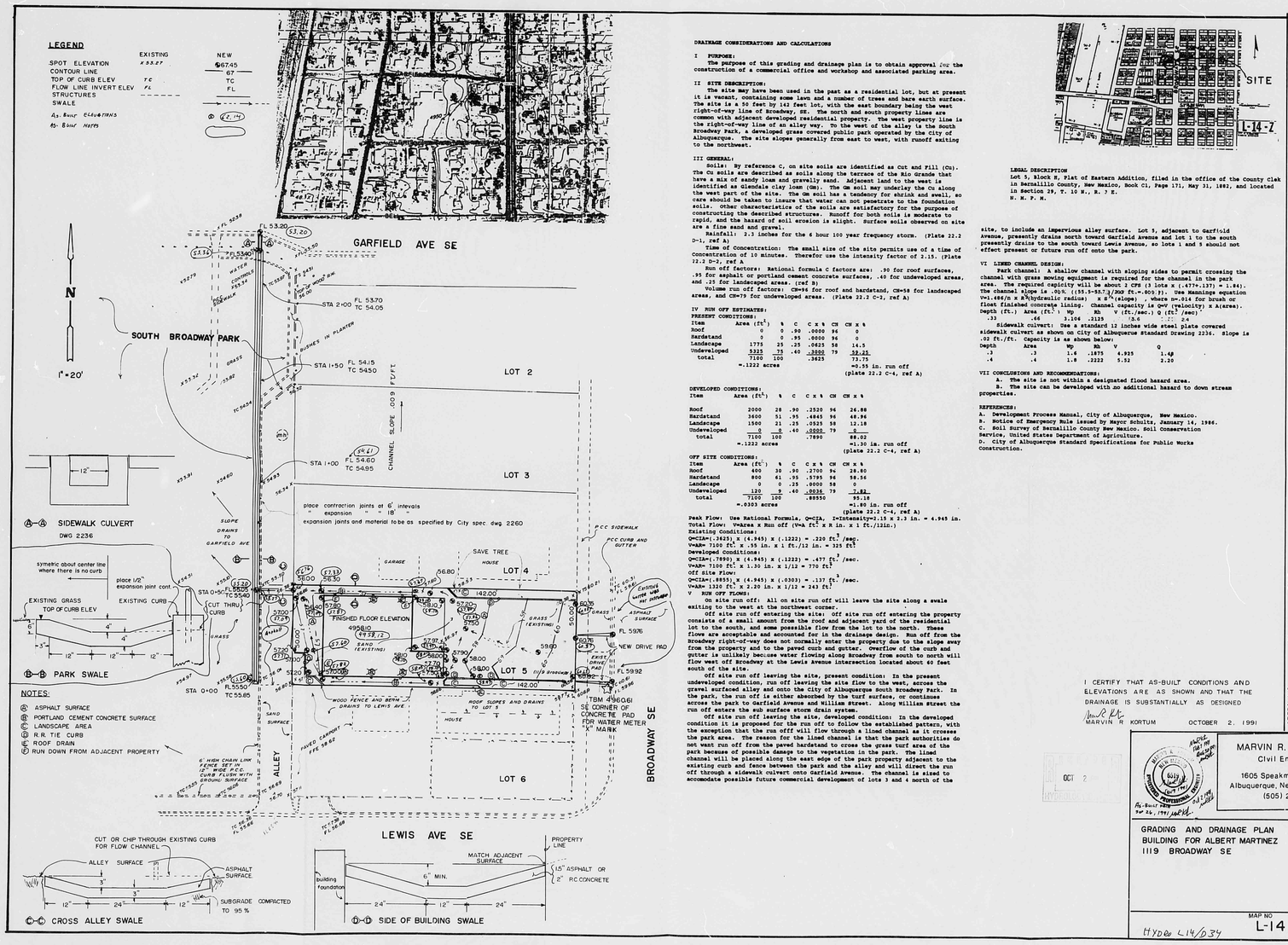

DRAINAGE CONSIDERATIONS AND CALCULATIONS

I PURPOSE:

The purpose of this grading and drainage plan is to obtain approval for the construction of a commercial office and workshop and associated parking area.

II SITE DESCRIPTION:

The site may have been used in the past as a residential lot, but at present it is vacant, containing some lawn and a number of trees and bare earth surface. The site is a 50 feet by 142 feet lot, with the east boundary being the west right-of-way line of Broadway, SE. The north and south property lines are common with adjacent developed residential property. The west property line is the right-of-way line of an alley way. To the west of the alley is the South Broadway Park, a developed grass covered public park operated by the city of Albuquerque. The site slopes generally from east to west, with runoff exiting to the northwest.

III GENERAL:

Soils: By reference C, on site soils are identified as Cut and Fill (Cn). The Cn soils are described as soils along the terrace of the Rio Grande that have a mix of sandy loam and gravelly sand. Adjacent land to the west is identified as Glendale clay loam (Gm). The Gm soil may underlay the Cn along the west part of the site. The Gm soil has a tendency for shrink and swell, so care should be taken to insure that water can not penetrate to the foundation soils. Other characteristics of the soils are satisfactory for the purpose of constructing the described structures. Runoff for both soils is moderate to rapid, and the hazard of soil erosion is slight. Surface soils observed on site are a fine sand and gravel.

Rainfall: 2.3 inches for the 6 hour 100 year frequency storm. (Plate 22.2 D-1, ref A)

Time of Concentration: The small size of the site permits use of a time of Concentration of 10 minutes. Therefor use the intensity factor of 2.15. (Plate 22.2 D-2, ref A

Run off factors: Rational formula C factors are: .90 for roof surfaces, .95 for asphalt or portland cement concrete surfaces, .40 for undeveloped areas, and .25 for landscaped areas. (ref B)

Volume run off factors: CN=96 for roof and hardstand, CN=58 for landscaped areas, and CN=79 for undeveloped areas. (Plate 22.2 C-2, ref A)

IV RUN OFF ESTIMATES:

PRESENT CONDITIONS:

Item	Area (ft^2)	%	C	C x %	CN	CN x %
Roof	0	0	.90	.0000	96	0
Hardstand	0	0	.95	.0000	96	0
Landscape	1775	25	.25	.0625	58	14.5
Undeveloped	5325	75	.40	.3000	79	59.25
total	7100	100		.3625		73.75
	=.1222 acres					=0.55 in. run off (plate 22.2 C-4, ref A)

DEVELOPED CONDITIONS:

Item	Area (ft^2)	%	C	C x %	CN	CN x %
Roof	2000	28	.90	.2520	96	26.88
Hardstand	3600	51	.95	.4845	96	48.96
Landscape	1500	21	.25	.0525	58	12.18
Undeveloped	0	0	.40	.0000	79	0
total	7100	100		.7890		88.02
	=.1222 acres					=1.30 in. run off (plate 22.2 C-4, ref A)

OFF SITE CONDITIONS:

Item	Area (ft^2)	%	C	C x %	CN	CN x %
Roof	600	38	.90	.3700	96	28.80
Hardstand	800	61	.95	.5795	96	58.56
Landscape	0	0	.25	.0000	58	0
Undeveloped	120	9	.40	.0036	79	7.82
total	7100	100		.88550		95.18
	=.0303 acres					=1.80 in. run off (plate 22.2 C-4, ref A)

Peak Flow: Use Rational Formula, Q=CIA. I=Intensity=2.15 x 2.3 in. = 4.945 in.
Total Flow: V=area x Run off (V=a ft^2 x R in. x 1 ft./12in.)
Existing Conditions:
Q=CIA=(.3625) x (4.945) x (.1222) = .220 ft^3/sec.
V=AR= 7100 ft^2 x .55 in. x 1 ft./12 in. = 325 ft^3
Developed Conditions:
Q=CIA=(.7890) x (4.945) x (.1222) = .477 ft^3/sec.
V=AR= 7100 ft^2 X 1.30 in. x 1/12 = 770 ft^3
off site Flow:
Q=CIA=(.8855) x (4.945) x (.0303) = .137 ft^3/sec.
V=AR= 1320 ft^2 x 2.20 in. x 1/12 = 243 ft^3

V RUN OFF FLOWS:

On site run off: All on site run off will leave the site along a swale exiting to the west at the northwest corner.

Off site run off entering the site: Off site run off entering the property consists of a small amount from the roof and adjacent yard of the residential lot to the south, and some possible flow from the lot to the north. These flows are acceptable and accounted for in the drainage design. Run off from the Broadway right-of-way does not normally enter the property due to the slope away from the property and to the paved curb and gutter. Overflow of the curb and gutter is unlikely because water flowing along Broadway from south to north will flow west off Broadway at the Lewis Avenue intersection located about 60 feet south of the site.

Off site run off leaving the site, present condition: In the present undeveloped condition, run off leaving the site flow to the west, across the gravel surfaced alley and onto the city of Albuquerque South Broadway Park. In the park, the run off is either absorbed by the turf surface, or continues across the park to Garfield Avenue and William Street. Along William Street the run off enters the sub surface storm drain system.

Off site run off leaving the site, developed condition: In the developed condition it is proposed for the run off to follow the established pattern, with the exception that the run offf will flow through a lined channel as it crosses the park area. The reason for the lined channel is that the park authorities do not want run off from the paved hardstand to cross the grass turf area of the park because of possible damage to the vegetation in the park. The lined channel will be placed along the east edge of the park property adjacent to the existing curb and fence between the park and the alley and will direct the run off through a sidewalk culvert onto Garfield Avenue. The channel is sized to accomodate possible future commercial development of lots 3 and 4 north of the site, to include an impervious alley surface. Lot 5, adjacent to Garfield Avenue, presently drains north toward Garfield Avenue and lot 1 to the south presently drains to the south toward Lewis Avenue, so lots 1 and 5 should not effect present or future run off onto the park.

VI LINED CHANNEL DESIGN:

Park channel: A shallow channel with sloping sides to permit crossing the channel with grass mowing equipment is required for the channel in the park area. The required capicity will be about 2 CFS (3 lots x (.4775-.137) = 1.84). The channel slope is .009. ((55.5-53.7)/200 ft.=.009 ft). Use Mannings equation $V=1.486/n \times R^{2/3}(\text{hydraulic radius}) \times S^{1/2}(\text{slope})$, where n=.014 for brush or float finished concrete lining. Channel capacity is Q=V (velocity) x A(area). Depth (ft.) Area (ft^2) Wp Rh V ($ft./sec.$) Q (ft^3/sec)

.33	.66	3.106	.2125	5.6	3.24

Sidewalk culvert: Use a standard 12 inches wide steel plate covered sidewalk culvert as shown on City of Albuquerque Standard Drawing 2236. Slope is .03 ft./ft. Capacity is as shown below:

Depth	Area	Wp	Rh	V	Q
.3	.3	1.6	.1875	4.925	1.48
.4	.4	1.8	.2222	5.52	2.20

VII CONCLUSIONS AND RECOMMENDATIONS:

A. The site is not within a designated flood hazard area.
B. The site can be developed with no additional hazard to down stream properties.

REFERENCES:

A. Development Process Manual, City of Albuquerque, New Mexico.
B. Notice of Emergency Rule issued by Mayor Schultz, January 14, 1986.
C. Soil Survey of Bernalillo County New Mexico. Soil Conservation Service, United States Department of Agriculture.
D. City of Albuquerque Standard Specifications for Public Works Construction.

LEGAL DESCRIPTION
Lot 5, Block H, Plat of Eastern Addition, filed in the office of the County clek in Bernalillo County, New Mexico, Book C1, Page 171, May 31, 1882, and located in Section 29, T. 10 N., R. 3 E.
N. M. P. M.

CERTIFICATE OF SURVEY BY LEONARD O. MARTINEZ, 21 APRIL, 1989.
Topographic Data by Marvin R Kortum, October, 1990.

BENCHMARK
L3-K14 Located at Cut Intersection & square, chiseled top of curb at east end of Pacific Ave. SE, in the south side of the sidewalk section. @ 4957.597 (NGVD 1929) 1111.1979

I CERTIFY THAT AS-BUILT CONDITIONS AND ELEVATIONS ARE AS SHOWN AND THAT THE DRAINAGE IS SUBSTANTIALLY AS DESIGNED
MARVIN R KORTUM OCTOBER 2, 1991

APPROVALS	BY	DATE
REV.1. P.C.C. PAD, DRAINAGE, NEW PROPERTY LINE, & ADD CHANNEL DETAILS	M.R.K.	AUG 30 1991
REV. 2. ADD CHANNEL DETAILS	M.R.K.	FEB 12 1991
PRELIMINARY	MR.KORTUM	FEB 7 1991
		JAN 9 1991

OCT 2

MARVIN R. KORTUM, P.E.
Civil Engineering
1605 Speakman Drive, S.E.
Albuquerque, New Mexico 87123
(505) 299-0774

GRADING AND DRAINAGE PLAN
BUILDING FOR ALBERT MARTINEZ
1119 BROADWAY SE

MAP NO	SHEET	OF
L-14	1	1

HYDRO L14/034

PG. 22 DATE 6/25/93 OF 57
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CITY CLERK RECORDER
OFFICIAL SEAL NORBERTA SANCHEZ NOTARY PUBLIC STATE OF NEW MEXICO My Commission Expires May 8, 1995
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CITY OF ALBUQUERQUE
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PLANS/PLATS ON FILE

FILE DESC: L-14/0034

PLANS/PLATS 1

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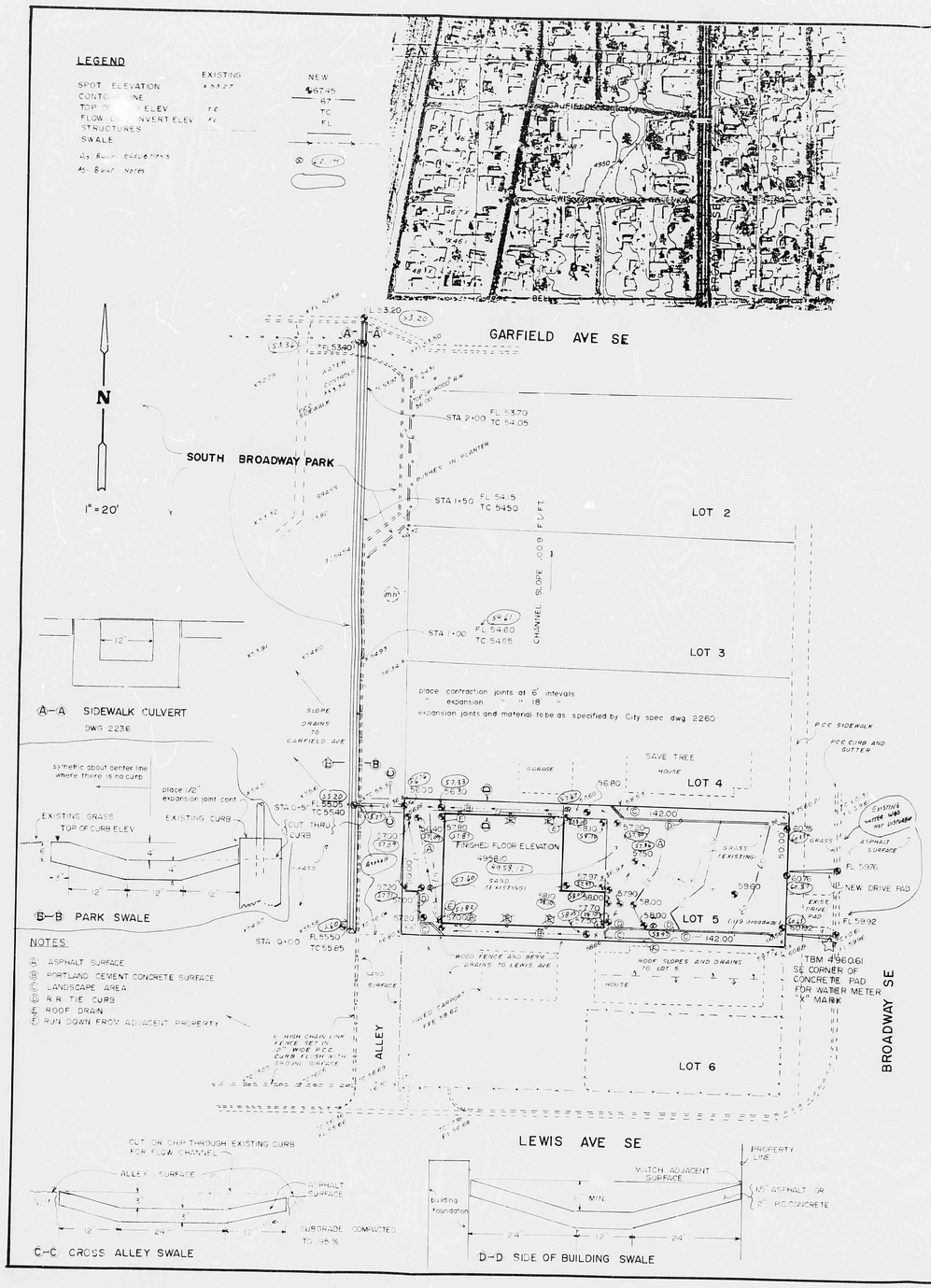

DRAINAGE CONSIDERATIONS AND CALCULATIONS

I PURPOSE:

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The site may have been used in the past as a residential lot, but at present it is vacant, containing some lawn and a number of trees and bare earth surface. The site is a 50 feet by 142 feet lot, with the east boundary being the west right-of-way line of Broadway, SE. The north and south property lines are common with adjacent developed residential property. The west property line is the right-of-way line of an alley way. To the west of the alley is the South Broadway Park, a developed grass covered public park operated by the City of Albuquerque. The site slopes generally from east to west, with runoff exiting to the northwest.

III GENERAL:

Soils: By reference C, on site soils are identified as Cut and Fill (Cu). The Cu soils are described as soils along the terrace of the Rio Grande that have a mix of sandy loam and gravelly sand. Adjacent land to the west is identified as Glendale clay loam (Gm). The Gm soil may underlay the Cu along the west part of the site. The Gm soil has a tendency for shrink and swell, so care should be taken to insure that water can not penetrate to the foundation soils. Other characteristics of the soils are satisfactory for the purpose of constructing the described structures. Runoff for both soils is moderate to rapid, and the hazard of soil erosion is slight. Surface soils observed on site are a fine sand and gravel.

Rainfall: 2.3 inches for the 6 hour 100 year frequency storm. (Plate 22.2 D-1, ref A)

Time of Concentration: The small size of the site permits use of a time of Concentration of 10 minutes. Therefor use the intensity factor of 2.15. (Plate 22.2 D-2, ref A

Run off factors: Rational formula C factors are: .90 for roof surfaces, .95 for asphalt or portland cement concrete surfaces, .40 for undeveloped areas, and .25 for landscaped areas. (ref B)

Volume run off factors: CN=96 for roof and hardstand, CN=58 for landscaped areas, and CN=79 for undeveloped areas. (Plate 22.2 C-2, ref A)

IV RUN OFF ESTIMATES:

PRESENT CONDITIONS:

Item	Area (ft^2)	%	C	C x %	CN	CN x %
Roof	0	0	.90	.0000	96	0
Hardstand	0	0	.95	.0000	96	0
Landscape	1775	25	.25	.0625	58	14.5
Undeveloped	5325	75	.40	.3000	79	59.25
total	7100	100		.3625		73.75

=.1222 acres

=0.55 in. run off
(plate 22.2 C-4, ref A)

DEVELOPED CONDITIONS:

Item	Area (ft^2)	%	C	C x %	CN	CN x %
Roof	2000	28	.90	.2520	96	26.88
Hardstand	3600	51	.95	.4845	96	48.96
Landscape	1500	21	.25	.0525	58	12.18
Undeveloped	0	0	.40	.0000	79	0
total	7100	100		.7890		88.02

=.1222 acres

=1.30 in. run off
(plate 22.2 C-4, ref A)

OFF SITE CONDITIONS:

Item	Area (ft)	%	C	C x %	CN	CN x %
Roof	400	30	.90	.2700	96	28.80
Hardstand	800	61	.95	.5795	96	58.56
Landscape	0	0	.25	.0000	58	0
Undeveloped	120	9	.40	.0036	79	7.82
total	7100	100		.8955		95.18

=.0303 acres

=1.80 in. run off
(plate 22.2 C-4, ref A)

Peak Flow: Use Rational Formula, Q=CIA, I=Intensity=2.15 x 2.3 in. = 4.945 in.
Total Flow: V=Area x Run off (V=A ft^2 x R in. x 1 ft./12in.)
Existing Conditions:
Q=CIA=(.3625) x (4.945) x (.1222) = .220 ft^3/sec.
V=AR= 7100 ft^2 x .55 in. x 1 ft./12 in. = 325 ft^3
Developed Conditions:
Q=CIA=(.7890) x (4.945) x (.1222) = .477 ft^3/sec.
V=AR= 7100 ft^2 x 1.30 in. x 1/12 = 770 ft^3
Off Site Flow:
Q=CIA=(.8955) x (4.945) x (.0303) = .137 ft^3/sec.
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N. M. P. M.

VI LINED CHANNEL DESIGN:

Park channel: A shallow channel with sloping sides to permit crossing the channel with grass mowing equipment is required for the channel in the park area. The required capicity will be about 2 CFS (3 lots x (.477+.137) = 1.84). The channel slope is .009. ((55.5-53.7)/203 ft.=.009)). Use Mannings equation $V=1.486/n \times R^{2/3}$(hydraulic radius) $\times S^{1/2}$(slope) , where n=.014 for brush or float finished concrete lining. Channel capacity is Q=V (velocity) x A(area).

Depth (ft.)	Area (ft^2)	Wp	Rh	V (ft./sec.)	Q (ft^3 /sec)
.33	.66	3.106	.2125	3.6	2.4

Sidewalk culvert: Use a standard 12 inches wide steel plate covered sidewalk culvert as shown on City of Albuquerque Standard Drawing 2236. Slope is .02 ft./ft. Capacity is as shown below:

Depth	Area	Wp	Rh	V	Q
.3	.3	1.6	.1875	4.925	1.48
.4	.4	1.8	.2222	5.52	2.20

VII CONCLUSIONS AND RECOMMENDATIONS:

A. The site is not within a designated flood hazard area.
B. The site can be developed with no additional hazard to down stream properties.

REFERENCES:

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D. City of Albuquerque Standard Specifications for Public Works Construction.

I CERTIFY THAT AS-BUILT CONDITIONS AND ELEVATIONS ARE AS SHOWN AND THAT THE DRAINAGE IS SUBSTANTIALLY AS DESIGNED

MARVIN R. KORTUM OCTOBER 2 1991

CERTIFICATE OF SURVEY BY LEONARD G. MARTINEZ, 21 APRIL, 1989.
Topographic Data by Marvin R Kortum, October, 1990.

BENCHMARK
L15-K14 Located at the intersection of Broadway Blvd. and Pacific Ave. SE. In the south east quadrant of the intersection. A square, ☑ chiseled on top of concrete curb @ the SSW curb return. @ 4957.597 1511.079

APPROVALS	BY	DATE
REV. PER PRD. DRAINAGE MRK		AUG 30 1991
ADD CHANNEL DETAILS	MRK	FEB 7 1991
PRELIMINARY	MRK/KORTUM	JAN 9 1991

THIS PLAN SHOT TWICE
ONCE ON LIGHT AND
ONCE ON DARK.

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CITY OF ALBUQUERQUE

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MARVIN R. KORTUM, P.E
Civil Engineering
1605 Speakman Drive, SE
Albuquerque, New Mexico 87123
(505) 299-0774

GRADING AND DRAINAGE PLAN
BUILDING FOR ALBERT MARTINEZ
1119 BROADWAY SE

MAP NO	SHEET	OF
L-14	1	1

HYDRO L14/D34

D 24 C 20 B 16 A 12 CITY OF ALBUQUERQUE C D