City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

December 14, 1994

Mark Goodwin
Mark Goodwin & Associates
P.O. Box 90606
Albuquerque, NM 87199

RE: REVISED GRADING/PAVING PLAN FOR DIAGNOSTEK EXPANSION
(F16-D34) REVISION DATED 12/14/94.

Dear Mr. Goodwin:

Based on the information provided on your December 14, 1994 submittal, the above referenced site is approved for Grading/Paving.

Please be advised that a separate permit is required for construction within City Right-of-Way. A copy of this approval letter must be on hand when applying for the excavation permit.

Engineer Certification per the D.P.M. checklist will be required after completion of project.

If I can be of further assistance, please feel free to contact me at 768-2667.

Sincerely,

Bernie J. Montoya, CE
Engineering Associate

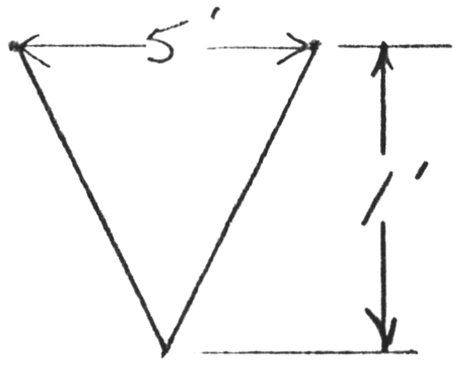
BJM/dl/WPHYD/3747

c: Andrew Garcia
Arlene Portillo
File

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT DIAGNOSTEK PARKING EXPANSION
SUBJECT DRAINAGE
BY RM DATE 28 NOV 94
CHECKED _____ DATE _____
SHEET 1 OF 1

- GRAVEL LINED SWALE (NORTH OF PARKING LOT & PONDING AREA)



$$Q = \frac{k}{n} A R_H^{2/3} S^{1/2}$$

$K = 1.49$ $A = 2.5\ ft^2$ $S = 0.0062$ (PARKING LOT)
$n = 0.025$ $R_H = A/WP$ $= 0.0025$ (PONDING AREA)
$WP = 5.39$

- SWALE NORTH OF PARKING LOT

$$Q = \frac{1.49}{0.025}(2.5)\left(\frac{2.5}{5.39}\right)^{2/3}(0.0062)^{1/2}$$

$Q = 7.03$ cfs

- SWALE NORTH OF POND

$$Q = \frac{1.49}{0.025}(2.5)\left(\frac{2.5}{5.39}\right)^{2/3}(0.0025)^{1/2}$$

$Q = 4.46$ cfs

MAXIMUM Q FROM AHYMO RESULTS

$Q = 3.03$ cfs

$Q_{MAX} < Q_{POND} < Q_{PARKING\ LOT}$

3.03cfs < 4.46 cfs < 7.03cfs

CHANNEL DIMENSIONS HAVE CAPACITY FOR TOTAL FLOW

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT DIAGNOSTEK EXPANSION
SUBJECT DRAINAGE
BY RM DATE 3 Nov 94
CHECKED _____ DATE _____
SHEET 1 OF 3

- SIZE OF NEW ADDITION

41,625 ft² 0.9556 ACRE 0.0015 SQ MI

- MAXIMUM ALLOWABLE FLOW OFF PROPERTY

$0.9556 * 0.1 = 0.0956$ cfs

- RESULTS FROM AHYMO

$Q = 3.03$ cfs $\quad T_{PEAK} = 1.5$ HRS

$\forall_{PEAK} = 0.0902$ ACRE-FEET

- SIZING OF POND

HOLD 95% OF $\forall$OLUME

$\forall_{POND} = 0.0902 * 0.95 = 0.0857$ ACRE-FEET $= 3733$ ft³

$\forall$ @ 1.5' DEPTH

50' x 50' INITIAL ESTIMATE

ELEVATION	AREA(ft²)	$\forall$OLUME ft³	ACRE-FEET
39.50	8001		
		4294.5	0.0986
40.00	9177		

$\forall_{POND} > \forall_{PEAK} > \forall_{HELD}$

$\forall_{POND} >> \forall_{HELD}$

$0.0986 >> 0.0857$

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT DIAGNOSTEK EXPANSION
SUBJECT DRAINAGE
BY RM DATE 4 Nov 94
CHECKED _____ DATE _____
SHEET 2 OF 3

• PIPE SIZING FOR ALLOWABLE FLOW OFF PROPERTY

$Q = 0.10 cfs$

FLOW WILL DISCHARGE FROM POND VIA A 2" PVC PIPE WITH AN ORIFICE CAP PLACED ON PIPE. THE DISCHARGE POINT FOR THE POND WILL BE ON THE SOUTH SIDE OF DESERT SURF CIRCLE, DUE NORTH OF POND.

$Q = CA\sqrt{2gH}$

$A = \frac{\pi}{4} d^2$ $\qquad A = \frac{Q}{C\sqrt{2gH}}$

$C = 0.8$

$g = 32.2$ $\qquad \frac{\pi}{4} d^2 = \frac{Q}{C\sqrt{2gH}}$

$H = 0.5$ $\qquad d^2 = \frac{4Q}{\pi C\sqrt{2gH}}$

$$d = \sqrt{\frac{4Q}{\pi C\sqrt{2gH}}} = \sqrt{\frac{4(0.1)}{\pi(0.8)\sqrt{2(32.2)0.5}}}$$

$d = 0.17'$

$= 2''$

*AN ORIFICE PLATE IS UNNECESSARY IN THIS APPLICATION. THE 2" PVC PIPE WILL SUFFICE.

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

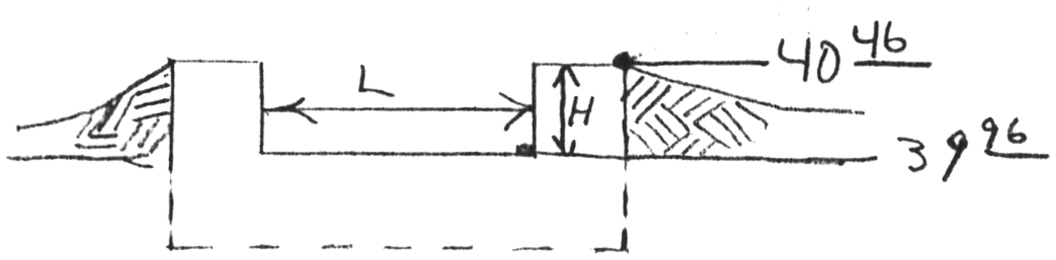
PROJECT DIAGNOSTEK EXPANSION
SUBJECT DRAINAGE
BY RM DATE 4 Nov 94
CHECKED _____ DATE _____
SHEET 3 OF 3

- MAXIMUM WATER SURFACE ELEVATION

ELEVATION	VOLUME (ACRE-FEET)
39^{50}	0
X	0.0902
40^{00}	0.0986

$X = 39^{96}$ MAXIMUM WATER SURFACE ELEVATION
*INDICATED ON PLAN

- EMERGENCY SPILLWAY



$Q = CLH^{3/2}$ $C = 2.9$

$Q = 3.03$

$L = Q/CH^{3/2}$ $H = 0.5'$

$= 3.03/2.9(0.5)^{3/2}$

$L = 2.96'$

SET OPENING @ $L = 3'$

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Consulting Engineers and Surveyors

JOB Diagnostik Expansion
SUBJECT Drainage
JOB NO. 92-50 SHEET 1 OF ____
BY GMM DATE 7 92
CHECKED ____ DATE ____

RECEIVED
JUL 27 1992
HYDROLOGY

The intent of this plan is to effectively drain areas of the proposed expansion while minimizing the impact on the existing, approved drainage plan. As this plan now exists, runoff is collected in basins A and B of Parcel "E" and discharged at a controlled rate into Alexander Blvd. and Montbell Loop. The new scheme will not change basin B, however, expansion of the structure to the east will reduce the area of basin A by approximately 8700 ft.^{2}. Spillway and discharge invert elevation will not be altered for these basins.

Expansion of this facility will extend into all of tract 12-B and the southern one-third of Parcel "E". Drainage basin C will consist of landscaping and and parking west of the building addition. Drainage basin D will accept all roof runoff and encompass all parking east of the building. A narrow section of a driveway between tracts 12-A and 12-B will be graded to convey runoff into the adjoining parking lot of tract 12-A. The drainage plan for tract 12-A has been previously designed to accept substaintially more runoff than this small area will generate.

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

JOB Diagnostek Expansion
SUBJECT Drainage
JOB NO. 92-50 SHEET 2 OF 7
BY GMM DATE 7/24/92
CHECKED _____ DATE _____

Total Area of site expansion = 3.966 Ac. 100%

Area of Tract 12-B to drain into 12-A = 0.035 Ac. 0.9%

Area of Basins C = 0.238 Ac. 6.0%

Area of Basin D = 3.693 Ac 93.1%

Land Treatment (Commercial site)

A = 0% B = 10% C = 0% D = 90%

Incremental time D_t = 0.05 hr.

Time to peak t_p = 8.0 minutes = 0.1333 hr (minimum)

Runoff quantities were generated utilizing AHYMO and a 24-hour event due to the ponding.

A copy of the program input and output is enclosed.

Input parameters were obtained from the COA Development Process Manual, August 1991.

Peak Discharge Rate $Q_{(100-24)}$ = 16.93 cfs

Runoff Volume V = 0.7228 Ac-Ft = 31485 cu. ft.

Allowable Discharge Q_{max} = 10% of Area = 0.40 cfs

dmg D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

JOB Diagnostek Expansion
SUBJECT Drainage
JOB NO. 92-50 SHEET 3 OF 7
BY GMM DATE
CHECKED DATE

Drainage Basin C

Area = 0.238 Ac - 6% of site

$Q_{Allowable}$ = 6% (0.40 cfs) = 0.024 cfs

Ponding Volume = 6% (31485 cu. ft.) = 1889 cu. ft. (required)

Detention Time = 21.9 hrs Discharge Invert @ 40.70 ft.

The ponding area for basin C will occupy a portion the western parking lot. Discharge via a concrete side walk culvert into Alexander Boulevard will be restricted to the allowable flow by an orifice plate at the entrance. Slight modifications to the existing driveway grade will enable it to serve as the overflow spillway.

MAX. Water Surface Elevation

$\left(\frac{\text{ponding req'd}}{\text{ponding provided}}\right)$ Δ water surface + pond invert elevation

$\left(\frac{1889\ ft^3}{1928\ ft^3}\right)$ 1.02 ft + 40.70 ft = 41.70 ft ⟸ Spillway Elevation

Size orifice for depth of 1.0 ft, Q_{max} = 0.024 cfs

$$A = \frac{Q}{C\sqrt{2gH}} = \frac{0.024\ cfs}{0.8\sqrt{2(32.2)(1.0)}} = 0.004\ ft^2 \rightarrow \text{use } 1\text{" diameter openning}$$

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JOB Diagnostek Expansion
SUBJECT Drainage
JOB NO. 92-50 SHEET 4 OF 7
BY JMM DATE 7/24/92
CHECKED _____ DATE _____

Drainage Basin D

Area = 3.693 Ac - 93.1% of site

$Q_{allowable}$ = 93.1% (0.40 cfs) = 0.372 cfs

Ponding Volume = 93.1% (31485 ft^3) = 29313 cu.ft. (required)

Detention Time = 21.9 hrs Discharge Invert @ 40.16 ft

All roof run off will be collected along the north side of the proposed building addition and conveyed via a concrete swale into the eastern parking lot. At this point, all runoff from basin D will be ponded in the northeast portion of the parking area to a maximum depth that will be controlled by the adjacent driveway / spillway. Gradual release through a 6" diameter PVC line and a 12" wide concrete sidewalk culvert will be restricted by a sized orifice plate.

Max Water Surface Elevation

$\left(\frac{29313\ ft^3}{30568\ ft^3}\right)$ 2.74 ft + 40.16 ft = 42.79 ft ← Spillway Elevation

Size orifice for depth of 2.63 ft and Q_{max} = .376 cfs

$A = \frac{0.376}{(.8)\sqrt{2(32.2)(2.63)}} = 0.036\ ft^2$ → use 2½" diameter opening

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JOB Diagnostek Expansion
SUBJECT Drainage
JOB NO. 92-50 SHEET 5 OF 7
BY GMM DATE 7/24/92
CHECKED _____ DATE _____

Ponding Provided (Drainage Basin C)

Elevation	Δ Elevation	Area	Avg. Area	Volume
40.70		0		
	1.02		1890	1928 ft³
41.72		3780		

(Drainage Basin D)

40.16		0		
	0.84		4,248	3,568
41.00		8,496		
	1.00		12,172	12,172
42.00		32,840		
	0.90		16,476	14,828
42.90		65,792		

30,568 ft³

Drainage From Tract 12-B Entering Tract 12-A

Actual runoff from driveway joining tracts:

Area = 0.035 Ac. — 0.9% of total

Q_{peak} = (0.9%)(16.93 cfs) = 0.15 cfs

$Volume_{peak}$ = (0.9%)(31485 ft^3) = 274 ft^3

Existing Drainage Capacity - Tract 12-A

Drainage calculations for the development of Tract 12-B (Club Market Center) were submitted by Hall Engineering Company and approved in 1989.

Total ponding required: 17,500 ft^3

Total ponding provided: 18,100 ft^3

Designed peak flow from 12-A onto 12-B: Q_{100} = 1.79 cfs

D. Mark Goodwin & Associates, P.A.
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JOB Diagnostek Expansion
SUBJECT Drainage
JOB NO. 92-50 SHEET 1 OF 1
BY JMM DATE 7/24/92
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Conveyance Swale on North Side of Addition

Area of roof draining into this swale: $A = 0.992\ Ac$

Portion of total basin $\frac{0.992A}{3.966} = 25\%$

$Q_{100} = (16.93\ cfs)\ 25\% = 4.23\ cfs$

Use 8" by 30" concrete channel - the capacity is:

$Q = \frac{1.49}{0.15}(1.667)(0.435)^{2/3}(0.25)^{1/2}$

$Q = 4.75\ cfs$

$A = 1.667\ ft^2$

$r_H = 0.435$

slope = 0.25%

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

November 23, 1994

John MacKenzie
D. Mark Goodwin & Associates
P.O. Box 90606
Albuquerque, NM 87199

RE: ENGINEER CERTIFICAITON FOR DIAGNOSTEK EXPANSION (F16-D3H)
ENGINEER CERTIFICATION STATEMENT DATED 11/15/94.

Dear Mr. MacKenzie:

Based on the information provided on your November 15, 1994 submittal, Engineer Certification for the above referenced site is acceptable.

If I can be of further assistance, please feel free to contact me at 768-2667.

Sincerely,

Bernie J. Montoya, CE
Engineering Associate

BJM/dl/WPHYD/3647

c: Andrew Garcia
File

THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPLOYER

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT Diagnostek Expansion
SUBJECT Drainage
BY JMM DATE 5/17/23
CHECKED _____ DATE _____
SHEET 1 OF ____

DRAINAGE BASIN D

With the addition of supplemental landscaping areas, the Basin "D" size increased from 3.693 Acres to 4.0663 Acres. Basin "D" will now be split into Basin "D-1" and Basin "D-2". A new ATHYMO run was executed (enclosed) to determine the required ponding volume and peak flows for each sub-basin.

Basin "D-1"

The peak flow for Basin "D-1" is 4.98 cfs with a required ponding volume of 9235 cu. ft. With a drainage basin area of 1.164 acres, the allowable flow is 0.12 cfs at 0.1 cfs per acre.

From the orifice eqn.: $A = \frac{Q}{C\sqrt{2gh}} = \frac{0.12}{(0.8)\sqrt{2(32.2)(2)}} = .0128\ ft^2$

$d = \sqrt{\frac{4A}{\pi}} = \sqrt{\frac{4(.0128)}{\pi}} = 1.53$ in. use 1½" opening

The orifice invert will be at 5041.00 and the spillway crest will be set at 5042.31 (see following calcs.)

The orifice controlled drain will discharge into ponding area "D-2".

The maximum water surface elevation for pond area "D-1" will be determined after the sizing calculations.

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT Diagnostek Expansion
SUBJECT Drainage
BY JMM DATE 5/17/93
CHECKED _____ DATE _____
SHEET 2 OF ____

Pond "D-1" sizing Calculations:

To detain a volume of 9235 cu ft, ponding area "D-1" has an area of 3150 ft^2 @ elev. 5041.00 and an area of 6162 ft^2 @ elevation 5143.00

Elevation	Area (sq. ft.)	Avg. Area (sq. ft.)	Depth (ft.)	Volume (cu. ft.)
5041	3150			
		4656	2	9312
5043	6162			

Spillway for Ponding Area "D-1"

For a peak flow of 4.98 cfs (A+4Mo), the required spillway width and spillway elevation is:

$\left(\frac{\text{ponding req'd}}{\text{ponding provided}}\right)$ Δ water surface + pond invert elevation

$\left(\frac{9235}{9312}\right) 2 + 41 = 42.98$ ← Max. water surface for "D-1"

Spillway length $L = \frac{Q}{2.9 H^{3/2}}$

$L = \frac{4.98 \text{ cfs}}{2.9(0.67)^{3/2}}$ 3.13 ft

use 3'-2" wide spillway with 8" high on sides

Setting the spillway H @ 42.31 would mean the depth of flow over the spillway, H, would be H = 0.67 ft or 8" deep.

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT Diagnostek Expansion
SUBJECT Drainage
BY JMM DATE 5/12/93
CHECKED _____ DATE _____
SHEET 3 OF ____

Basin "D-2"

For Drainage Basin "D-2", the peak flow is 12.39 cfs and the basin size is 2.903 acres.

Therefore, the allowable will be 0.29 cfs @ 0.1 cfs/acre

The orifice size is $A = \frac{Q}{C\sqrt{2gh}} = \frac{0.29}{0.8\sqrt{(2)(32.2)(1.27)}} = 0.04\ ft^2$

where $H = 1.27'$ is the depth of ponding

$diam. = \sqrt{\frac{4A}{\pi}} = \sqrt{\frac{4(5.77 in^2)}{\pi}} = 2.71$ in. use $2\frac{3}{4}$" opening

The orifice invert will be set to 5039.73.

From AHYMO the req'd ponding volume is 23,035 ft^3 for Basin "D-2"

Elevation	Area (sq. ft.)	Avg Area (sq. ft.)	Depth (ft.)	Volume (cu. ft.)
5039.70	0			
		7487.5	0.27	2022
5040.00	14975			
		21050	1.00	21050
5041.00	27125			
				23072

Max Water Surface

$\left(\frac{23035}{23072}\right)1.30 + 39.70 = 5041.00$ ←

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Consulting Engineers and Surveyors

PROJECT Diagnostek Expansion
SUBJECT Drainage
BY JMM DATE 5/17/93
CHECKED _____ DATE _____
SHEET 4 OF ____

Spillway for Basin "D-2"

The spillway for Basin "D-2" will be sized to accommodate the peak for Basin "D-1" (Q_{peak} = 4.98 cfs) and the peak for Basin "D-2" (Q_{peak} = 12.39 cfs) for a total of 17.37 cfs at a depth of 8".

L = Length of spillway $\qquad L = \dfrac{Q}{C H^{3/2}}$

$L = \dfrac{17.37}{2.9(.67)^{3/2}} = 10.92$ use 11' wide spillway @ 8" high

For the sidewalk, this will involve 5 double culverts (24" wide) and 1 single culvert (12" wide).

.106420
UNIT PEAK = 16.118 CFS UNIT VOLUME = .9985 B = 526.28 P60 = 1.96
0
AREA = .004082 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

K = .131484HR TP = .133300HR K/TP RATIO = .986380 SHAPE CONSTANT, N =
.579744
UNIT PEAK = 1.1097 CFS UNIT VOLUME = .9898 B = 326.10 P60 = 1.96
0
AREA = .000454 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .050000

PRINT HYD ID=2 CODE=1

PARTIAL HYDROGRAPH 101.20

RUNOFF VOLUME = 2.18605 INCHES = .5288 ACRE-FEET
PEAK DISCHARGE RATE = 12.39 CFS AT 1.500 HOURS BASIN AREA = .0045 SQ. MI.

***** THESE ARE BASIN "D-2" RUNOFF QUANTITIES FOR THE 100 YEAR, 24 HOUR
FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 10:26:43

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

June 16, 1993

Mark Goodwin
D. Mark Goodwin & Associates
P.O. Box 90606
Albuquerque, NM 87199

RE: REVISED DRAINAGE PLAN FOR DIAGNOSTEK EXPANSION (F16-D3H)
REVISION DATED 6/10/93.

Dear Mr. Goodwin:

Based on the information provided on your June 10, 1993 resubmittal, the above referenced site is approved for Building Permit.

Please attach a copy of this approved plan to the construction sets prior to sign-off by Hydrology.

Also, a separate permit is required for construction within City Right-of-Way. A copy of this approval letter must be on hand when applying for the excavation permit.

Please be advised that prior to Certificate of Occupancy release, Engineer Certification per the D.P.M. checklist will be required.

If I can be of further assistance, please feel free to contact me at 768-2667.

Sincerely,

Bernie J. Montoya

Bernie J. Montoya, CE
Engineer Associate

BJM/dl/WPHYD/3647

xc: Alan Martinez
Darlene Saavedra
File

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

April 21, 1993

Mark Goodwin
D. mark Goodwin & Associates
P.O. Box 90606
Albuquerque, NM 87199

RE: REVISED DRAINAGE PLAN FOR DIAGNOSTEK (F16-D3H) REVISION
DATED 4/15/93.

Dear Mr. Goodwin:

Based on the information provided on your April 16, 1993 resubmittal, the above referenced site is approved for Building Permit.

Please attach a copy of this approved plan to the construction sets prior to sign-off by Hydrology.

Also, a separate permit is required for construction within City Right-of-Way. A copy of this approval letter must be on hand when applying for the excavation permit.

Please be advised that prior to Certificate of Occupancy release, Engineer Certification per the D.P.M. checklist will be required.

If I can be of further assistance, please feel free to contact me at 768-2667.

Sincerely,

Bernie J. Montoya

Bernie J. Montoya, CE
Engineer Associate

BJM/dl/WPHYD/3647

xc: Alan Martinez
Darlene Saavedra
File

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

September 30, 1992

Mark Goodwin
Mark Goodwin & Associates
P.O. Box 90606
Albuquerque, NM 87199

RE: REVISED DRAINAGE PLAN FOR DIAGNOSTEK (F16-D3H) ENGINEER'S STAMP DATED 9/18/92.

Dear Goodwin:

Based on the information provided on your September 21, 1992 resubmittal, the above referenced site is approved for Building Permit.

Please attach a copy of this approved plan to the construction sets prior to sign-off by Hydrology.

Also, a separate permit for construction within City Right of Way is required. A copy of this approval letter must be on hand when applying for the excavation permit.

Please be advised that prior to Certificate of Occupancy release, Engineer Certification per the D.P.M. checklist will be required.

If I can be of further assistance, please feel free to contact me at 768-2667.

Sincerely,

Bernie J. Montoya

Bernie J. Montoya, CE
Engineering Assistant

BJM/dl/WPHYD/3747

xc: Alan Martinez
Darlene Saavedra
File