13	4	3 0	12	5	6 11	14-1/2	3 9	4	3 5	14-1/2	5	18	5	5 8	14-1/2	5	5 8	14-1/2	38.43	5	8	5	5 8	14-1/2	8	5 8	14-1/2	9	5 8	14-1/2	6	10	50.65	54.08	6	8	5	5 8	14-1/2	8	5 8	14-1/2	7	10	59.75	13																																			
14	4	3 0	12	5	7 2	14-1/2	4 0	5	3 11	14-1/2	5	18	5	6 0	14-1/2	5	6 0	14-1/2	40.72	5	8	5	6 0	14-1/2	8	6 0	14-1/2	9	6 0	14-1/2	6	10	53.39	57.01	6	8	5	6 0	14-1/2	9	6 0	14-1/2	7	10	66.11	14																																			
15	4	3 0	12	6	7 8	14-1/2	4 2	5	3 11	14-1/2	5	18	6	6 4	14-1/2	5	6 4	14-1/2	47.04	5	8	6	6 4	14-1/2	8	6 4	14-1/2	9	6 4	14-1/2	6	10	60.17	63.99	6	8	6	6 4	14-1/2	9	6 4	14-1/2	7	10	73.08	15																																			
16	5	4 0	12	6	7 11	14-1/2	4 5	6	4 4	14-1/2	5	18	6	6 8	14-1/2	6	6 8	14-1/2	54.76	5	8	6	6 8	14-1/2	8	6 8	14-1/2	9	6 8	14-1/2	6	10	65.80	69.83	6	8	6	6 8	14-1/2	7	6 8	14-1/2	7	10	71.44	16																																			
17	5	4 0	12	7	8 6	14-1/2	4 7	6	4 4	14-1/2	5	18	7	7 0	14-1/2	5	7 0	14-1/2	60.62	5	8	7	7 0	14-1/2	9	7 0	14-1/2	10	7 0	14-1/2	6	10	78.87	84.10	6	8	7	7 0	14-1/2	6	7 0	14-1/2	7	10	76.96	17																																			
18	5	4 0	12	7	8 10	13	4 10	6	4 5	13	5	18	7	7 3	13	5	7 3	13	66.39	5	8	7	7 3	13	9	7 3	13	10	7 3	13	6	10	86.76	92.80	6	8	7	7 3	13	7	7 3	13	7	10	86.77	18																																			
19	5	4 0	12	7	9 0	13	5 0	7	5 0	13	5	18	7	7 6	13	6	7 6	13	73.91	5	8	7	7 6	13	10	7 6	13	11	7 6	13	6	10	97.89	104.88	6	8	7	7 6	13	7	7 6	13	7	10	91.34	19																																			
20	5	4 0	12	8	10 0	13	5 3	7	5 1	13	5	22	7	7 9	13	5	7 9	13	83.44	5	10	7	7 9	13	10	7 9	13	11	7 9	13	6	12	112.26	119.49	6	10	7	7 9	13	6	7 9	13	7	12	103.32	20																																			
21	5	4 0	12	8	10 2	13	5	8	5 10	13	5	22	8	8 0	13	6	8 0	13	97.36	5	10	8	8 0	13	11	8 0	13	11	8 0	13	6	12	131.01	131.01	6	10	8	8 0	13	6	8 0	13	7	12	113.96	21																																			
22	5	4 0	12	9	11 0	13	5 8	8	5 11	13	5	22	8	8 3	13	6	8 3	13	107.99	5	10	8	8 3	13	11	8 3	13	11	8 3	13	6	12	142.52	142.52	6	10	8	8 3	13	6	8 3	13	7	12	124.59	22																																			
23	5	4 0	12	9	11 2	13	5 10	9	6 9	13	5	22	6	8 6	6 1/2	4	8 6	13	112.17	5	10	9	8 6	13	9	8 6	13	10	8 6	13	6	12	142.20	149.29	6	10	9	8 6	13	6	8 6	13	7	12	138.41	23																																			
24	5	4 0	12	10	11 13	13	6 1	* 9	6 10	13	5	22	7	8 9	6 1/2	4	8 9	13	134.32	5	10	9	8 9	13	8	8 9	13	10	8 9	13	6	12	150.43	163.62	6	10	9	8 9	13	6	8 9	13	7	12	152.09	24																																			
25	5	4 0	12	10	12 1	13	6 3	10	7 5	13	5	22	7	9 0	6 1/2	4	9 0	13	144.09	5	10	7	9 0	6 1/2	10	9 0	13	11	9 0	13	6	12	179.80	188.19	6	10	9	9 0	6 1/2	4	9 0	13	7	12	160.70	25																																			
26	5	4 0	12	11	12 11	14-1/2	6 6	11	8 2	14-1/2	5	22	8	9 3	7	4	9 3	14-1/2	167.34	5	10	8	9 3	7	9	9 3	14-1/2	8	9 3	7-1/4	6	12	199.78	208.63	6	10	8	9 3	7	4	9 3	14-1/2	7	12	183.95	26																																			
27	5	4 0	12	11	13 1	14-1/2	6 8	11	8 2	14-1/2	5	22	8	9 6	7	4	9 6	14-1/2	169.33	5	10	8	9 6	7	9	9 6	14-1/2	10	9 6	7-1/4	6	12	196.36	207.31	6	10	8	9 6	7	6	9 6	14-1/2	7	12	192.52	27																																			
28	5	4 0	12	11	13 5	13	6 11	11	8 3	13	5	22	8	9 9	6-1/2	6	9 9	13	194.97	5	10	8	9 9	6-1/2	9	9 9	13	10	9 9	13 **	6	12	217.56	264.41	6	10	8	9 9	6-1/2	7	9 9	13	7	12	216.45	28																																			
29	5	4 0	12	11	13 7	12	7 1	11	8 3	13	5	22	8	10 0	6	6	10 0	12	211.54	5	10	8	10 0	6	9	10 0	12	10	10 0	12 **	6	12	270.03	288.09	6	10	8	10 0	6	7	10 0	12	7	12	233.57	29																																			
30'	# 5	4' 0"	12"	# 11	13' 11"	11"	7' 4"	# 11	8' 4"	11"	# 5	22	# 8	10' 3"	5-1/2"	# 5	10' 3"	11"	227.47	# 5	10	# 8	10' 3"	5-1/2"	# 9	10' 3"	11"	# 10	10' 3"	11" **	# 6	12	297.36	317.56	# 6	10	# 8	10' 3"	5-1/2"	# 6	10' 3"	11"	# 7	12	249.21	30'																																			

USE WITH ALL PILING

USE WITH TIMBER PILING ONLY

USE WITH CONCRETE PILING ONLY

USE WITH STEEL PILING ONLY

NOTE:

Reinforcement quantities for pile footings include bars K, O & T

① For Design Load 50 Tons/Pile

② For Design Load 60 Tons/Pile

* Place two layers of bars as shown

Spacing as indicated

2" cl.

RETAINING WALL - LEVEL FILL

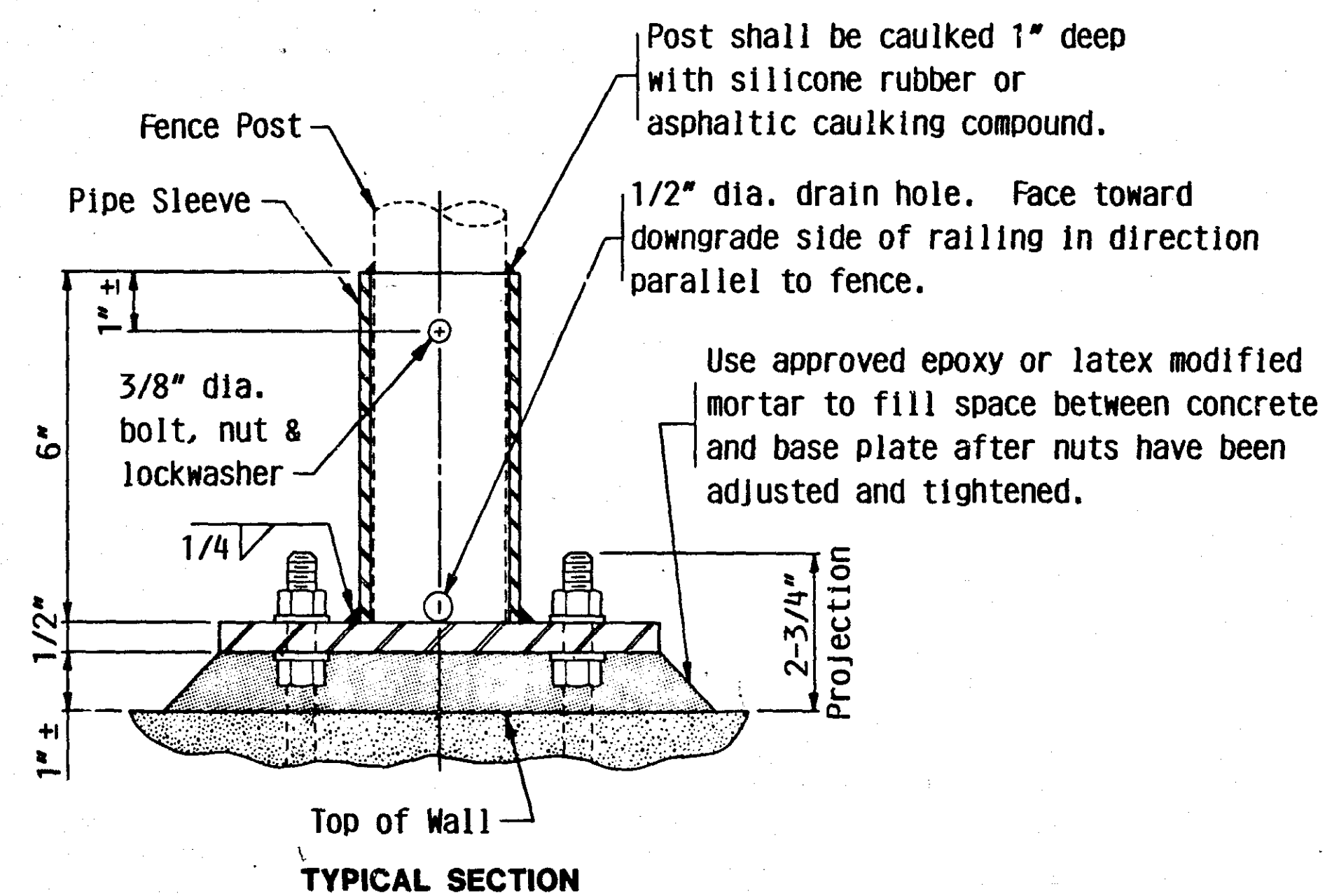
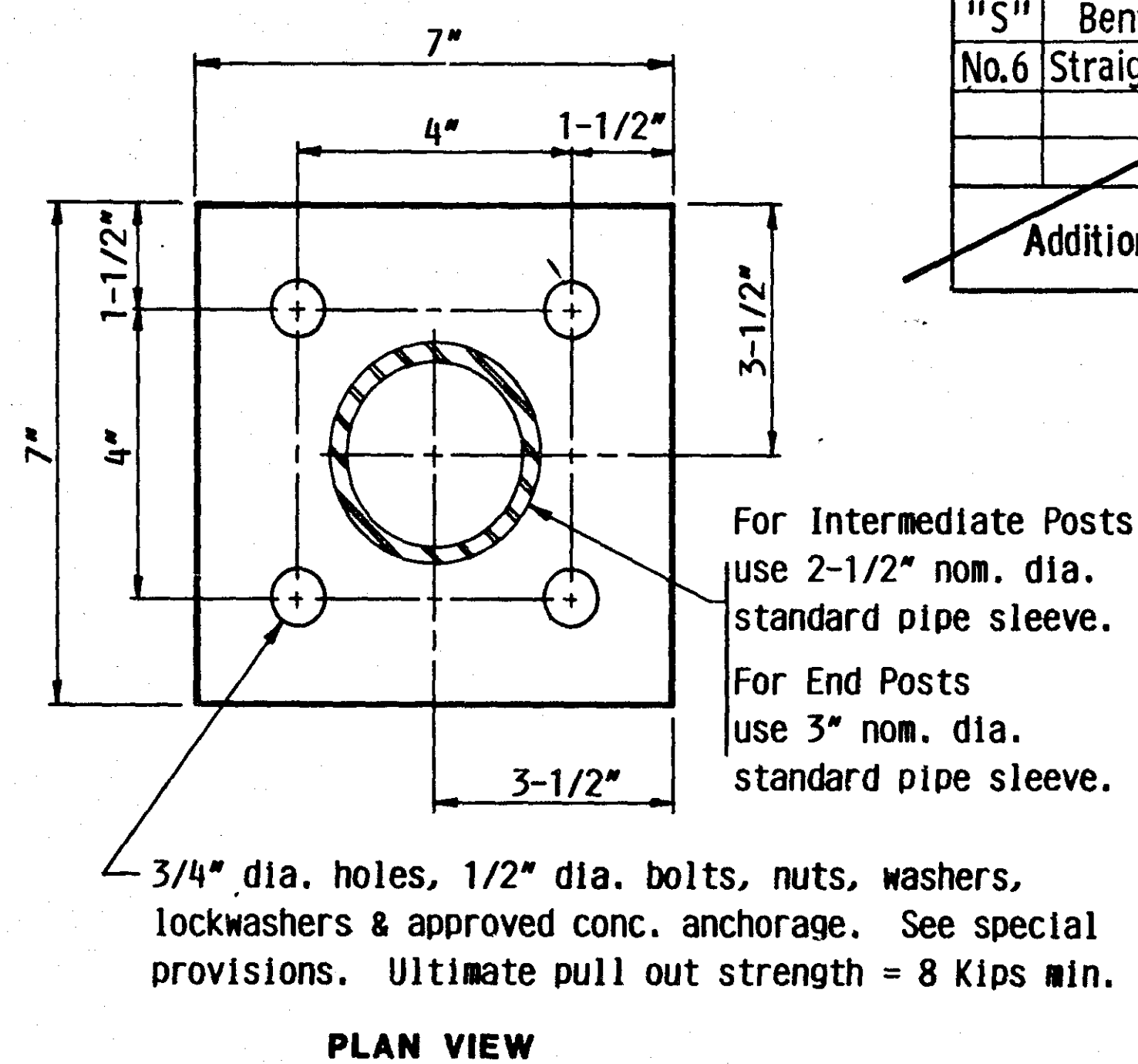
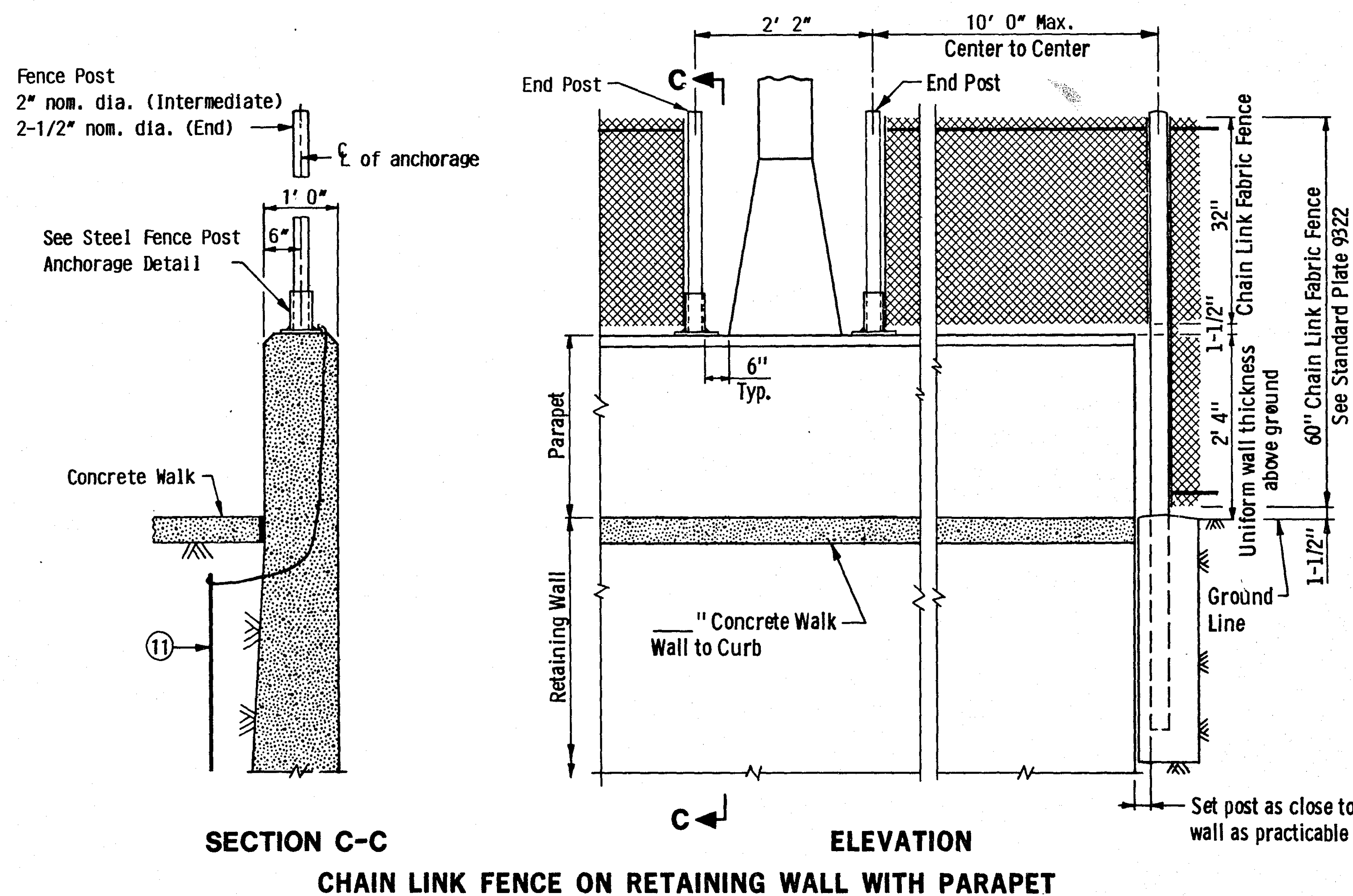
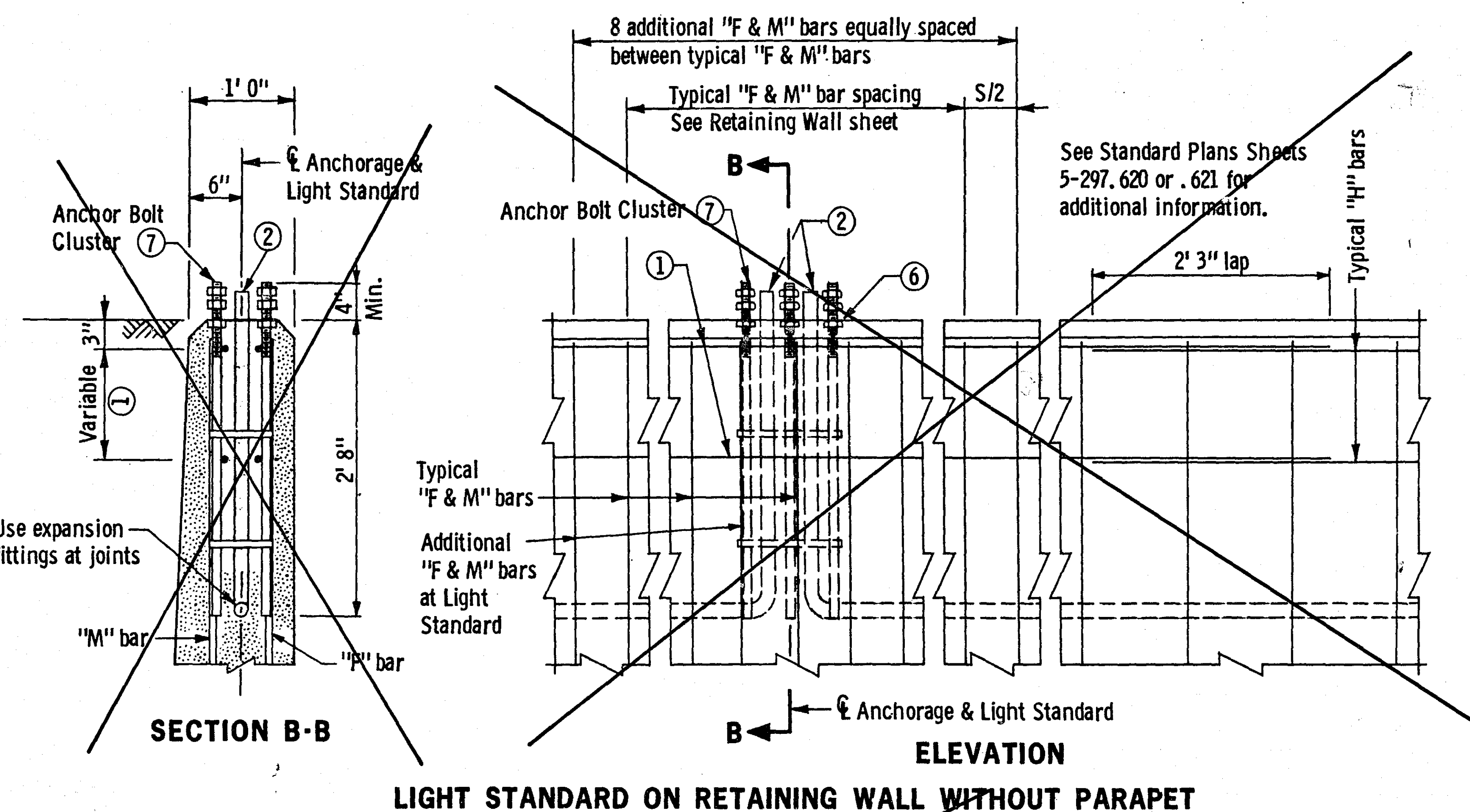
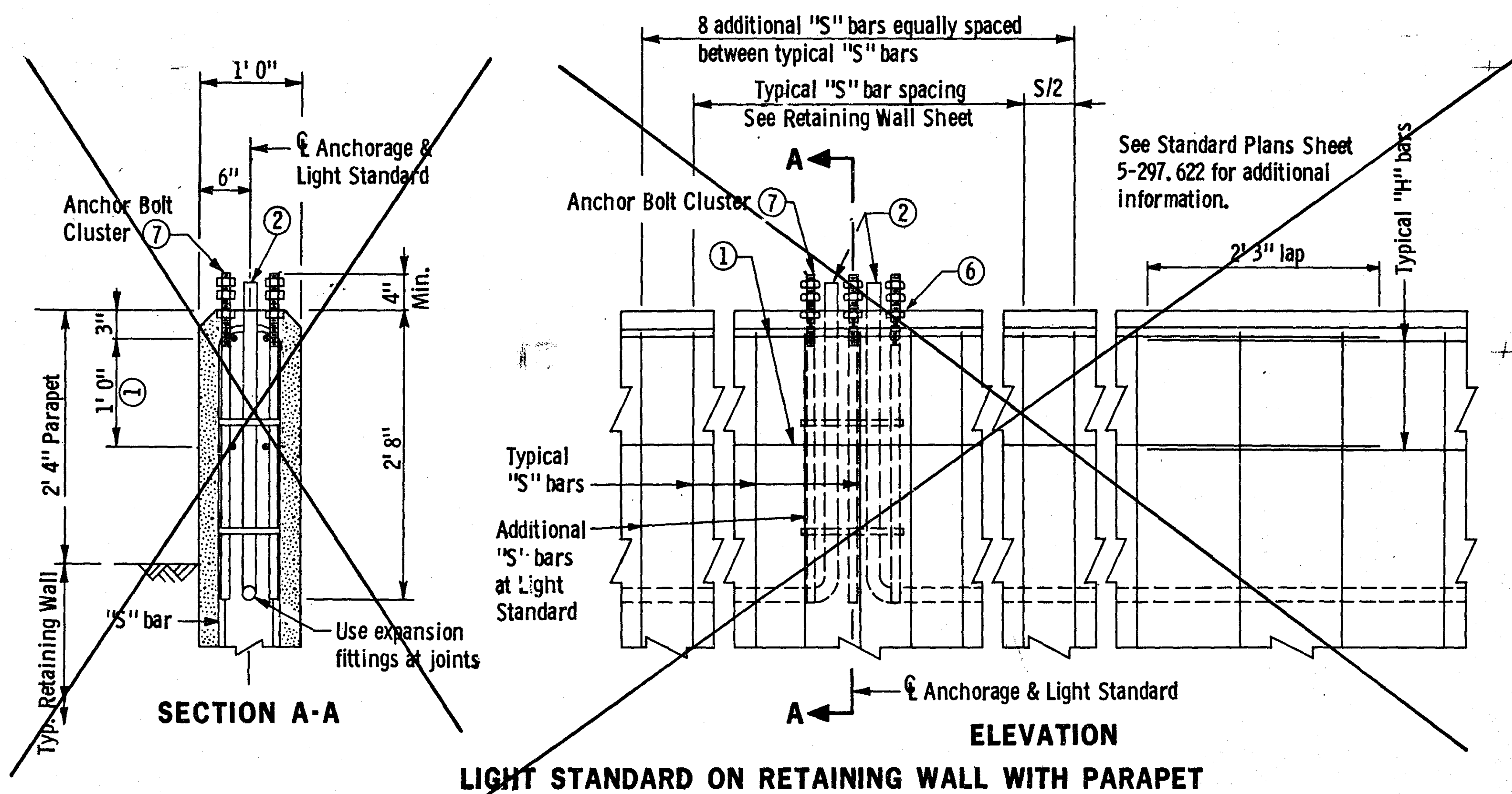
(FOOTING REINFORCEMENT)

Feb. 27, 1980

State Proj. No. S.A.P.62-646-09

S.A.P.147-020-17

Sheet No. 10 of 25 Sheets



STEEL FENCE POST ANCHORAGE DETAIL ⑨⑩

BILL OF REINFORCEMENT PER LIGHT BASE (With Parapet Type Retaining Wall)				
Bar	Shape	Number	Length	Location
"S"	Bent	8 additional	10' 0"	Parapet - Vertical @ Light
No. 6	Straight	4	10' 0"	Parapet - Horizontal @ Light
			Additional Reinforcement Bars	140 Pounds

BILL OF REINFORCEMENT PER LIGHT BASE (Without Parapet Type Retaining Wall)				
Bar	Shape	Number	Length	Location
No. 6	Straight	4	10' 0"	Wall - Horizontal @ Light
"F"	Straight	8 additional	10' 0"	Wall - F.F., Vertical @ Light
"M"	Straight	8 additional	10' 0"	Wall - B.F., Vertical @ Light
			Additional Reinforcement Bars ⑤	60 Pounds

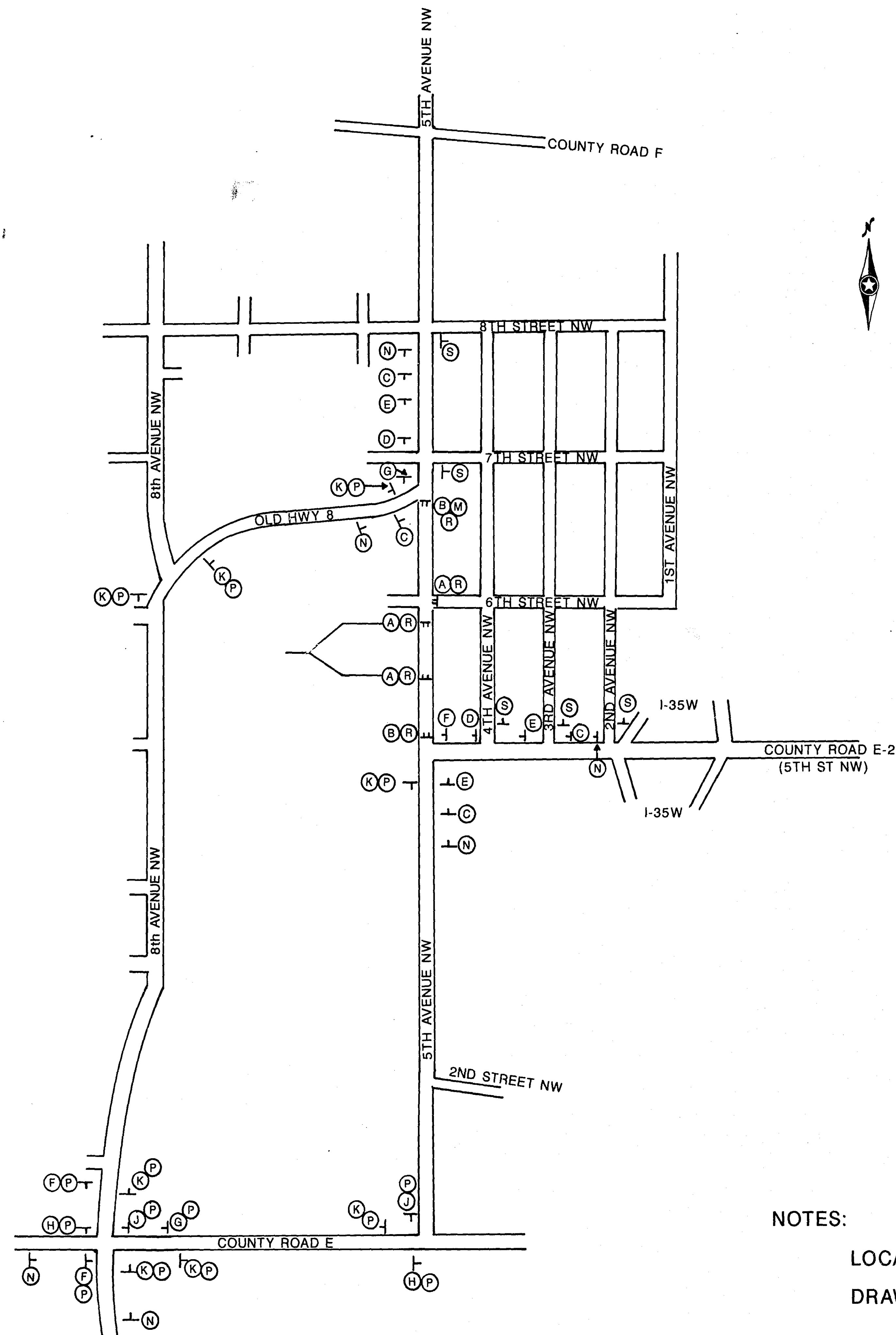
NOTES:

- ① Splice 2-No. 6 bars 10 ft. long in lieu of No. 5 (Typ.), at the light standard locations.
- ② 1-1/2" dia. RSC shall extend 3" above railing and be capped.
- ③ Same dimension as typ. "F" bars. See retaining wall sheet.
- ④ Same dimension as typ. "M" bars. See retaining wall sheet.
- ⑤ Does not include the additional "F" and "M" bars. All reinforcement bars shall have 2" clear, except as noted.
- ⑥ Top of lower nuts shall be flush with top of conc. railing. Wrap threads below nuts with 3 layers of plastic elec. tape.
- ⑦ For details of Anchor Bolt Cluster, see Standard Plate 8332.
- ⑧ 1-1/2" nom. conduit to be placed inside this dimension.
- ⑨ ℓ of anchorage to be a min. of 6" from deflection joints.
- ⑩ Estimated Weight = 10 or 11 lbs.
Struct. Steel per Spec. 3306 - Struct. Pipe per Spec. 3362
Standard Pipe Weights { 2-1/2" nom. dia. = 5.79 lbs./ft.
for Steel Pipe Sleeve { 3" nom. dia. = 7.58 lbs./ft.
Galvanize the fence post anchorage after fabrication per Spec. 3394. Galvanize the fasteners per Spec. 3392
- ⑪ Provide electrical grounds for fencing per Spec. 2557 and as modified below:
 - a. Walls without sidewalks adjacent to wall; Install per Spec. 2557.
 - b. Walls with sidewalks adjacent to wall; Place grounding rods below sidewalk elevation. Locate connecting wire (from fence to ground rod) down, thru wall to below sidewalk elevation and then out to rod.
 - c. Grounding shall not be connected to the lighting system when lighting is required on the wall. Use either "a" or "b" above.

**LIGHT ANCHORAGE & CHAIN LINK FENCE
FOR RETAINING WALLS**

28-111

BASE	OVERLAY	DRG NO.



NOTES:
LOCATION OF SIGNS ARE APPROXIMATE.
DRAWING IS NOT TO SCALE.

LEGEND

SYMBOL	SIGN	NUMBER	SIZE	QUANTITY
A	ROAD CLOSED	R11-2	48"x30"	3
B	ROAD CLOSED TO THRU TRAFFIC	R11-4	60"x30"	2
C	ROAD CONSTRUCTION AHEAD	W20-1	36"x36"	4
D	DETOUR AHEAD	W20-2	48"x48"	2
E	ROAD CLOSED AHEAD	W20-3	48"x48"	3
F	DETOUR	M4-9L	30"x24"	3
G	DETOUR	M4-9R	30"x24"	2
H	DETOUR	M4-9L	30"x24"	2
J	DETOUR	M4-9R	30"x24"	2
K	DETOUR	M4-9S	30"x24"	8
M	DETOUR	M4-10R	48"x18"	1
N	5TH AVE NW NORTH OF CO. RD. E2 CLOSED BEGINS (Date)	—	—	6
P	5TH AVE NW	—	—	15
R	TYPE III BARRICADE	—	—	5
S	NO THRU TRUCKS	—	—	5

ALL TRAFFIC CONTROL DEVICES, SHALL CONFORM TO THE MUTCD, INCLUDING APPENDIX B, DATED SEPTEMBER, 1985.

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S.A.P.147-020-17

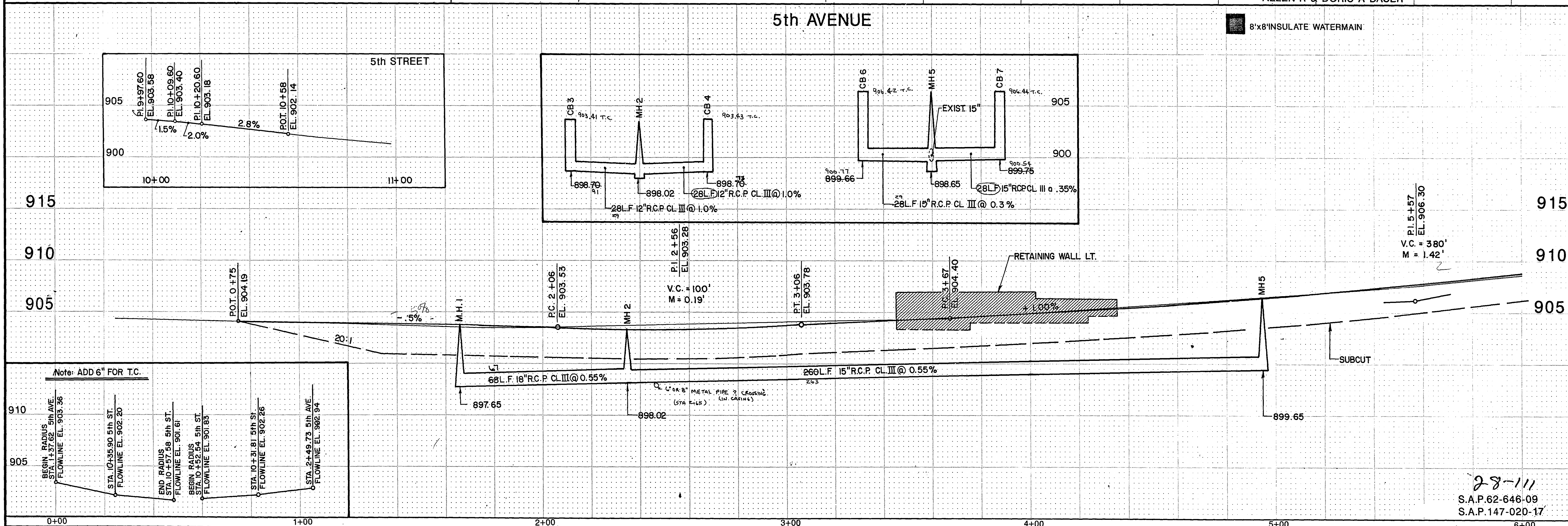
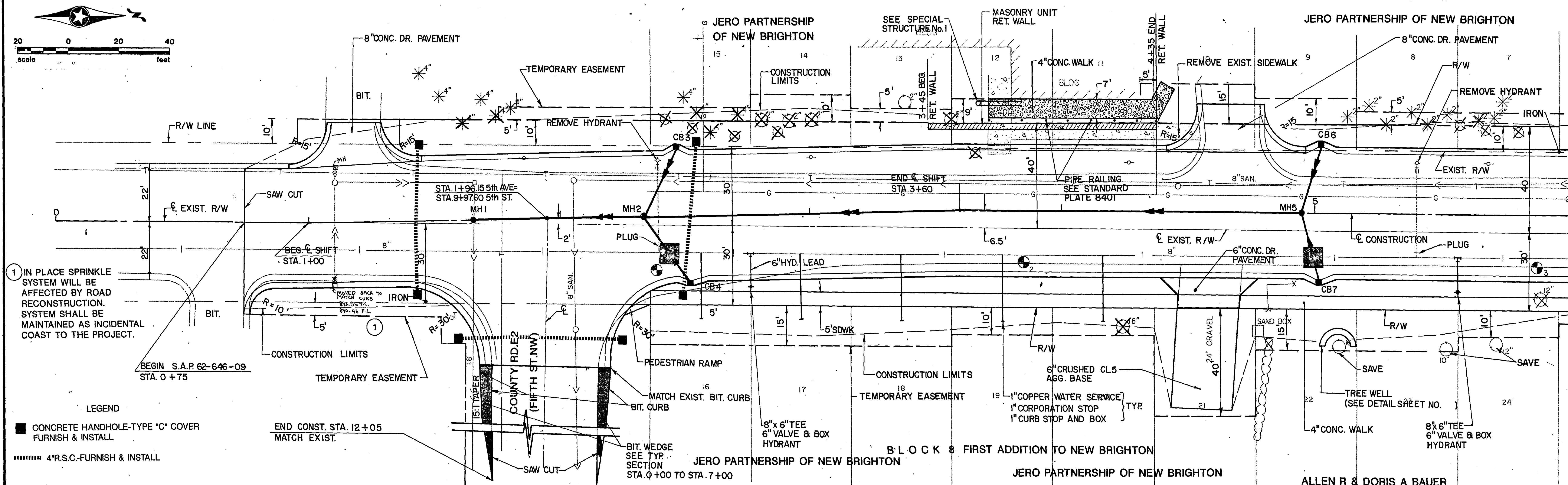
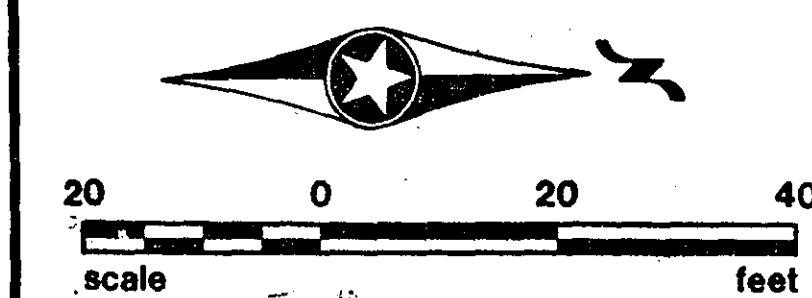
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RAMSEY COUNTY, MINNESOTA
5TH AVENUE NW

SIGNING AND DETOUR
LAYOUT

FILE NO.	12
DATE	25
3/14/90	



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S.A.P.147-020-17

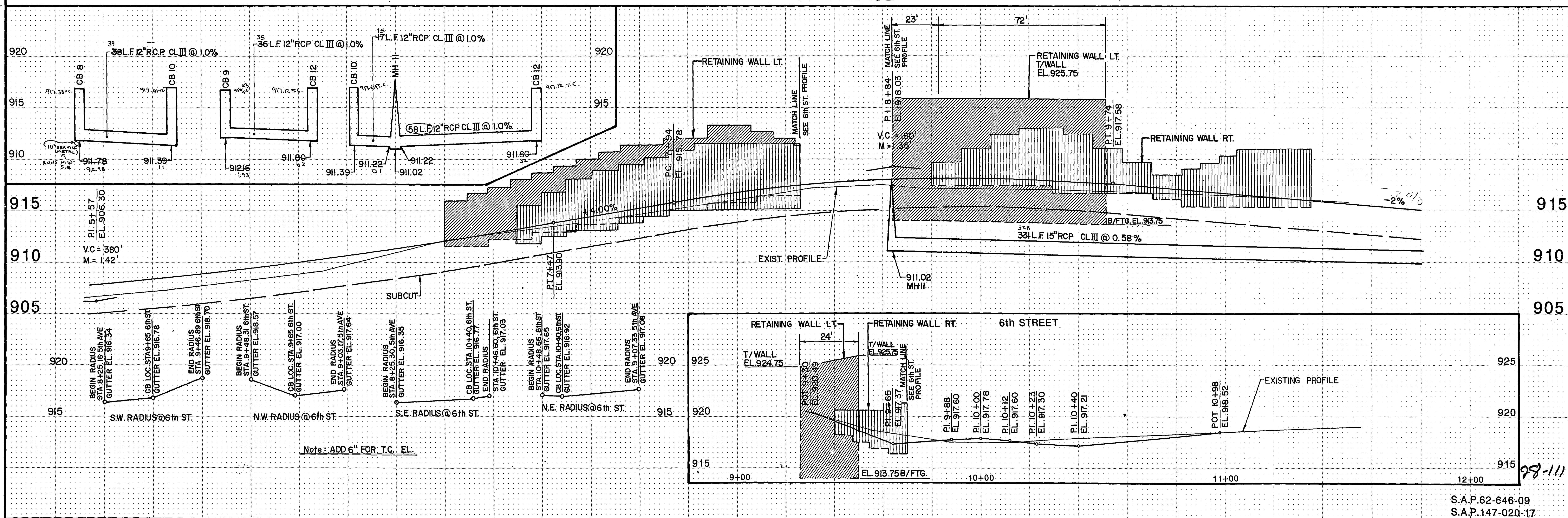
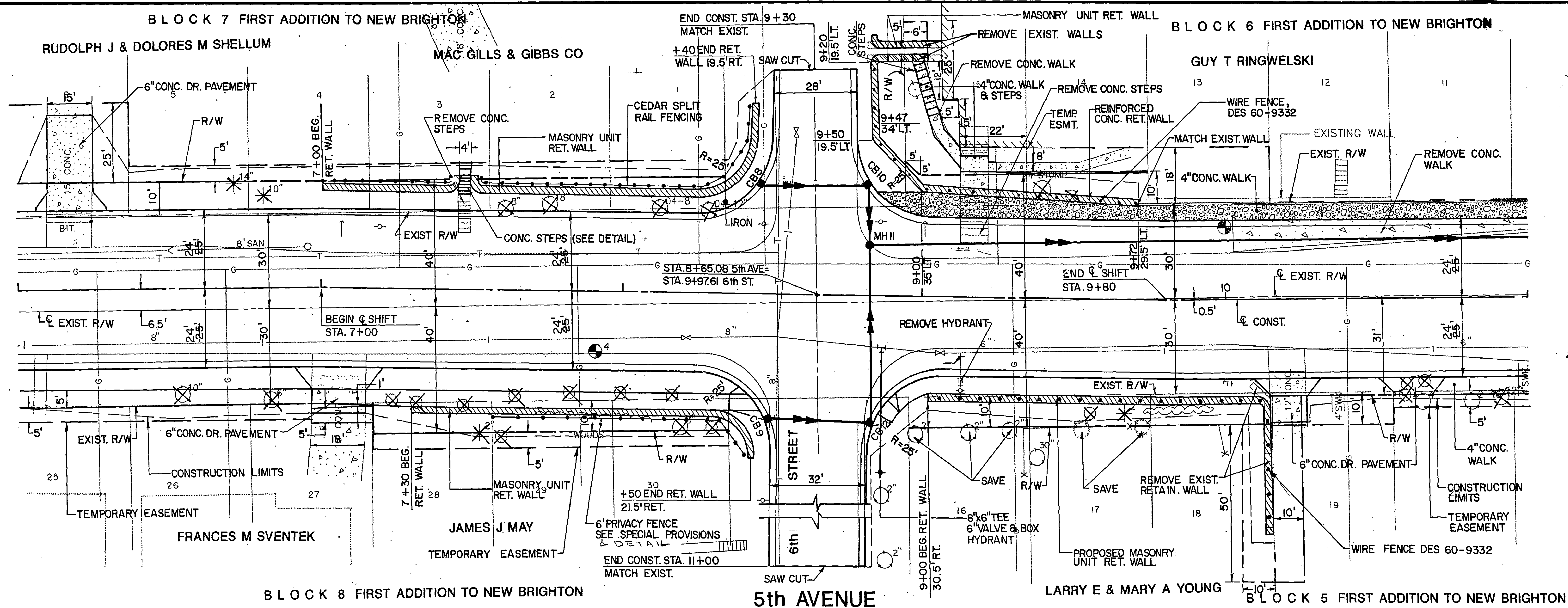
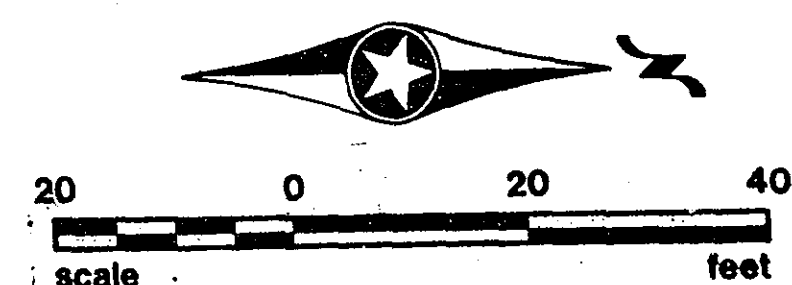
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NO.	BY	DATE	REVISIONS	ITEM	DESIGN	CHECKED	Date	Reg No	



RAMSEY COUNTY, MINNESOTA

PLAN AND PROFILE

FILE NO. 89132	13 25
DATE 3/14/90	



				6+00				7+00				8+00					
1	WRL	7-18-91	50' ROADWAY to 48' ROADWAY											I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the state of Minnesota			
NO.	BY	DATE	REVISIONS				ITEM	DESIGN	CHECKED					Data	Rev No		



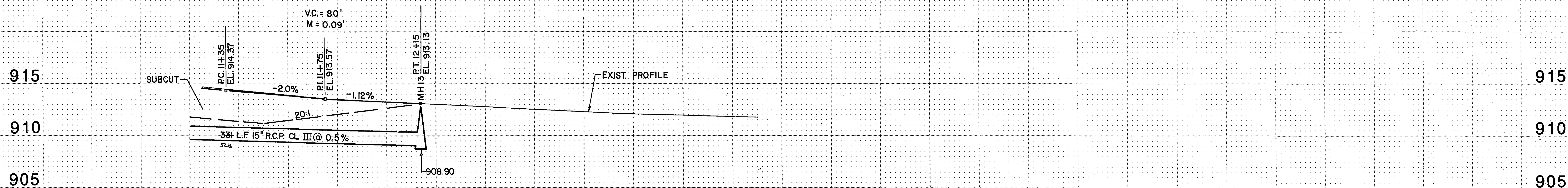
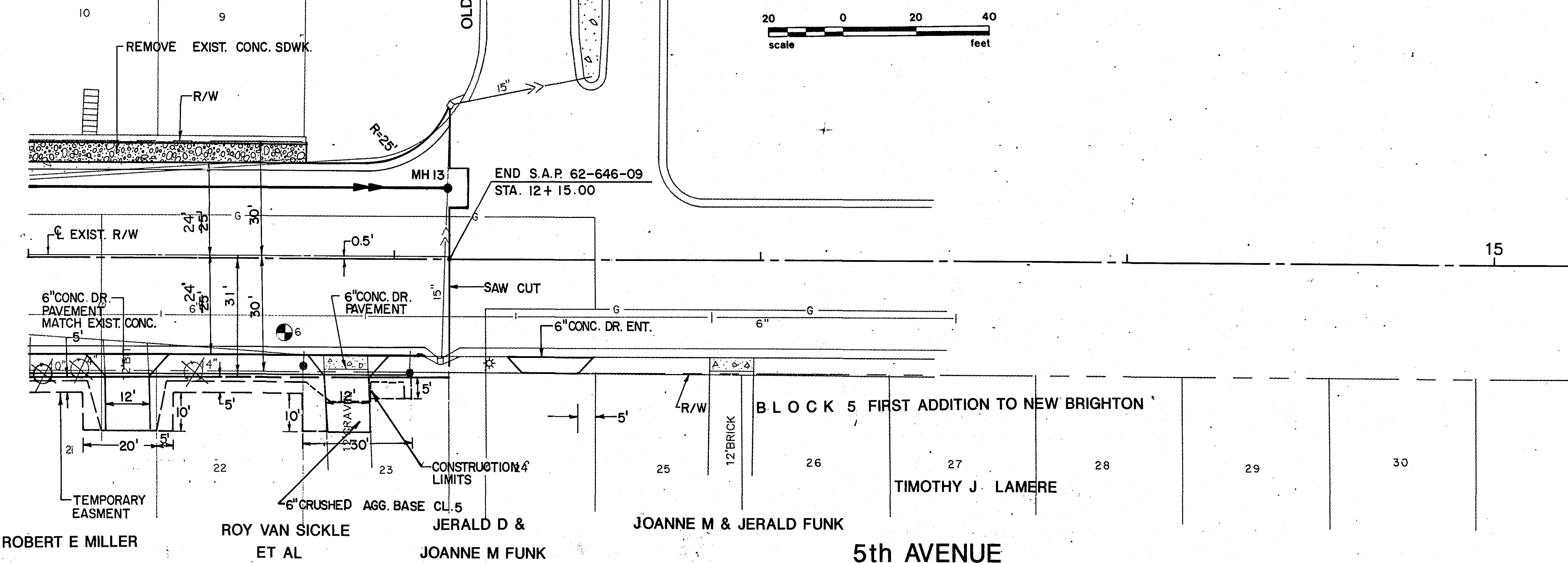
RAMSEY COUNTY, MINNESOTA

PLAN AND PROFILE

FILE NO. 89132	14 25
DATE 3/14/90	

B L O C K 6 FIRST ADDITION TO NEW BRIGHTON

G MALVINA BERQUIST



28-111
S.A.P.62-646-09.
S.A.P.147-020-17

11+00										12+00										13+00									
1	WRL	7-19-91	50' ROADWAY to 48' ROADWAY																	I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the state of Minnesota									
NO.	BY	DATE	REVISIONS										ITEM					DESIGN					CHECKED					Date _____	Reg No. _____

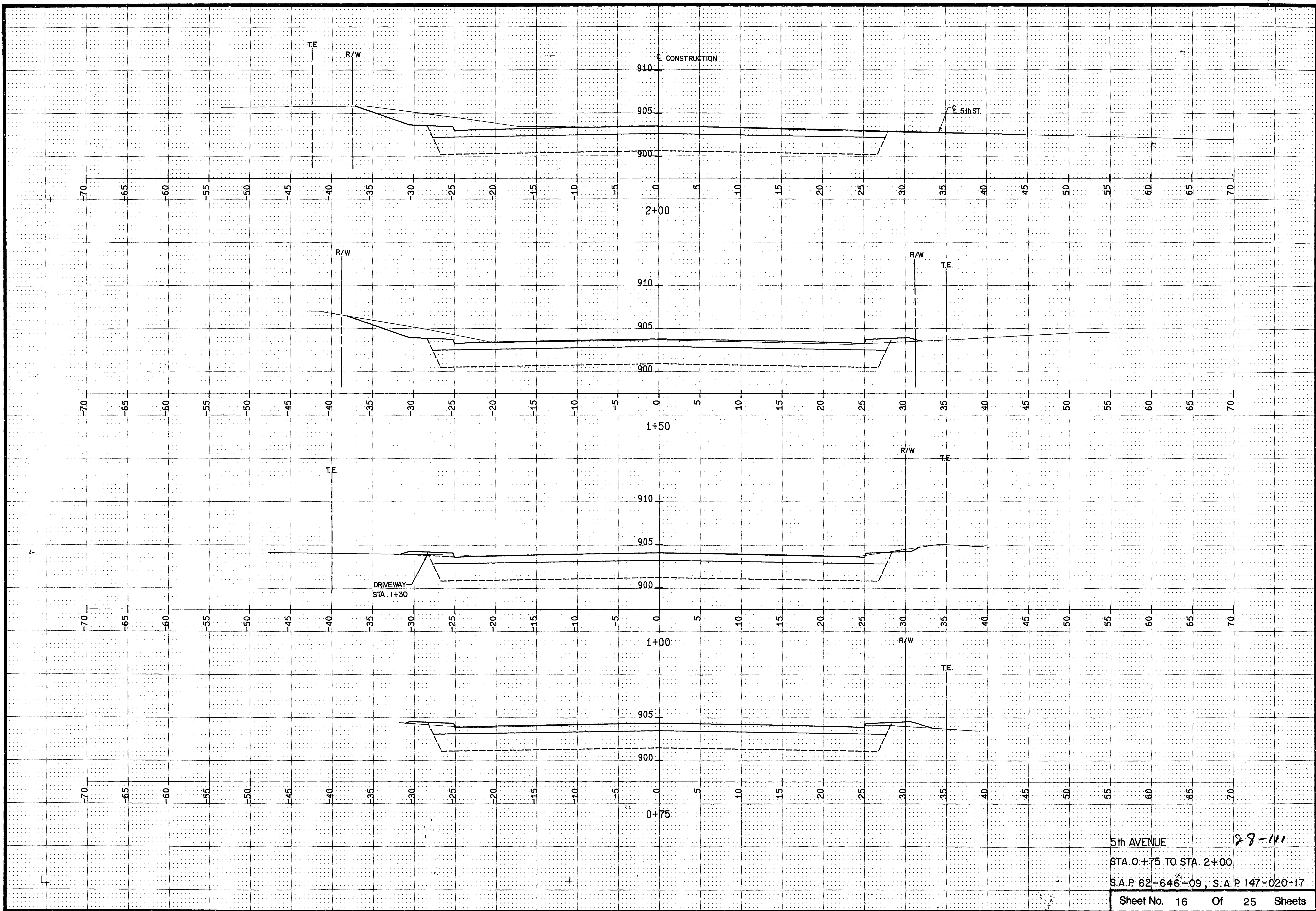


RAMSEY COUNTY, MINNESOTA

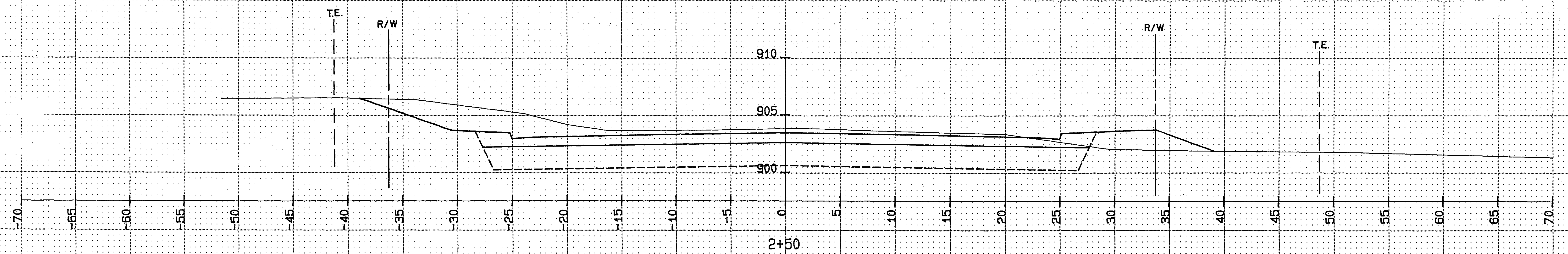
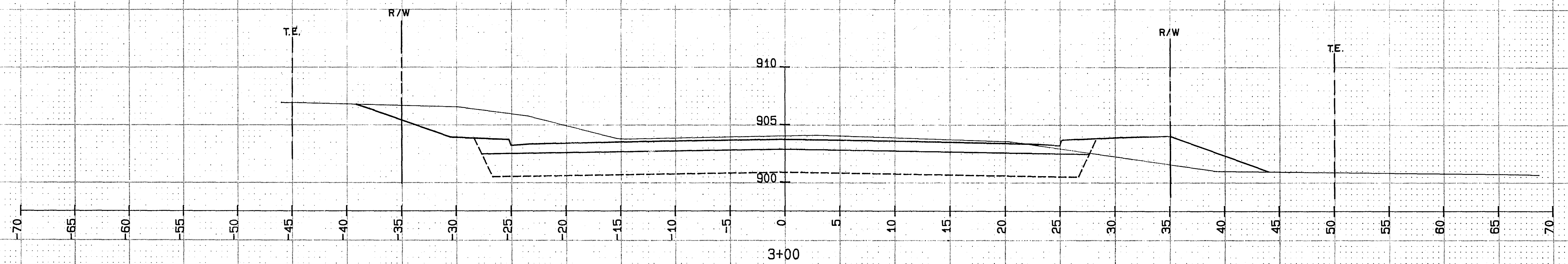
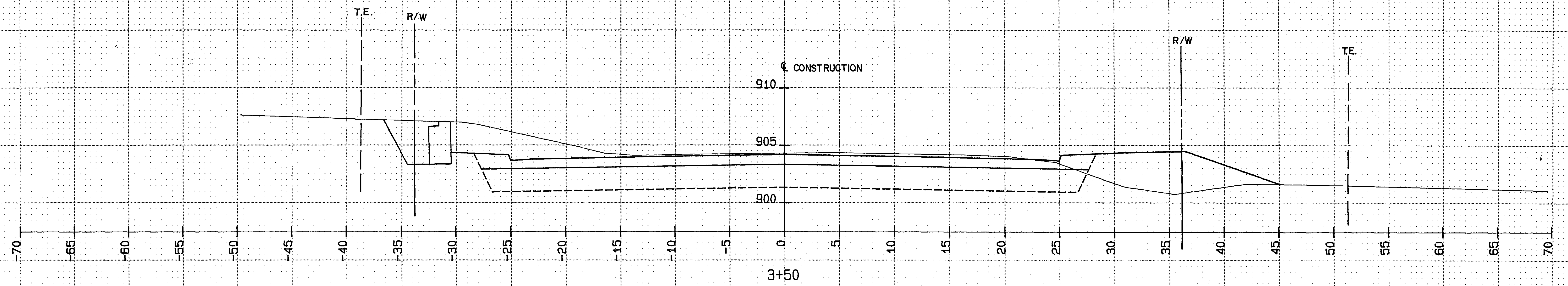
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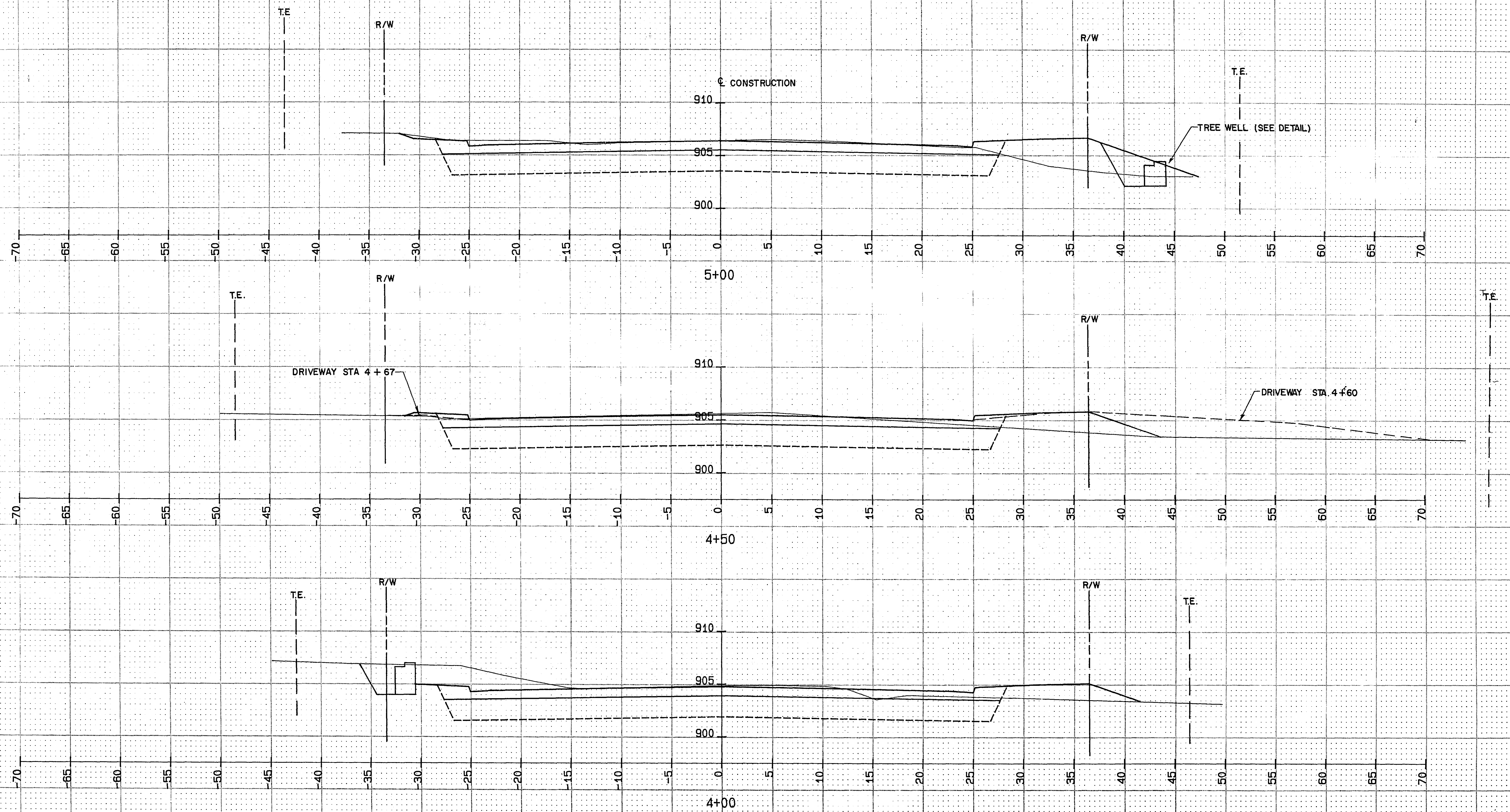
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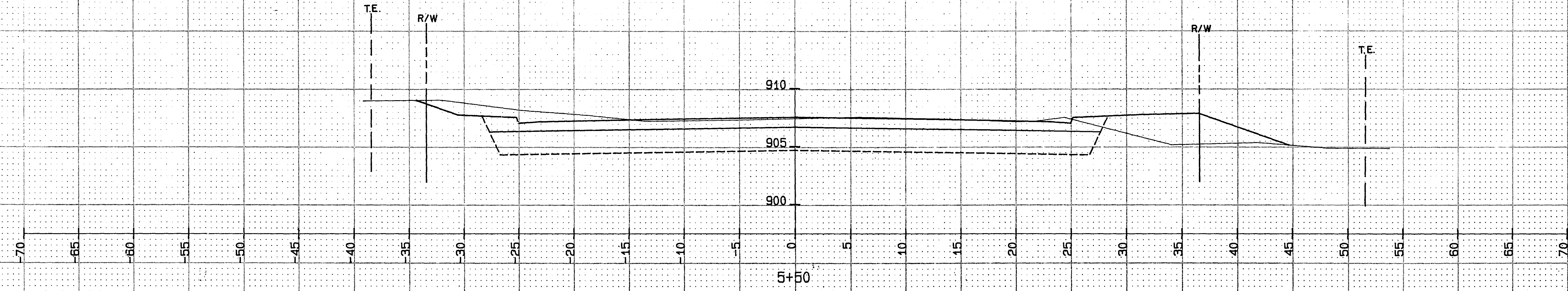
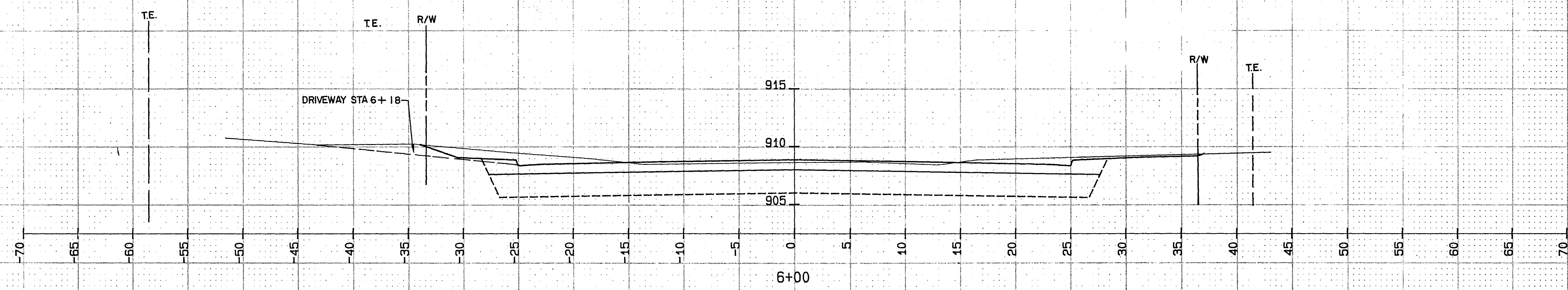
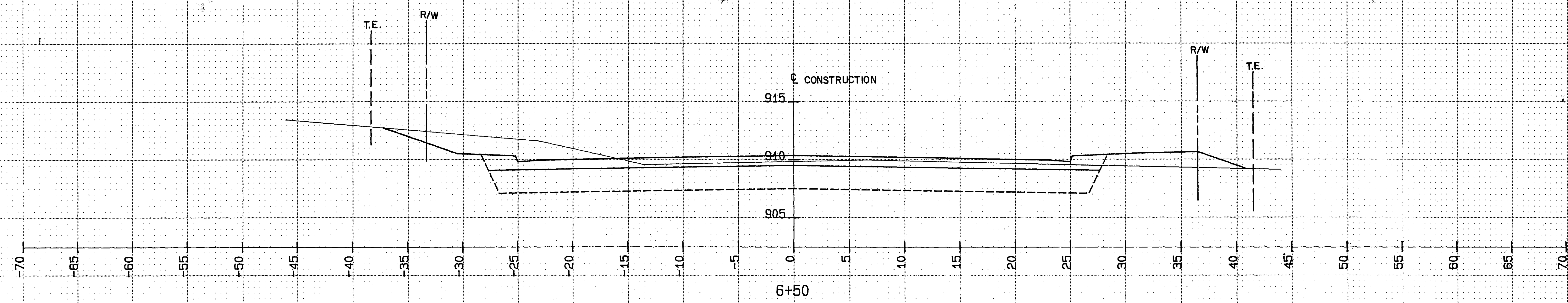
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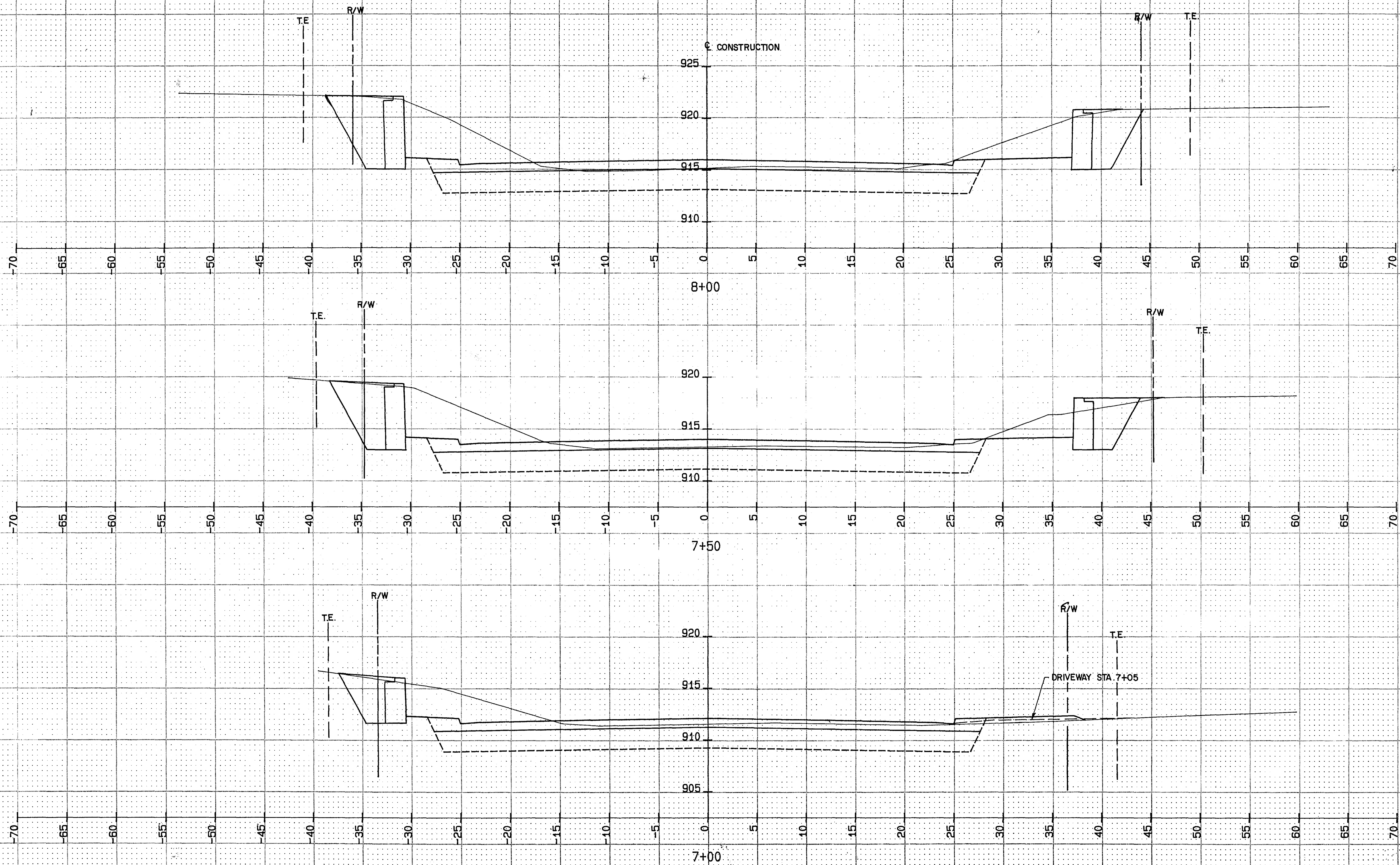


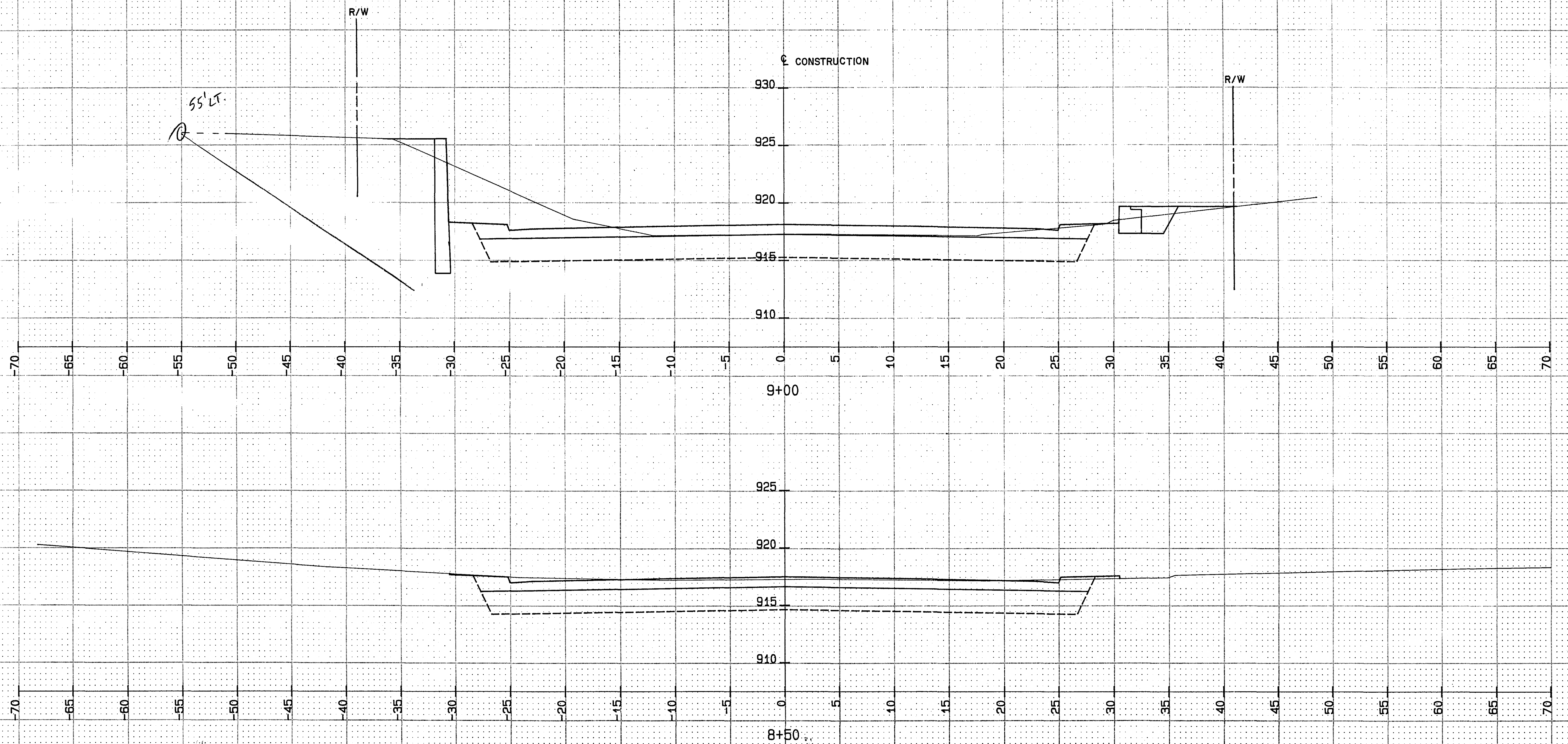
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Sheet No. 16 Of 25 Sheets









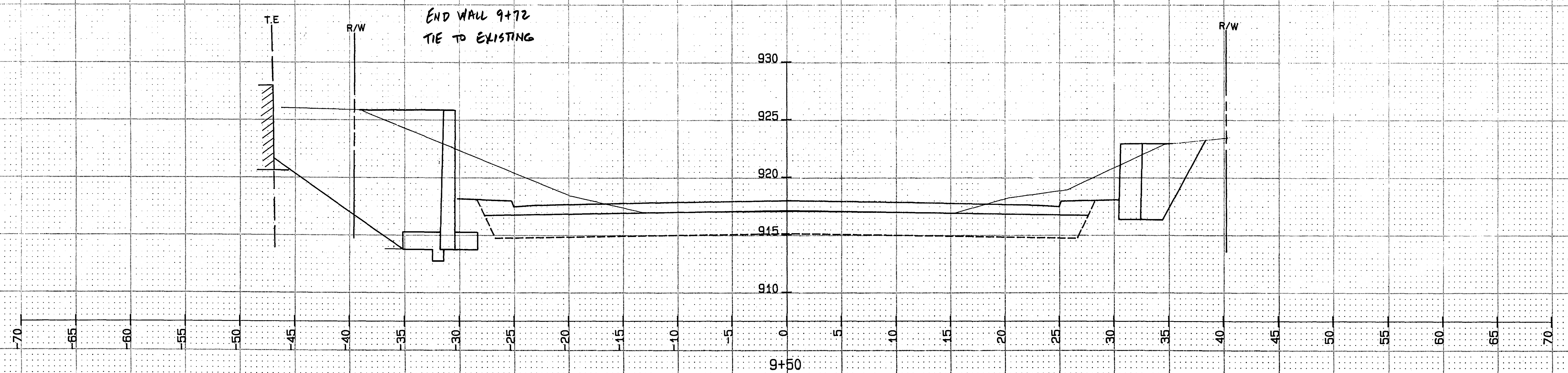
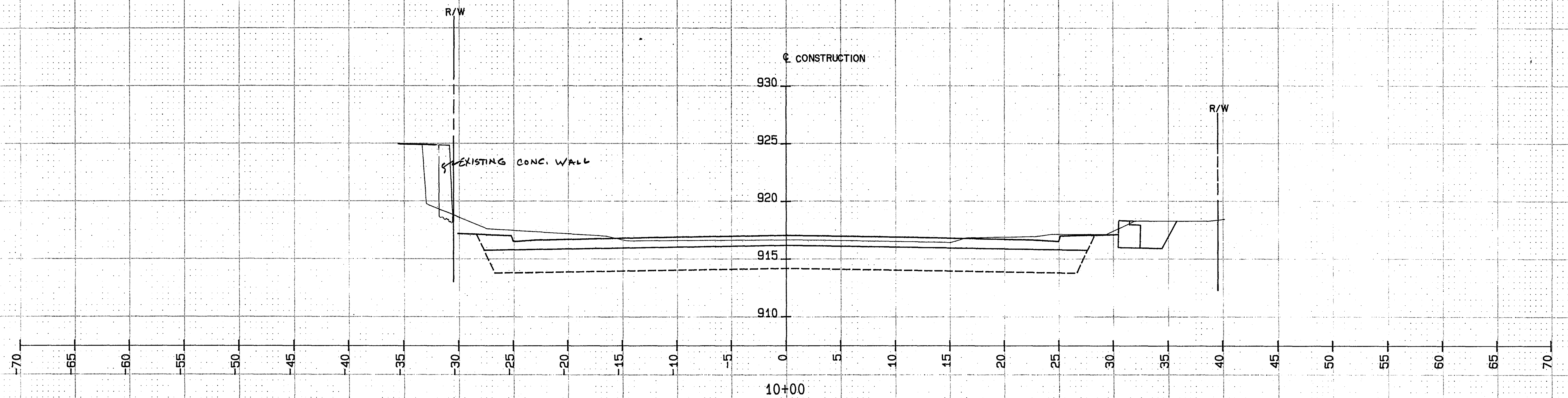


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Sheet No. 21 Of 25 Sheets



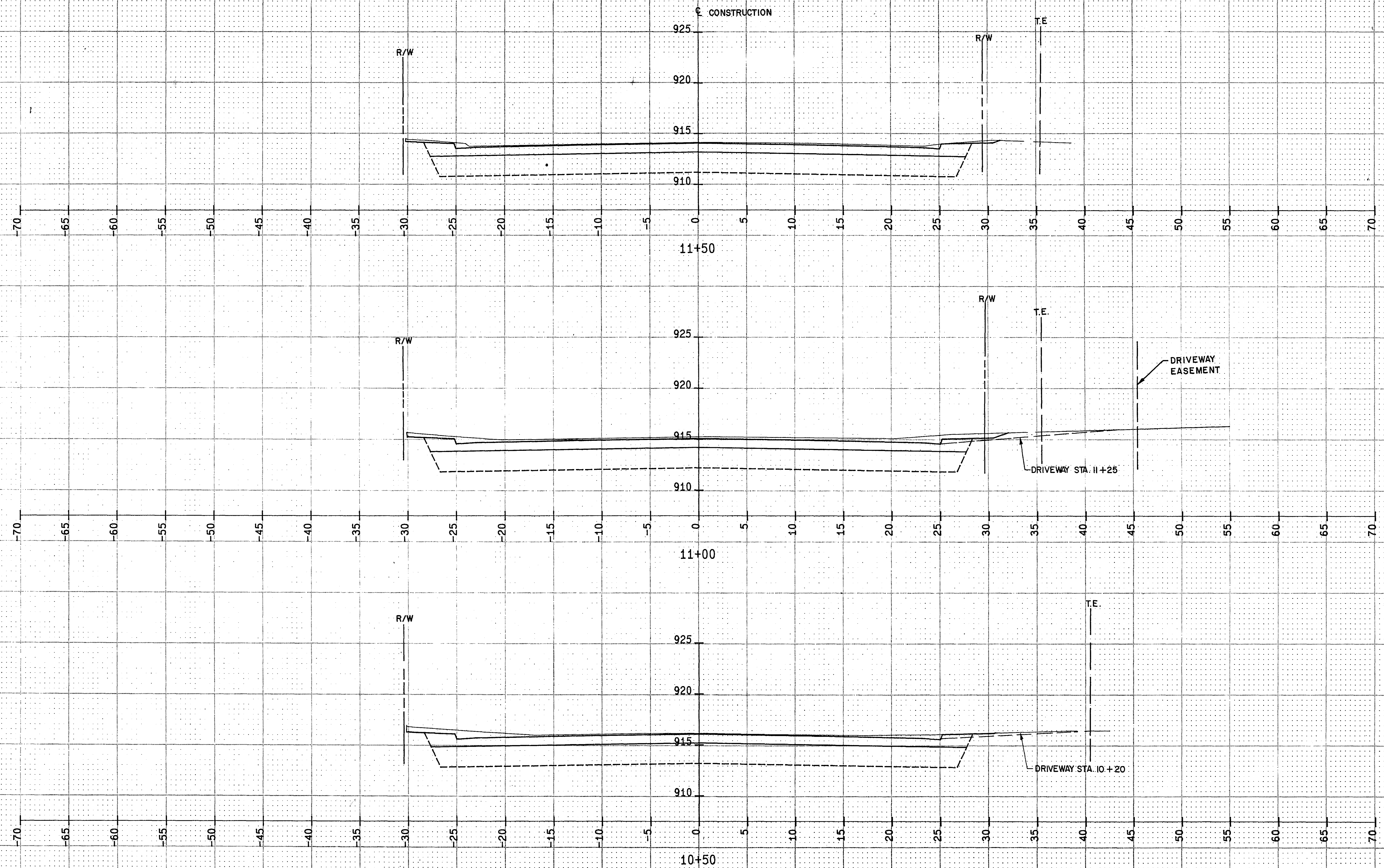
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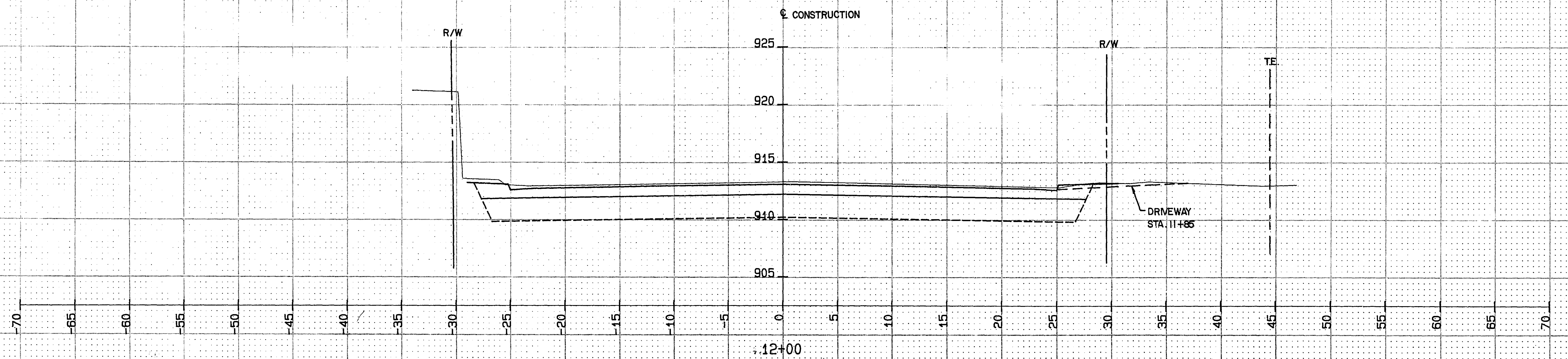
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5th AVENUE

STA. 12+00

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