

SQUAW PEAK HIGHWAY

GENERAL PLAN

DRAINAGE REPORT

March, 1989

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Submitted by



Michael Baker, Jr., Inc.
Phoenix, Arizona

SQUAW PEAK HIGHWAY
GENERAL PLAN
DRAINAGE REPORT

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Urban Highway
Section

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I. INTRODUCTION

This report identifies the major drainage elements of the Squaw Peak Highway from Glendale Avenue to the Outer Loop (Pima Freeway). Included in this report are discussions on the pavement drainage, cross drainage, detention and stormwater pump systems as well as special consideration areas, (i.e. equestrian and bicycle crossings.) Each design segment of the Squaw Peak Highway will be discussed to provide information necessary for the final engineering design of drainage systems within that segment.

The design discharges used in this report were developed from hydrologic studies of the highway system and have been previously published by Baker Engineers in the "Squaw Peak Highway Final Hydrology Report." Design discharges for major offsite and cross drainage systems will be included in the discussions for each respective design segment. Details of the discharge computations can be found in the hydrology report and will not be reproduced in this text.

For discussion purposes, the Squaw Peak Highway will be separated into the following design segments:

1. Glendale Avenue to Northern Avenue
2. Northern Avenue to Shea Boulevard
3. Shea Boulevard to Sweetwater Avenue
4. Sweetwater Avenue to Greenway Road
5. Greenway Road to Bell Road
6. Bell Road to the Central Arizona Project
7. Central Arizona Project to Outer Loop (Pima Freeway)

The location map for the Squaw Peak General Plan is shown in Figure 1.

II. GLENDALE AVENUE TO NORTHERN AVENUE

A. Myrtle Wash Detention Basin

To offset increased stormwater discharges from the construction of the Squaw Peak Highway, a detention basin is planned on acreage bounded by Myrtle Wash, 20th Street, Orangewood Avenue and the Squaw Peak Highway, see Figure 2. This basin will provide detention storage for highway pavement drainage between Station 32+00 and Station 62+10 as well as a portion of the cross drainage at Orangewood Avenue. Discharges from the basin will be through an outlet discharge pipe and emergency overflow structure to the drop structure at the upstream crossing of Myrtle Wash under the Squaw Peak Highway. Preliminary calculations were based on a 24-inch discharge pipe. The intake structure will be designed to accommodate more frequent storms (i.e. 10-year, 25-year, 50-year) in addition to the 100-year storm.

A schematic of the basin was developed using 100 year discharge inflow hydrographs. The detention basin configuration consists of side slopes of 2:1 with an average depth of 12 to 14 feet. Preliminary computations indicate that a storage volume of 250,000 to 300,000 cubic feet will be required for a 100 year storm. Due to the depressed pavement section of Squaw Peak Highway in this area, additional consideration must be given to prevent backwater effects of the basin onto the pavement. Final configuration of the basin must take into account the construction of berms in the general vicinity of 20th Street for noise mitigation.

B. Myrtle Wash Crossing

The major portion of stormwater runoff from the area east of the Squaw Peak Highway is concentrated in Myrtle Wash. 50 and 100 year discharges of 1,301 cfs and 1,528 cfs, respectively have been computed for the area. A 10 foot by 10 foot reinforced concrete box culvert is proposed to convey these flows under the Squaw Peak Highway, see Figure 3.

The proposed pavement elevations of the highway at Myrtle Wash are approximately equal to the existing flowline of the wash. To move water under the freeway will require a 12 to 15 foot drop in the flowline of the

wash to accommodate the highway. A combination drop structure and energy dissipation structure is to be designed at the inlet side of the box culvert. Additionally, channel excavation and lining will be required on the downstream side of the box culvert to meet existing flowlines.

The existing equestrian trail along the east side of 19th Street is proposed to be relocated along the east side of the highway in the vicinity of Myrtle Wash. It is proposed that the trail utilize the box culvert at Myrtle Wash as an equestrian crossing. As such, consideration must be given to the entrance and exit treatments of the box culvert to accommodate this use.

C. Glendale Avenue Pump Station

Under the City of Phoenix contract for the Squaw Peak Parkway Segment No. 5B, roadway construction will terminate with the ramps on the northern half of the Glendale Avenue interchange. Included in this project is the construction of a 12,600 gallons per minute (GPM) pump station at Glendale Avenue to drain the depressed section of the Squaw Peak Highway at the interchange, see Figure 4. Ramp drainage and discharge from the pump station will be carried by a storm sewer system to the south into the Arizona Canal Division Channel (ACDC).

Included in the design of the reach of the Squaw Peak Highway between Glendale Avenue and Northern Avenue is the design of catch basins and storm sewers which will drain to the Glendale Avenue Pump Station. Approximately 1,400 linear feet of mainlane pavement drainage is included in this design. The design of the pump station by Howard Needles Tammen Bergendoff (HNTB) for the City of Phoenix contract has included the additional drainage area north of Glendale Avenue.

D. Pavement Drainage

Catch basins for pavement and median drainage will consist of ADOT Standards Type 1 and Type 4, respectively. Curb heights will vary between three and six inches depending upon the roadway being in a fill or depressed section. Allowable spread of pavement flows will be in accordance with ADOT guidelines for urban highways.

Pavement drainage between Stations 32+00 and Station 62+10 will be drained to the south to the proposed detention basin at Myrtle Wash. Peak discharges will be reduced by the basin and then discharged into Myrtle Wash. Pavement elevations south of Station 32 + 00 will not allow drainage to the Myrtle Wash basin without ponding stormwater across the mainlane pavement and will be discharged directly to Myrtle Wash. Similar problems between Station 62+10 and Northern Avenue will require that pavement drainage be discharged to existing drainage ways at Station 66+80, 71+00, 74+30 and the proposed 10 foot by 4 foot concrete box culverts at the previous Dreamy Draw Park entrance (Station 83+50).

E. Cross Drainage

Due to existing residential and light commercial development in the areas downstream of the Squaw Peak Highway, cross drainage flows are to be restricted to existing levels. Capacities of the existing culverts were calculated and reinforced concrete pipes (RCP) and concrete box culverts (CBC) of equivalent flow capacity were chosen for each crossing. The following cross drainage pipes are recommended to replace the existing systems:

<u>Station</u>	<u>Proposed Pipe</u>		<u>Existing Pipe</u>	<u>Discharges</u>	
	<u>Size</u>	<u>Material</u>	<u>Size</u>	Q50	Q100
37+00	48"	RCP	48"	119 cfs	134 cfs
52+00	24"	RCP	24"	28 cfs	31 cfs
55+10	30"	RCP	36" x 22"	18 cfs	20 cfs
58+20	36"	RCP	43" x 27"	17 cfs	19 cfs
71+00	30"	RCP	30"	35 cfs	39 cfs
74+30	36"	RCP	36"	52 cfs	57 cfs
83+50	2-10'x4'	CBC	2-Arch Pipes	618 cfs	703 cfs

The existing pipe at Orangewood Avenue (Station ±37+00) is to be replaced with a 48-inch RCP. Downstream restrictions and proposed pavement elevations restrict the size of the culvert such that significant headwater depths would be needed to convey flood flows. To offset this condition, an inlet structure and second 48-inch RCP are proposed at Orangewood Avenue

to split discharges and carry a portion of the runoff to the Myrtle Wash detention basin, see Figure 5.

F. Pleasant Drive Crossing

As with the Myrtle Wash crossing, the proposed 10 foot by 10 foot box culvert at Pleasant Drive will serve multiple purposes. The crossing size exceeds the drainage needs for the watershed draining to it and is sized to provide access for horses and bicycles, see Figure 7. Special attention to entrance and exit structures will be needed to allow for these multi-uses. Design discharges for the crossing are $Q_{50} = 80$ cfs and $Q_{100} = 90$ cfs.

G. Northern Avenue Drainage

A 48-inch storm sewer line is proposed to cross Northern Avenue on the east side of the Squaw Peak Highway, see Figure 9. This pipe will collect offsite runoff from a portion of the Dreamy Draw Park area to the east and convey it to the inlet structure for the dual 10' x 4' concrete box culverts under Squaw Peak. Pavement drainage for Northern Avenue will be discharged to the wash at the outlet of the proposed dual 10' x 4' box culverts.

III. NORTHERN AVENUE TO SHEA BOULEVARD

A. Equestrian Crossing

A dual purpose crossing is proposed under the Squaw Peak Highway at Station 126+80, see Figure 12. The 10 foot by 10 foot concrete box culvert will allow for equestrian riders to move from one side of the highway to the other within the Phoenix Mountain Preserve. The 10 foot by 10 foot culvert is of sufficient size to convey upstream drainage under the highway and into the Dreamy Draw Reservoir. Design discharges for the crossing are $Q_{50} = 19$ cfs and $Q_{100} = 21$ cfs.

B. Cross Drainage

Apart from the Equestrian crossing at Station 126+80, only one additional cross drainage culvert is planned for the reach of the Squaw Peak Highway between Northern Avenue and the Dreamy Draw Dam. A 60-inch RCP culvert is proposed for cross drainage at Station 124+80 to carry storm runoff into the Dreamy Draw Reservoir, see Figure 12. Design discharges for the cross culvert are $Q_{50} = 93$ cfs and $Q_{100} = 113$ cfs.

C. 26th Street Exit Ramp

To accommodate the northbound exit ramp to 26th Street, it becomes necessary to carry offsite and pavement drainage through a closed conduit system, see Figure 13. A 10 foot by 10 foot concrete box culvert is proposed between Station 142+60 and 147+40. The box culvert is split at Station 146+40 into a 10 foot by 5 foot box culvert which will carry hillside drainage from the Phoenix Mountain Preserve and a 10 foot by 10 foot box culvert which drains the north and south side trunk sewer lines, see Sections D and E. Included in the design will be any internal transition structures, junction boxes, inlet headwalls, outlet headwalls and energy dissipation structures.

Design discharges for the box culvert system are as follows:

<u>Station to Station</u>		<u>Q50</u>	<u>Q100</u>	<u>Pipe Size</u>
Outfall	146+40	890 cfs	1078 cfs	10' x 10' CBC
146+40	147+00	344 cfs	418 cfs	10' x 05' CBC
146+40	147+40	546 cfs	660 cfs	10' x 10' CBC

Cross drainage for areas north of the Squaw Peak Highway and west of 26th Street will be conveyed by cross culverts at Stations 135+85 and 143+00. Preliminary pipe sizes and design discharges for the cross culverts are as follows:

<u>Station</u>	<u>Q50</u>	<u>Q100</u>	<u>Pipe Size</u>
135+85	70 cfs	57 cfs	48" RCP
143+00	222 cfs	182 cfs	66" RCP

D. Trunk Storm Sewer (South Side)

Stormwater runoff from the Mountain Preserve and the area of 29th Street at Northern Avenue is presently drained by a series of washes along Northern Avenue. Construction of the Squaw Peak Highway will cut off many of these washes. A trunk storm sewer line along the south side of the highway is planned to intercept runoff from the mountains in the reach from 32nd Street to the 26th Street, see Figure 13 - 16.

Using the following discharges from the Hydrology Report, a gravity storm sewer system was sized to carry runoff into the Dreamy Draw Reservoir.

<u>Station to Station</u>		<u>Q50</u>	<u>Q100</u>	<u>Pipe Size</u>
147+40	158+15	303cfs	367cfs	72" RCP
158+15	163+35	264cfs	320cfs	72" RCP
163+35	168+40	175cfs	211cfs	66" RCP
168+40	178+50	134cfs	162cfs	60" RCP
178+50	182+30	121cfs	146cfs	54" RCP

Offsite stormwater and pavement drainage will be collected in the trunk storm system. Inlets to the system from the offsite washes will be sized and designed to accommodate site specific conditions.

E. Trunk Storm Sewer (North Side)

A large diameter trunk storm sewer along the north side of the Squaw Peak Highway will collect runoff from the 29th Street and Northern Avenue areas, see Figures 13 15. Existing washes on the east and west side of 26th Street will be collected in the storm sewer system and discharged into the proposed 8 foot by 8 foot box culvert under the 26th Street exit ramp.

The gravity storm sewer system to drain offsite areas north of the Squaw Peak Highway was sized to carry the following discharges:

<u>Station to</u>	<u>Station</u>	<u>Q50</u>	<u>Q100</u>	<u>Pipe</u> <u>Size</u>
Junction Box	150+50	242cfs	293cfs	78" RCP
150+50	155+00	80cfs	97cfs	48" RCP
155+00	165+80	66cfs	80cfs	42" RCP

The limits of the storm sewer beyond Station 165+80 will be dictated by local site conditions at the Mercury Mine School. Final layout of grading plans for this area will determine the upstream limits of the storm sewer system.

F. Mountainview Road Detention Basin

Construction of the northbound exit ramp to 32nd Street will require the reconstruction of a portion of the embankment for Detention Basin No. 99, see Figure 16. This detention basin, located at the intersection of 32nd Street and Mountainview Road, consists of a primary outlet structure with a 27" RCP discharge pipe and a large concrete emergency overflow structure.

The existing 27" discharge pipe and inlet structure will be removed as part of the roadway construction. No modification or demolition of the emergency overflow structure appears to be necessary. The existing earthen

embankment will be realigned and regraded to accommodate the proposed exit ramp.

A new intake structure and discharge pipe will be built prior to realignment of the embankment. This discharge system will be connected to the proposed trunk storm sewer along the south side of Squaw Peak with ultimate discharge into the Dreamy Draw Reservoir. Storage volumes within the basin will be increased as necessary to offset volume lost by the construction of the new earthen embankment.

G. Pavement Drainage

Highway pavement south and west of the roadway crest near Station 174+00 will be drained into the proposed trunk storm sewers along the north and south side of the roadway. ADOT standard catch basins and median drains will be used throughout the entire reach from Northern Avenue to Shea Boulevard.

Pavement north and east of the roadway crest near Station 174+00 will be drained into a collector storm sewer system along Squaw Peak to Shea Boulevard. ADOT's construction schedule temporarily halts northward construction of the highway with the bridge at Shea Boulevard. In the interim time period, pavement drainage will be collected in the sump of an interim pump station near Shea Boulevard, see Figure 19. Ultimate roadway construction will continue the collector storm sewer north to a permanent pump station facility to be located near Cactus Road.

H. Shea Boulevard Siphon and Pump Station

The existing 78-inch RCP storm sewer in Shea Boulevard will be severed by the construction of the depressed section of the Squaw Peak Highway. The proposed drainage channel along the west side of the highway is not deep enough to drain the 78-inch line. To provide positive drainage for the area currently served by the storm sewer, a siphon is to be constructed beneath the main lanes of the highway with its downstream terminus being the existing 78-inch storm sewer east of Squaw Peak, see Figure 19.

At least one access manhole will be constructed on the siphon line in addition to a low level drain line. This drain line is to be connected to the sump of the interim pump station at Shea Boulevard. Until the roadway construction is completed between Shea Boulevard and Cactus Road, this pump station will serve a dual purpose. The Shea Boulevard siphon will use the station as a drain outlet when maintenance is required on the line and the mainlane pavement drainage between Station 176+00 and Shea Boulevard will use the station as an outlet. Stormwater will be discharged from the pump station into the existing 78-inch storm sewer via a force main and manhole on the east side of the Squaw Peak Highway. Upon completion of the next highway section to the north and the proposed pump station near Cactus Road, the Shea Boulevard Station, could remain as a permanent drain outlet for the Shea Boulevard siphon.

IV. SHEA BOULEVARD TO SWEETWATER AVENUE

A. Pavement Drainage

Storm runoff collected along the mainlanes and ramps between Shea Boulevard and Sweetwater Avenue will be transported through a trunk storm sewer. Outfall for the trunk line will be the pump station to be located near Cactus Road. This station is to be located between the proposed drainage channel and the southbound entrance ramp at Shea Boulevard, see Figure 22.

B. Cactus Road Siphon

Construction of the depressed mainlanes of Squaw Peak will interrupt flows in the existing 78-inch storm sewer in Cactus Road. As with the existing storm sewer in Shea Boulevard, the proposed drainage channel along the west highway right-of-way is not of sufficient depth to gravity drain the Cactus Road storm sewer. A siphon under the highway is proposed with sufficient access to the line for maintenance. A gravity drain line will be connected from the siphon to the wet well of the Cactus Road pump station for servicing the siphon.

C. Cactus Road Pump Station

Pavement drainage from Station 176+00 to Sweetwater Avenue will be drained to the wet well of the Cactus Road pump station. Peak 50 year inflow for this pump station is estimated at 150 cfs. The pump station site is located on the southwest corner of the Squaw Peak - Cactus Road traffic interchange between the concrete drainage channel and the southbound entrance ramp, see Figure 22. Stormwater flows will be discharged into the concrete drainage channel adjacent to the pump station.

D. Offsite Drainage Channel

A concrete drainage channel is planned to parallel the Squaw Peak Highway from Shea Boulevard to Sweetwater Avenue, see Figures 19-24. At Sweetwater Avenue, the channel will cross under the highway and discharge into Indian Bend Wash. Surface runoff, which presently flows from west to east along such streets as Shea Boulevard, Cholla Street, Cactus Road and Sweetwater Avenue to Indian Bend Wash, will be intercepted before reaching

the highway and diverted into the proposed channel. The following channel dimensions have been determined for the respective reaches:

	<u>Bottom Width</u>	<u>Channel Type</u>
Shea Boulevard to Cholla Street	16 feet	Concrete Trapezoidal (2:1 side slopes)
Cholla Street to Cactus Road	36 feet	Concrete Rectangular
Cactus Road to Sweetwater Ave	45 feet	Concrete Rectangular
Sweetwater Avenue to Outfall	55 feet	Concrete Rectangular

E. Indian Bend Wash

Between the Squaw Peak Highway and 40th Street, excavation of Indian Bend Wash is required to offset runoff being conveyed by the offsite drainage channel as well as the existing flows within the wash. The channel flowline will be lowered to provide a gravity outlet for the Squaw Peak Highway and adjacent area drainage. Preliminary computations indicate that an earthen channel with an average bottom width of 160 feet with sides slopes of 4:1 (H:V) or lower would be sufficient, see Figures 44 - 46.

The outlet from the offsite drainage channel will require design of an energy dissipation structure near Sweetwater Avenue. This structure should reduce flow velocities before reaching the wash. Roadway sections at 36th Street and 40th Street will continue to serve as fords for Indian Bend Wash. Discharges for Indian Bend Wash are:

<u>Location</u>	<u>Q50</u>	<u>Q100</u>
Sweetwater Avenue to 40th Street	6,090 cfs	7,430 cfs
Thunderbird Road to Sweetwater Avenue	1,810 cfs	2,310 cfs

V. SWEETWATER AVENUE TO GREENWAY ROAD

A. Pavement Drainage

Catch basins and inlets along the roadway between Sweetwater Avenue and the crest over Thunderbird Road will outlet to the concrete drainage channel or directly to Indian Bend Wash. Some lateral storm sewer pipe will be necessary to concentrate stormwater discharges to Indian Bend Wash at one outfall location.

Pavement between Thunderbird Road and Greenway Road will be drained to the trunk storm sewer line along the east side of the highway. Inlets in the sag area under Greenway will not be tied to the trunk storm sewer because hydraulic grade line elevations will pond water across the mainlane pavement. This will require that a pump station be constructed at Greenway Road to drain the portion of the roadway unable to drain to a gravity outlet.

B. Offsite Drainage Channel (Emile Zola to Sweetwater Avenue)

As with the area south of Sweetwater Avenue, the highway will sever the existing west-east drainage paths of the water between Thunderbird Road and Sweetwater Avenue. A concrete rectangular channel with a 20 foot bottom width is proposed to intercept runoff between Emile Zola and Sweetwater Avenue, see Figures 24 and 25. The channel will outlet into the offsite channel from the south at Sweetwater Avenue.

C. Indian Bend Wash - Thunderbird Road to Sweetwater Avenue

Clearances for the drainage structure under Thunderbird Road called for the lowering of the downstream flowline along Indian Bend Wash. Beginning at the confluence of the offsite drainage channel and Indian Bend Wash at Sweetwater Avenue, a 0.20% bottom slope was carried up to the Thunderbird Road crossing. An earthen channel with a 30 foot bottom width and 4:1 side slope appears to be adequate for drainage purposes, see Figures 42 - 44.

D. Box Culvert Crossing - Thunderbird Road

Existing flows along Indian Bend Wash through the proposed Venturoso Park will be blocked by the construction of the Squaw Peak overpass at Thunderbird Road. A box culvert crossing consisting of three 10 foot x 8 foot reinforced concrete box culverts is proposed, see Figures 26 and 27. The inlet structure on the west side of the highway will have sufficient capacity to allow for passage of the 100 year discharge and work into the plan for Venturoso Park. The outlet structure into Indian Bend Wash will also include the outfall for the trunk storm sewer line which will parallel the highway along the east side. Design discharges for the crossing are $Q_{50} = 1,410$ cfs and $Q_{100} = 1,730$ cfs.

E. Greenway Road Pump Station

Outfall depths in Indian Bend Wash limit the portion of the highway pavement north of Thunderbird Road which can be drained by gravity. Computations indicate that a 1,200 foot long section of the highway at the sag under Greenway Road will have to drain to a pump station. This station is to be located on the southeast corner of the Squaw Peak - Greenway Road traffic interchange, see Figure 29. The station will be designed for an inflow of approximately 45 cfs and will discharge to the east side trunk storm sewer.

F. East Side Trunk Storm Sewer

The area north of Thunderbird Road and east of the Squaw Peak Highway presently drains to the southwest across the alignment of the highway. To intercept the surface runoff, a trunk storm sewer is planned to intercept surface flows at existing concentration points, (i.e. washes or culverts.) These flows along with storm runoff from the roadway pavement will be carried along the east side of the highway and discharged into Indian Bend Wash, see Figures 26 - 29. The reach between Indian Bend Wash and Greenway Road has been initially sized for a 10 foot by 6 foot reinforced concrete box culvert. Design discharges for this reach are $Q_{50} = 433$ cfs and $Q_{100} = 601$ cfs.

VI. GREENWAY ROAD TO BELL ROAD

A. Pavement Drainage

Catch basins and inlets along the roadway between Greenway Road and Bell Road will outlet into the trunk sewer line along the east side of Squaw Peak Highway.

B. East Side Trunk Sewer

The east side trunk storm sewer line which outfalls to Indian Bend Wash will be extended north to intercept surface runoff before reaching the highway, see Figures 30 - 33. The 10 foot by 6 foot concrete box sewer will be reduced to an 8 foot by 6 foot concrete box between Greenway Road and Paradise Lane. Design discharges for this reach are $Q_{50} = 350$ cfs and $Q_{100} = 463$ cfs. North of Paradise Lane, the trunk sewer has been preliminarily sized as a 6 foot by 6 foot concrete box sewer and will extend north of Bell Road to the south end of Paradise Valley Park. Design discharges for this reach are $Q_{50} = 317$ cfs and $Q_{100} = 399$ cfs.

C. 36th Street Storm Sewer

The City of Phoenix has completed design of a trunk storm sewer to provide drainage along 36th Street from Bell Road to Greenway Road. This 54-inch storm sewer will tie into an existing storm sewer at Greenway Road and outfall into Indian Bend Wash. The line is to be laid at a depth of approximately 8 feet below natural ground and will be cut off by the Squaw Peak Highway. The 54-inch storm sewer will be cut near Monte Cristo Avenue and carried to the east under the mainlanes of Squaw Peak. On the east side of the highway, the storm sewer will be tied into the proposed 8 foot by 6 foot trunk sewer which will outfall to Indian Bend Wash, see Figure 31.

VII. BELL ROAD TO THE CENTRAL ARIZONA PROJECT

A. Pavement Drainage

Storm water collected along the roadway and ramps between Bell Road and the CAP will be connected to the trunk sewer which parallels the Squaw Peak Highway on the east.

B. East Side Trunk Sewer

The east side trunk sewer will collect the cross drainage and the pavement drainage and discharge these flows to Indian Bend Wash, see Figures 33 - 37. There are two major cross drainage inflows in this reach at Station $\pm 462+00$ and at Station $\pm 487+00$. Inlets to the system will be constructed at these locations to collect offsite flows and will be designed to meet specific site conditions. A 72-inch storm sewer is planned for the reach between the south end of Paradise Valley Park and Union Hills Drive. Design discharges for this reach are $Q_{50} = 238$ cfs and $Q_{100} = 295$ cfs. The trunk sewer north of Union Hills Drive will be sized to accommodate only pavement drainage.

VIII. CENTRAL ARIZONA PROJECT TO THE OUTER LOOP (PIMA FREEWAY)

A. Pavement Drainage

All storm waters collected on the mainline and ramps for this reach will be discharged into the flood storage pools behind the detention dikes of the Central Arizona Project.

B. Granite Reef Aqueduct Floodway

The Squaw Peak Highway north of the CAP canal will cross the flood storage pools of the Granite Reef Aqueduct detention basins. The proposed Outer Loop Highway will intercept the major portion of the cross drainage for the area and will convey these storm water west along the Outer Loop to the CAP embankment. The storm water will flow along the berm on the north side to the floodway. The Squaw Peak Highway must maintain a 125 foot open space between the CAP embankment and the fill of the Squaw Peak Highway. An equal amount of filled placed for the Squaw Peak Highway must be removed from the floodway in order to maintain the design volume that presently exists.

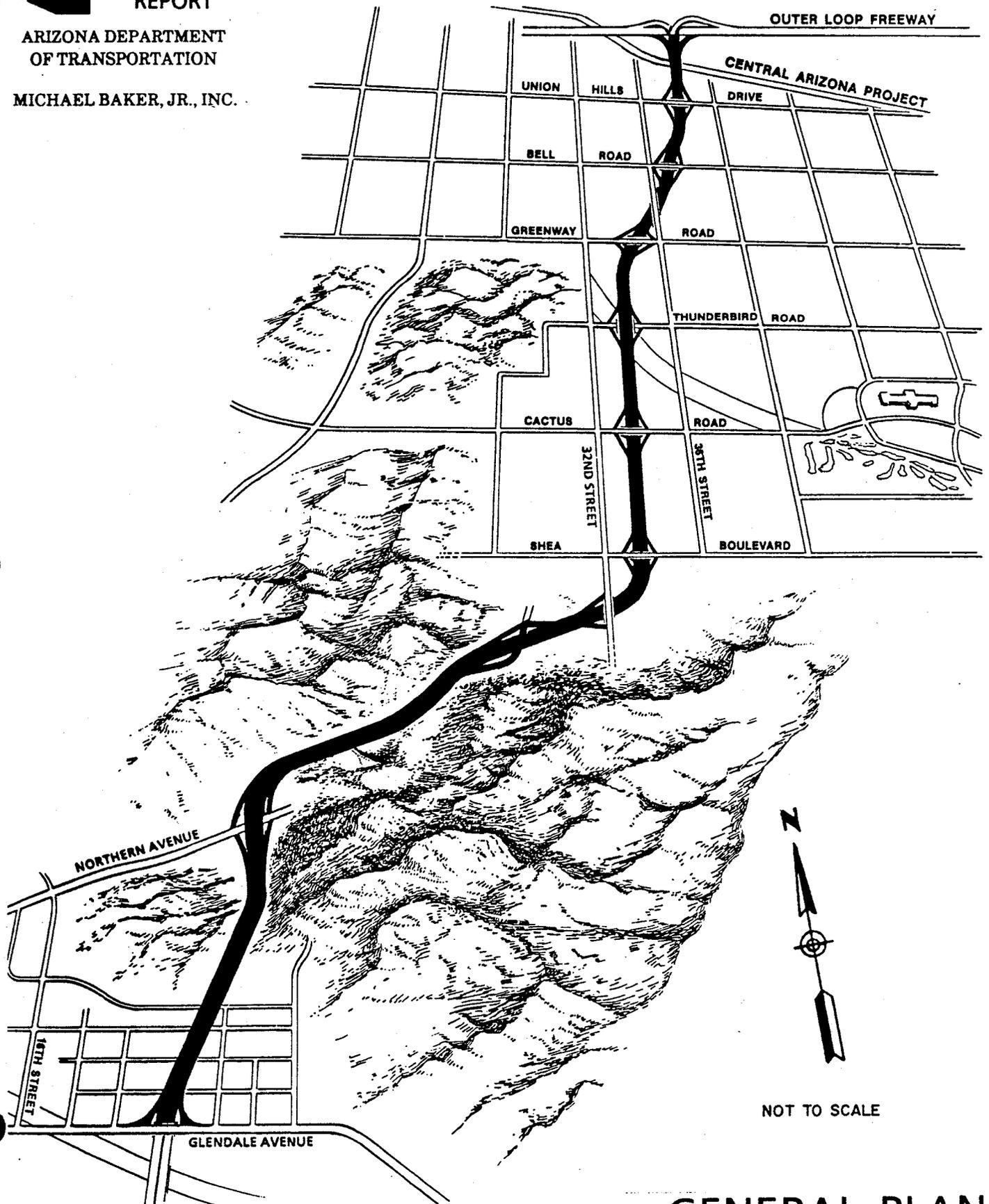


**SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT**

ARIZONA DEPARTMENT
OF TRANSPORTATION

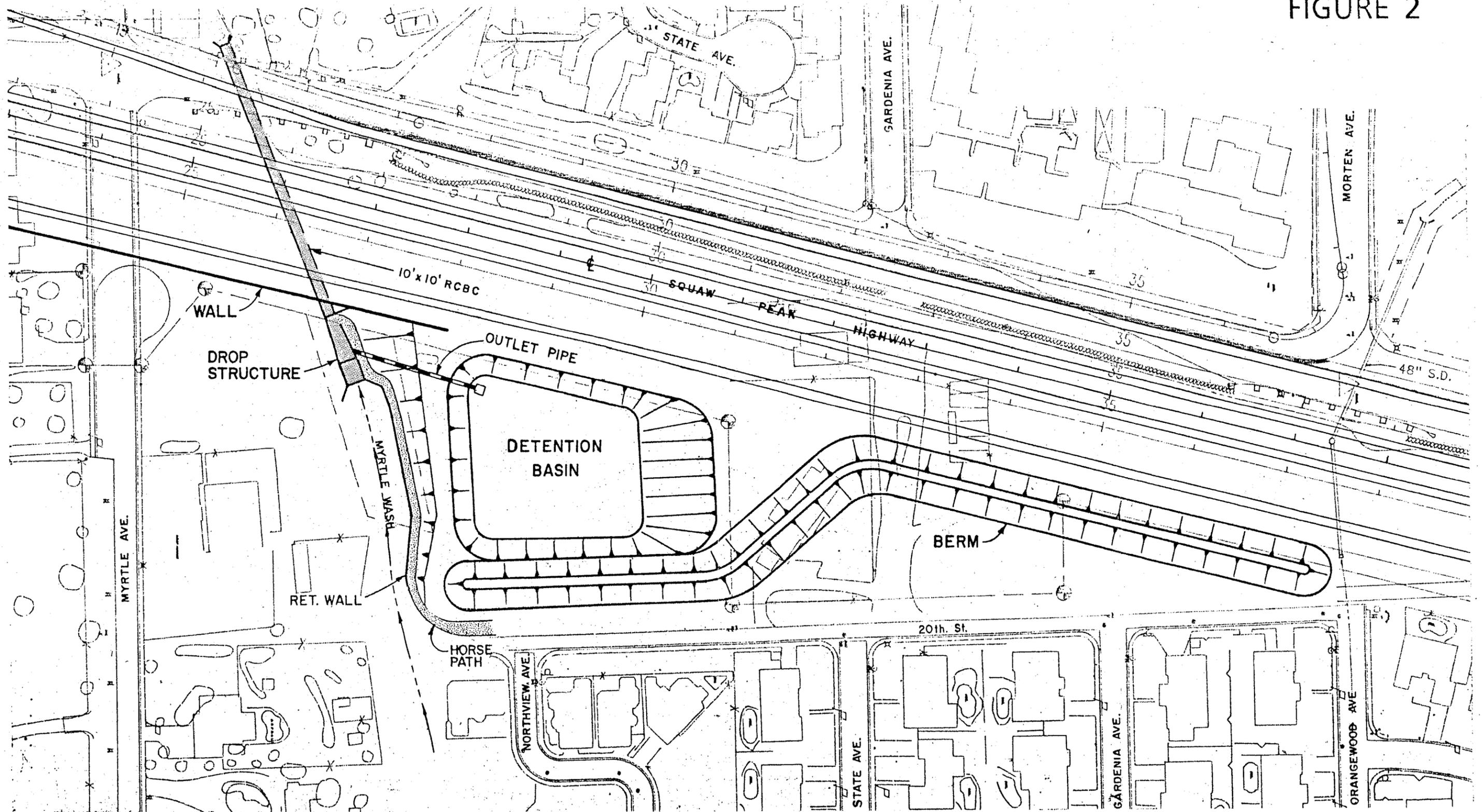
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FIGURE 1



GENERAL PLAN

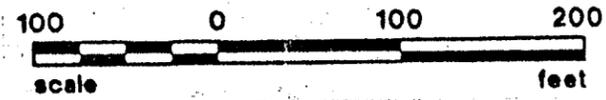
FIGURE 2



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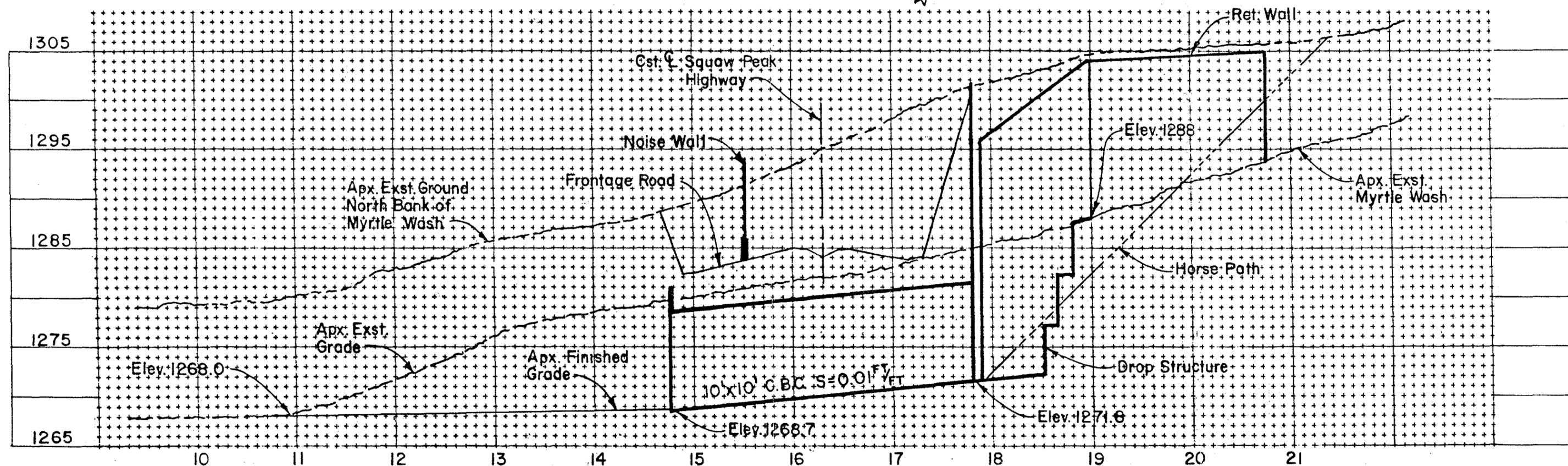
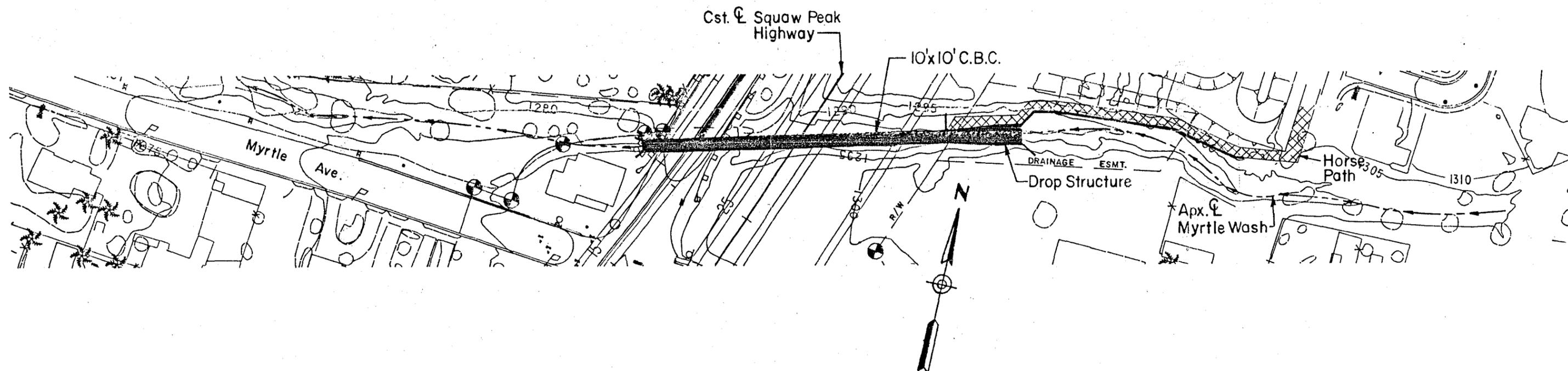
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MYRTLE WASH
DETENTION BASIN PLAN

FIGURE 3



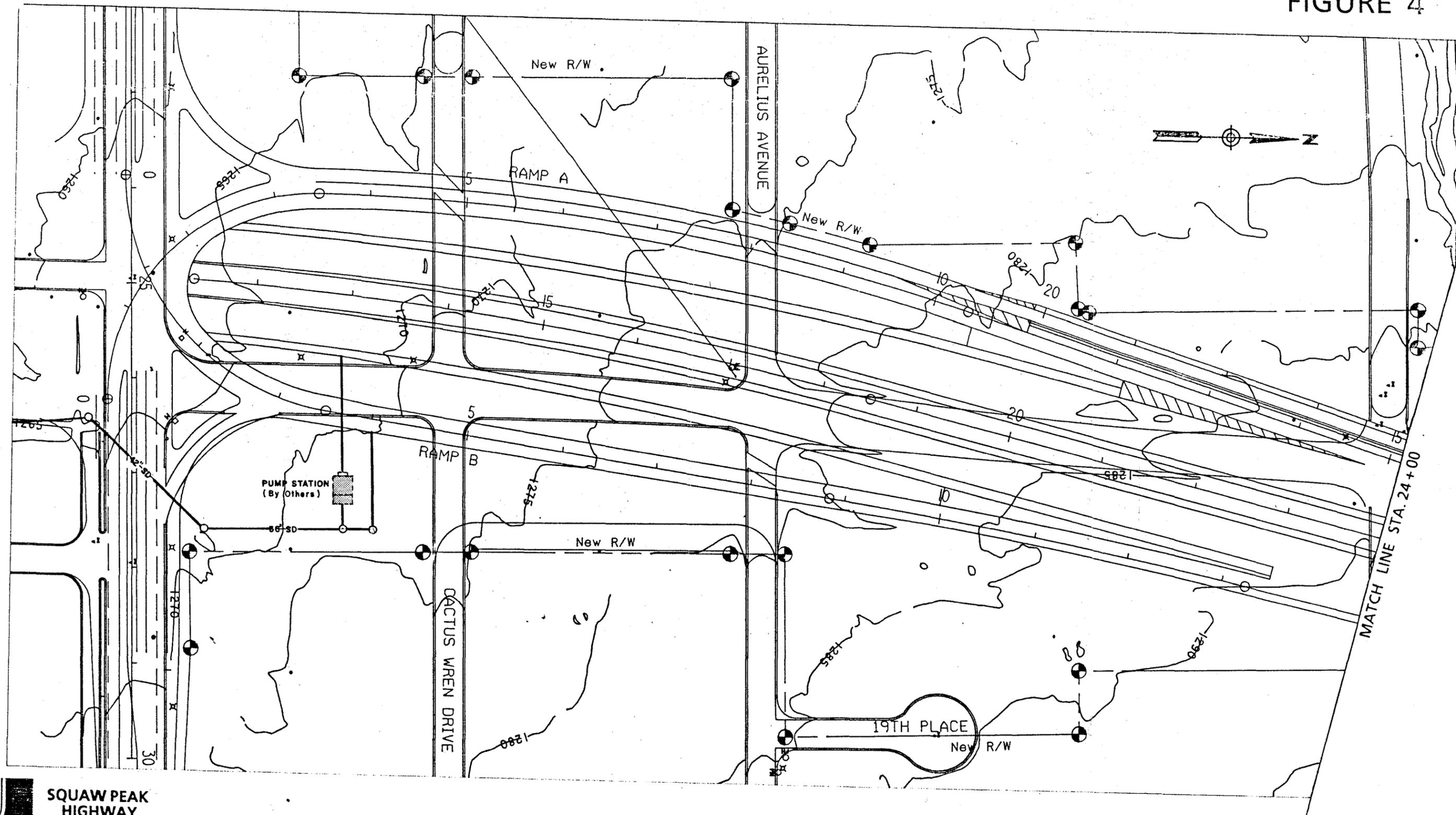
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MYRTLE WASH
CROSS DRAINAGE
PLAN & PROFILE

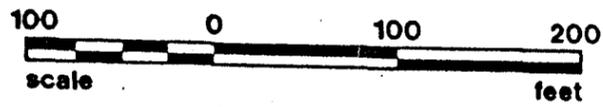
FIGURE 4



**SQUAW PEAK
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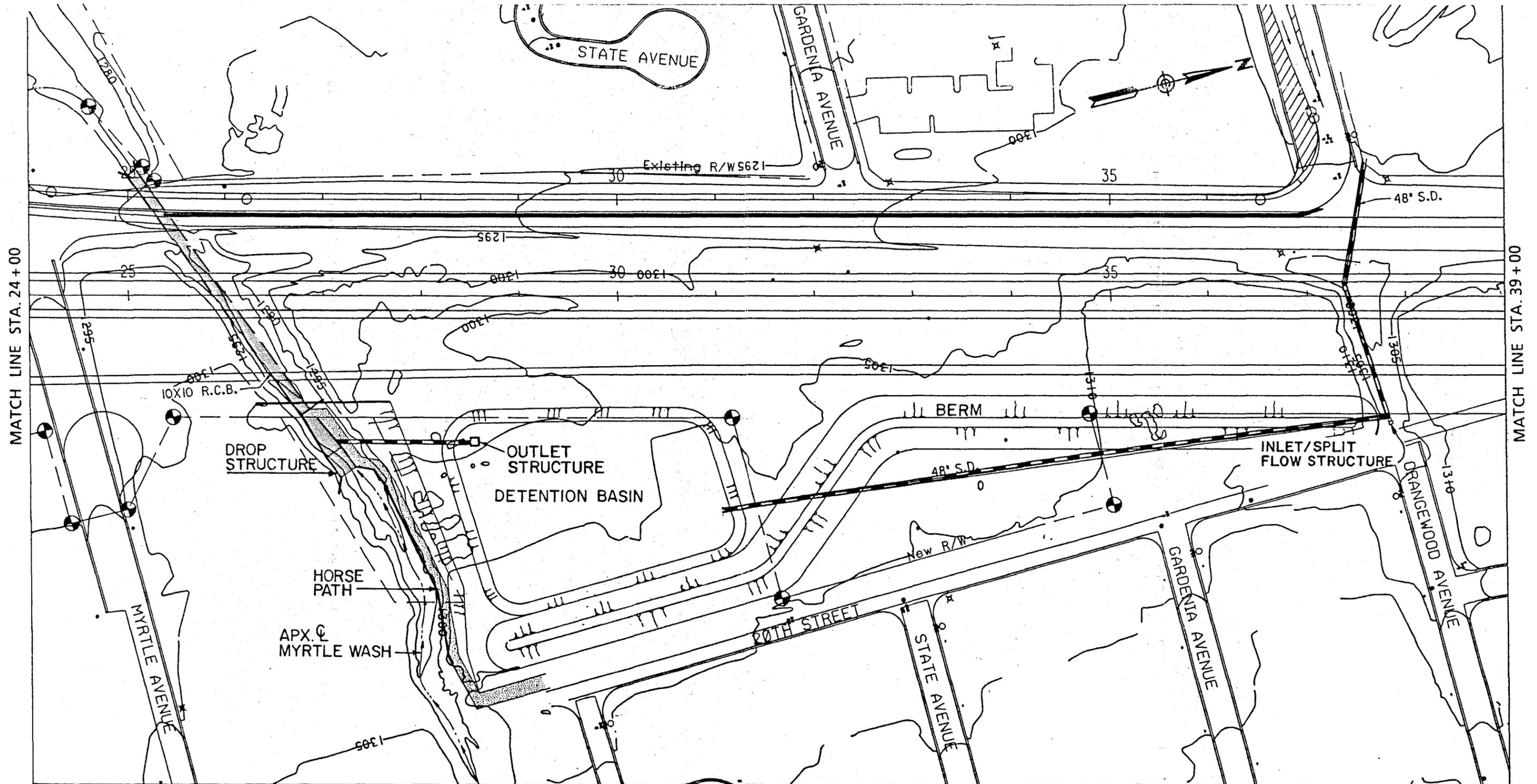
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Contour Interval 5ft.

**GENERAL PLAN
STA. 11 + 00 TO STA. 24 + 00**

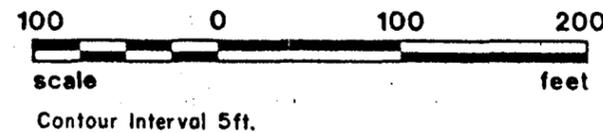
FIGURE 5



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

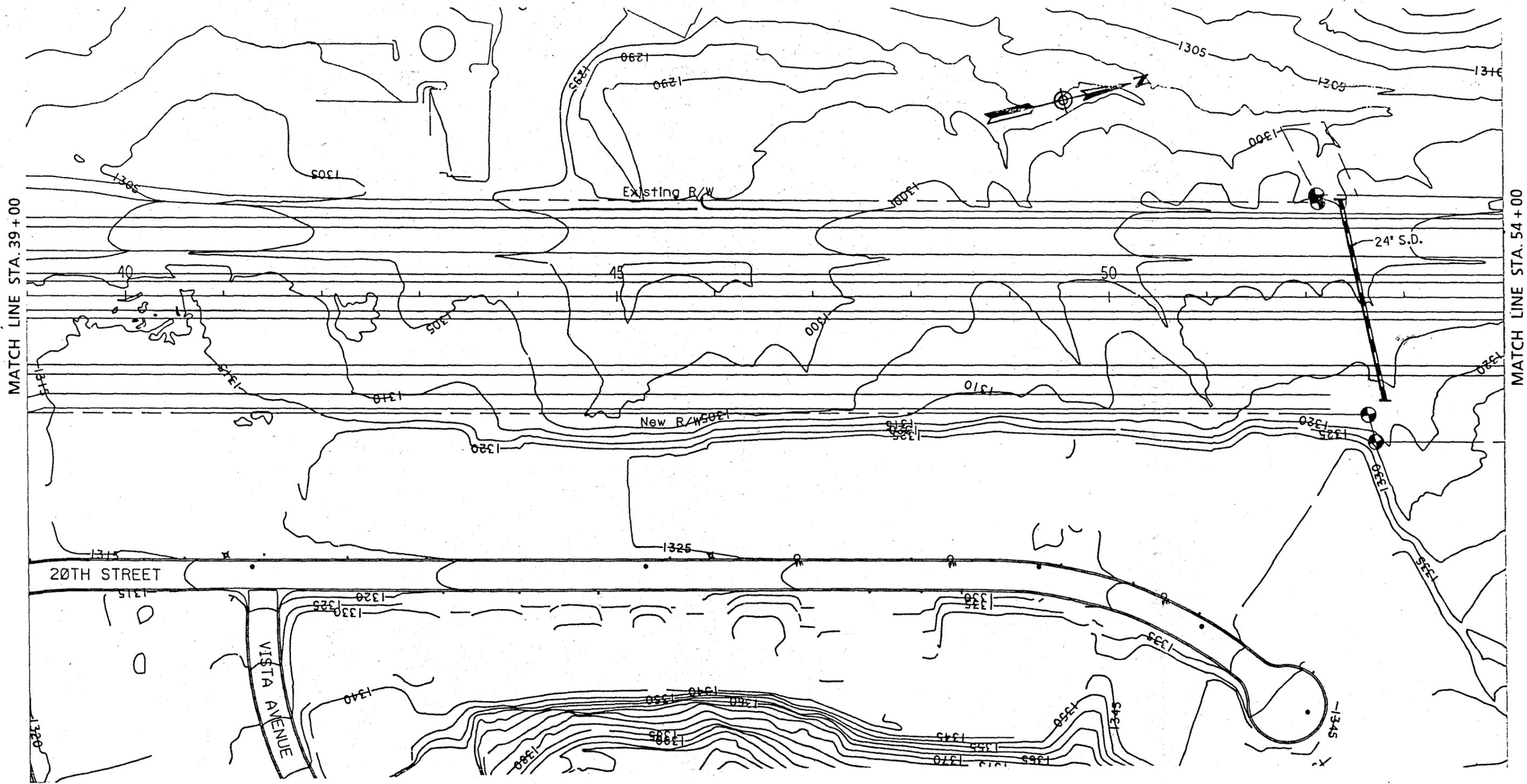
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



GENERAL PLAN
STA. 24 + 00 TO STA. 39 + 00

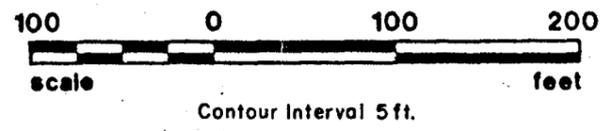
FIGURE 6



MATCH LINE STA. 39+00

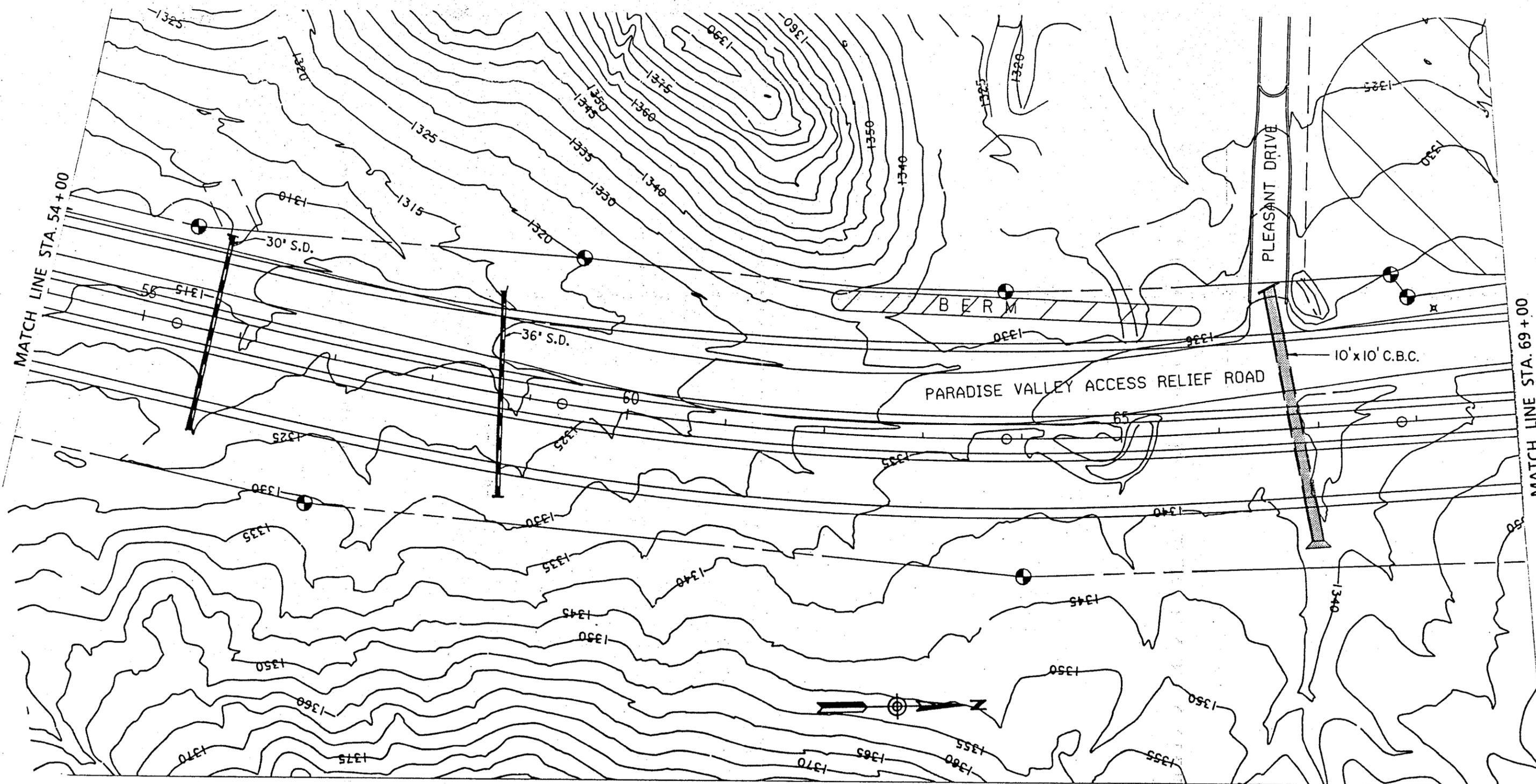
MATCH LINE STA. 54+00


**SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT**
ARIZONA DEPARTMENT
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MICHAEL BAKER, JR., INC.



**GENERAL PLAN
STA. 39+00 TO STA. 54+00**

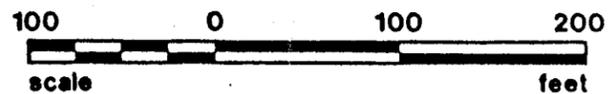
FIGURE 7



**SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT**

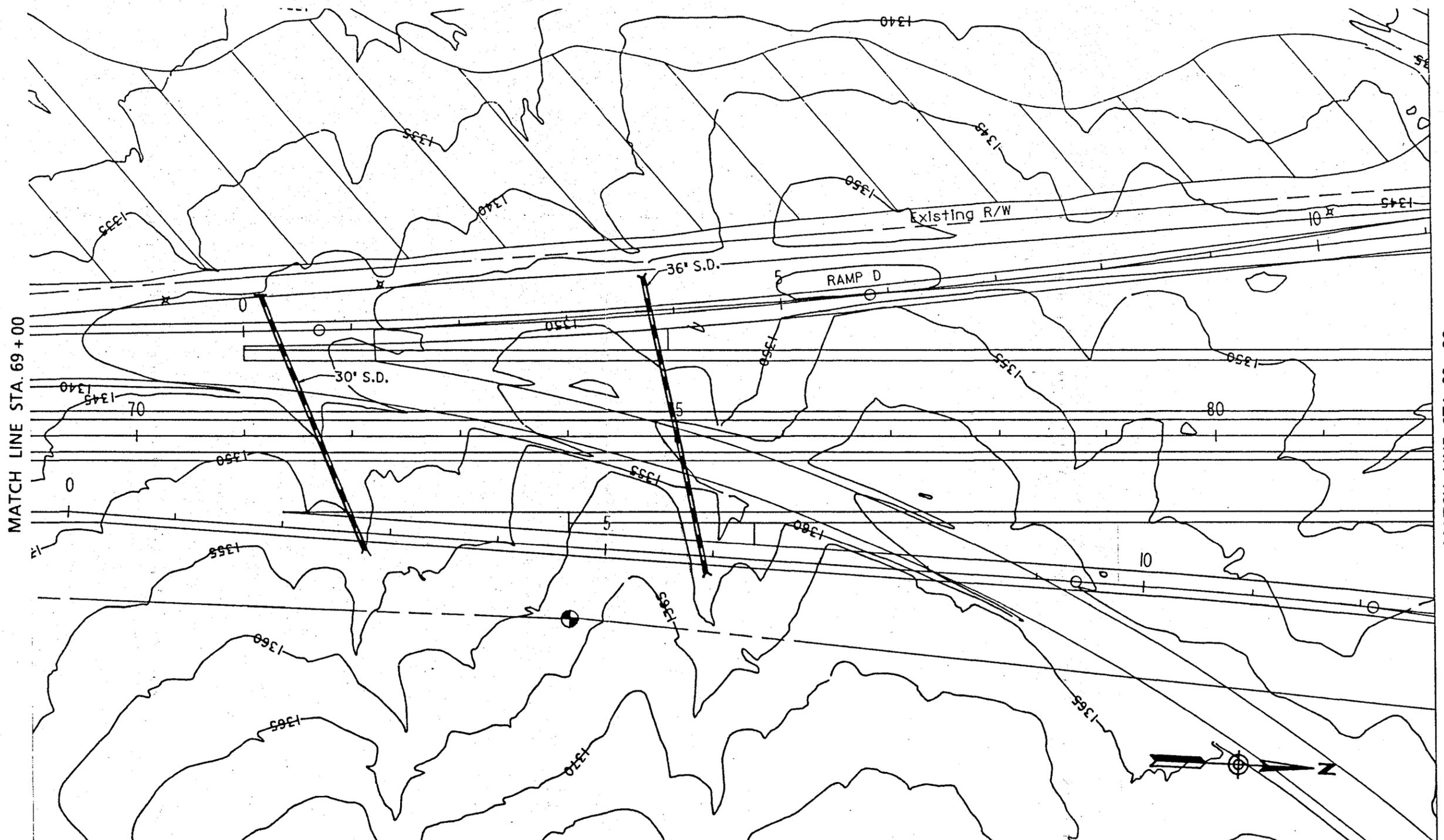
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



**GENERAL PLAN
STA. 54+00 TO STA. 69+00**

FIGURE 8



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

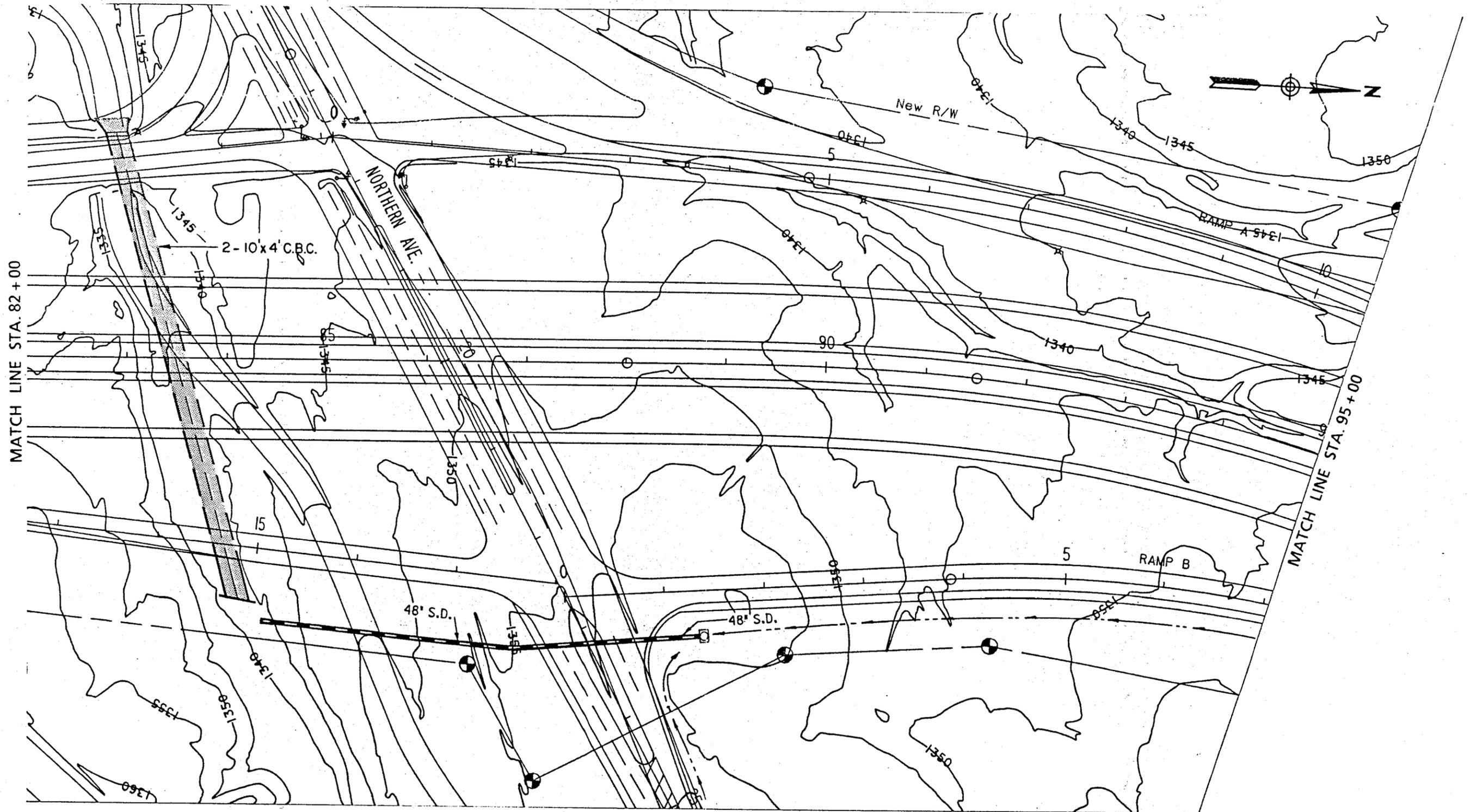
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



GENERAL PLAN
STA. 69 + 00 TO STA. 82 + 00

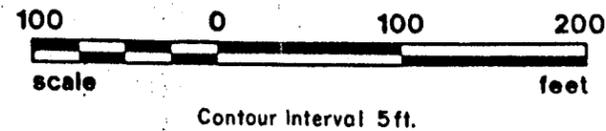
FIGURE 9



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

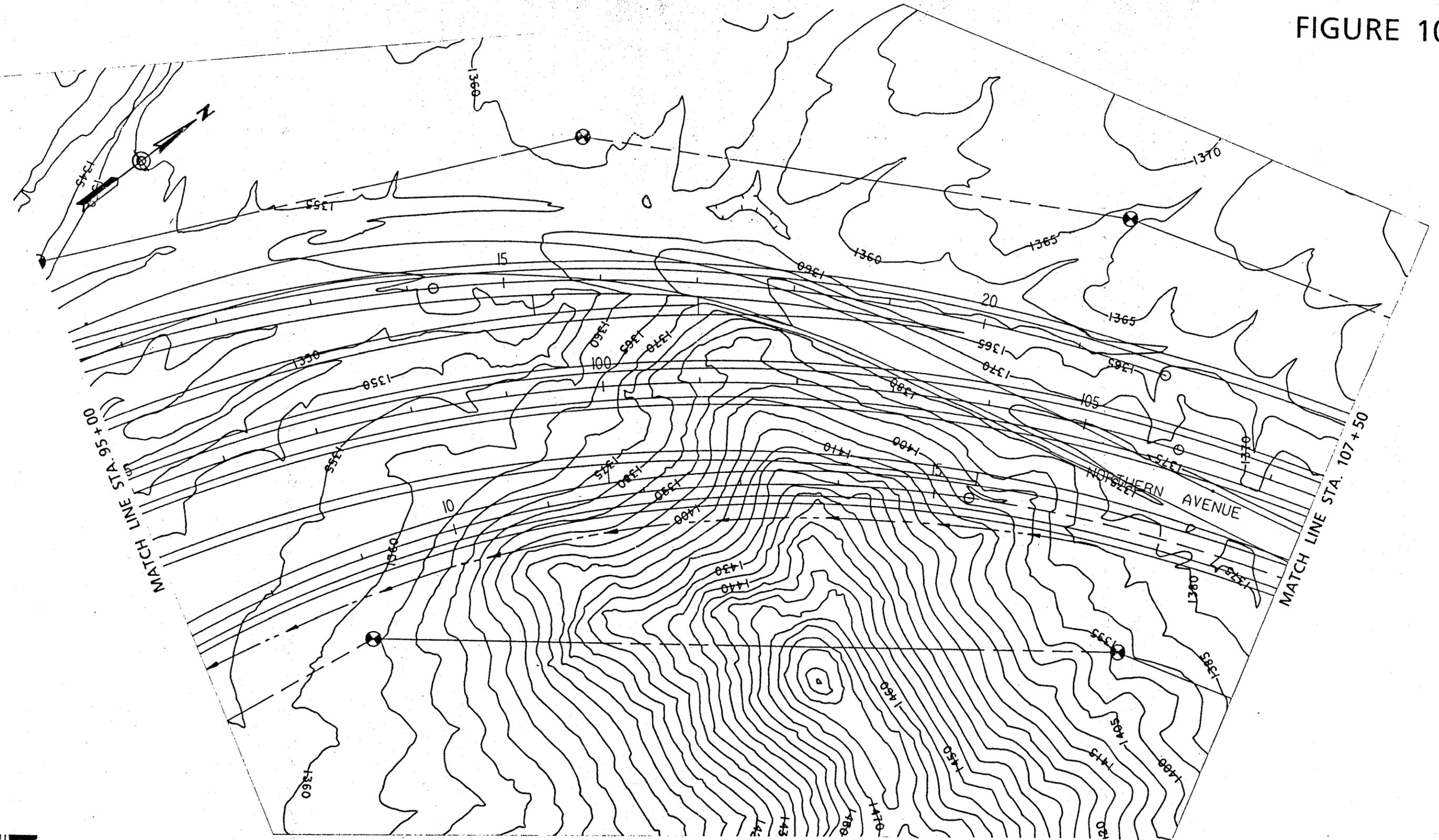
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



GENERAL PLAN
STA. 82 + 00 TO STA. 95 + 00

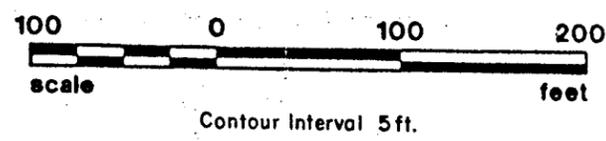
FIGURE 10



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

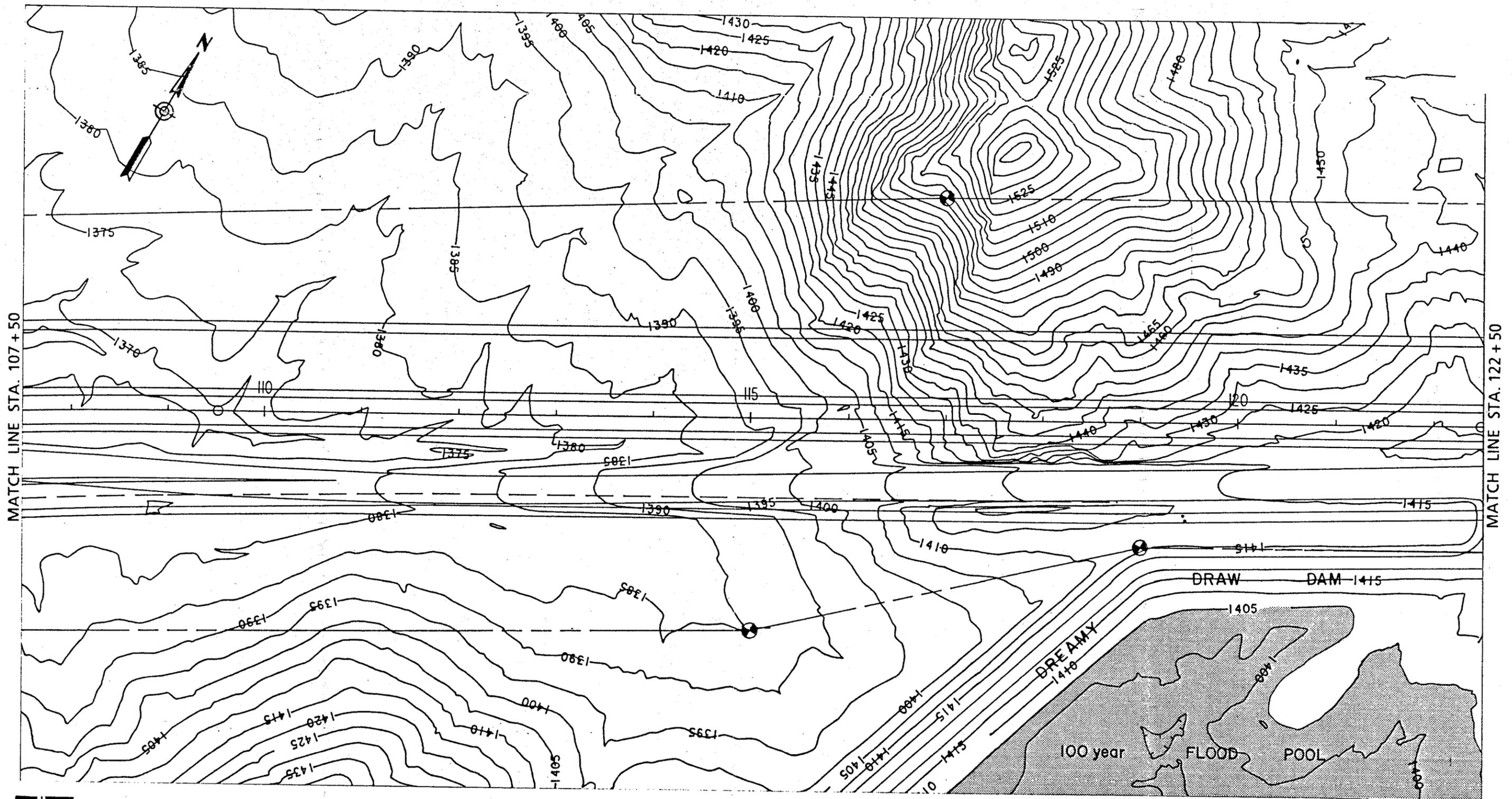
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



GENERAL PLAN
STA. 95+00 TO STA. 107+50

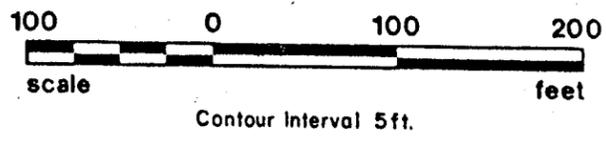
FIGURE 11



**SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT**

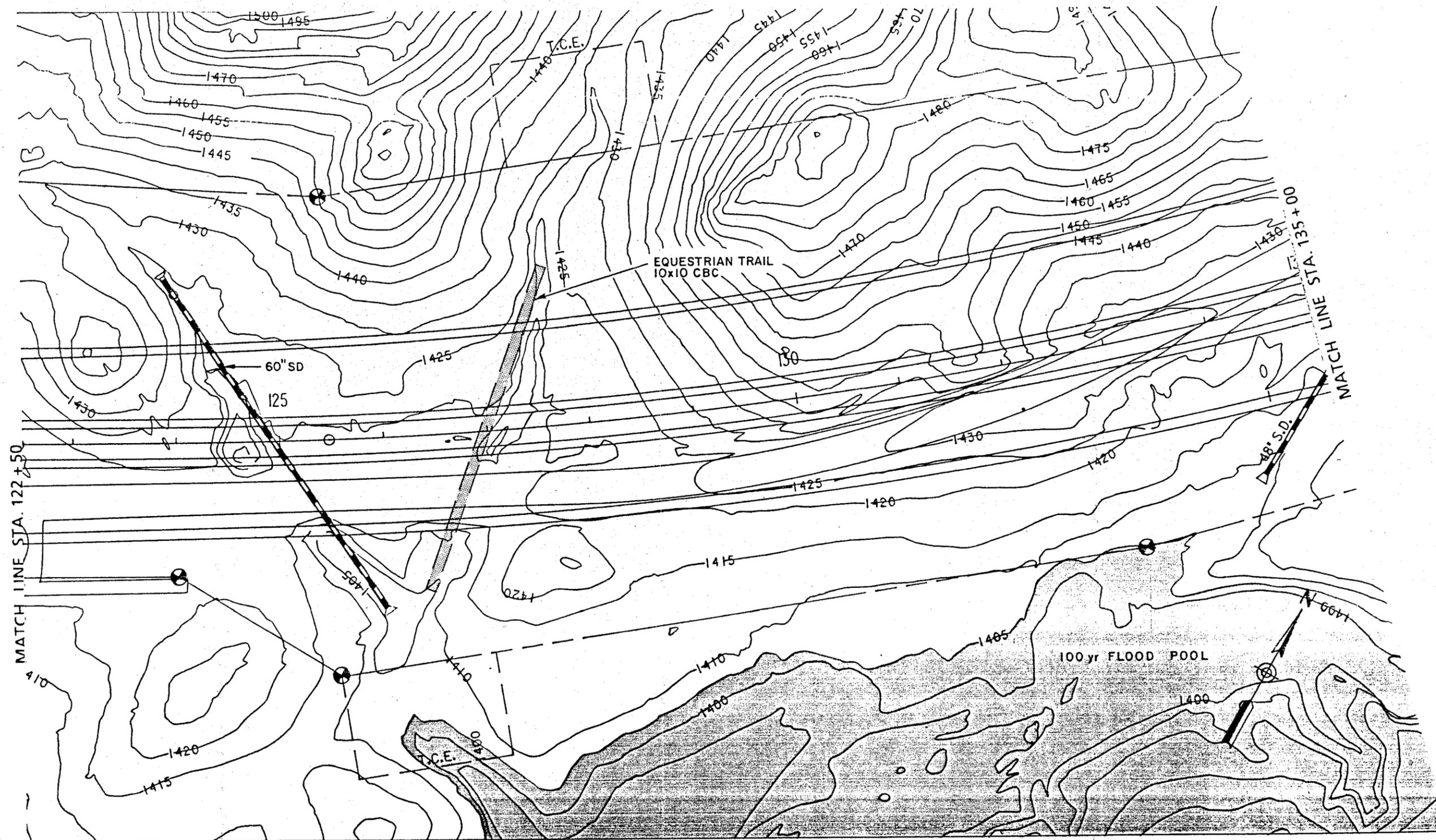
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



**GENERAL PLAN
STA. 107 + 50 TO STA. 122 + 50**

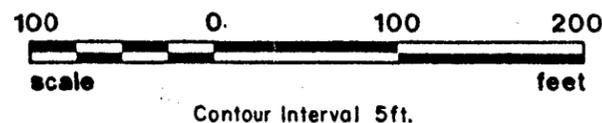
FIGURE 12



**SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT**

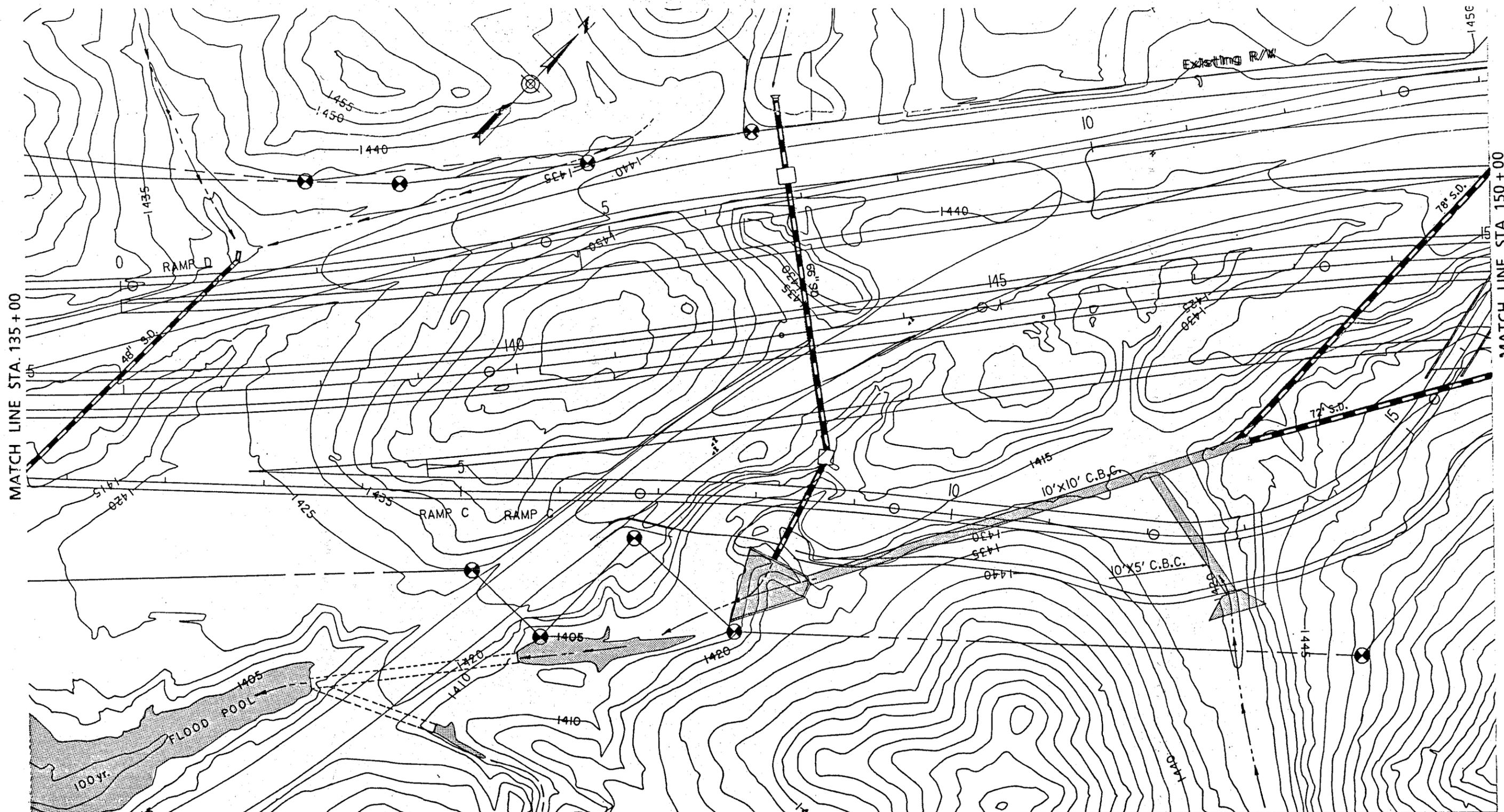
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.

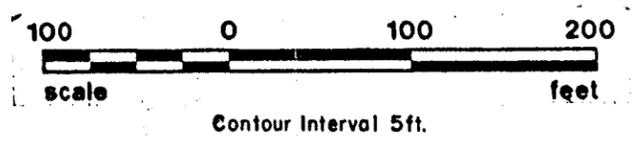


**GENERAL PLAN
STA. 122 + 50 TO STA. 135 + 00**

FIGURE 13

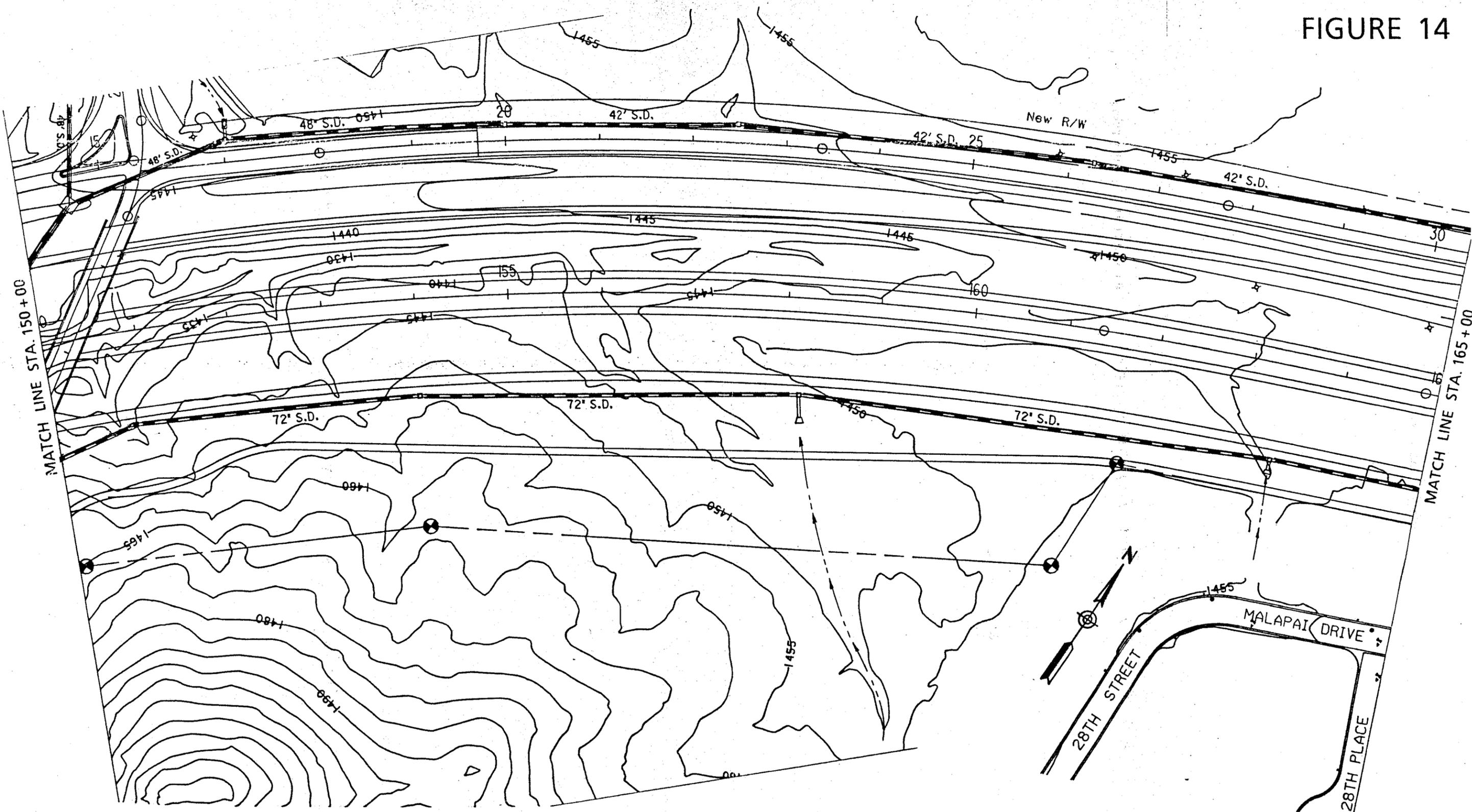


**SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT**
ARIZONA DEPARTMENT
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MICHAEL BAKER, JR., INC.



**GENERAL PLAN
STA. 135 + 00 TO STA. 150 + 00**

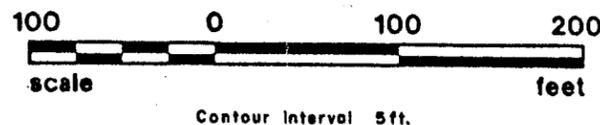
FIGURE 14



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

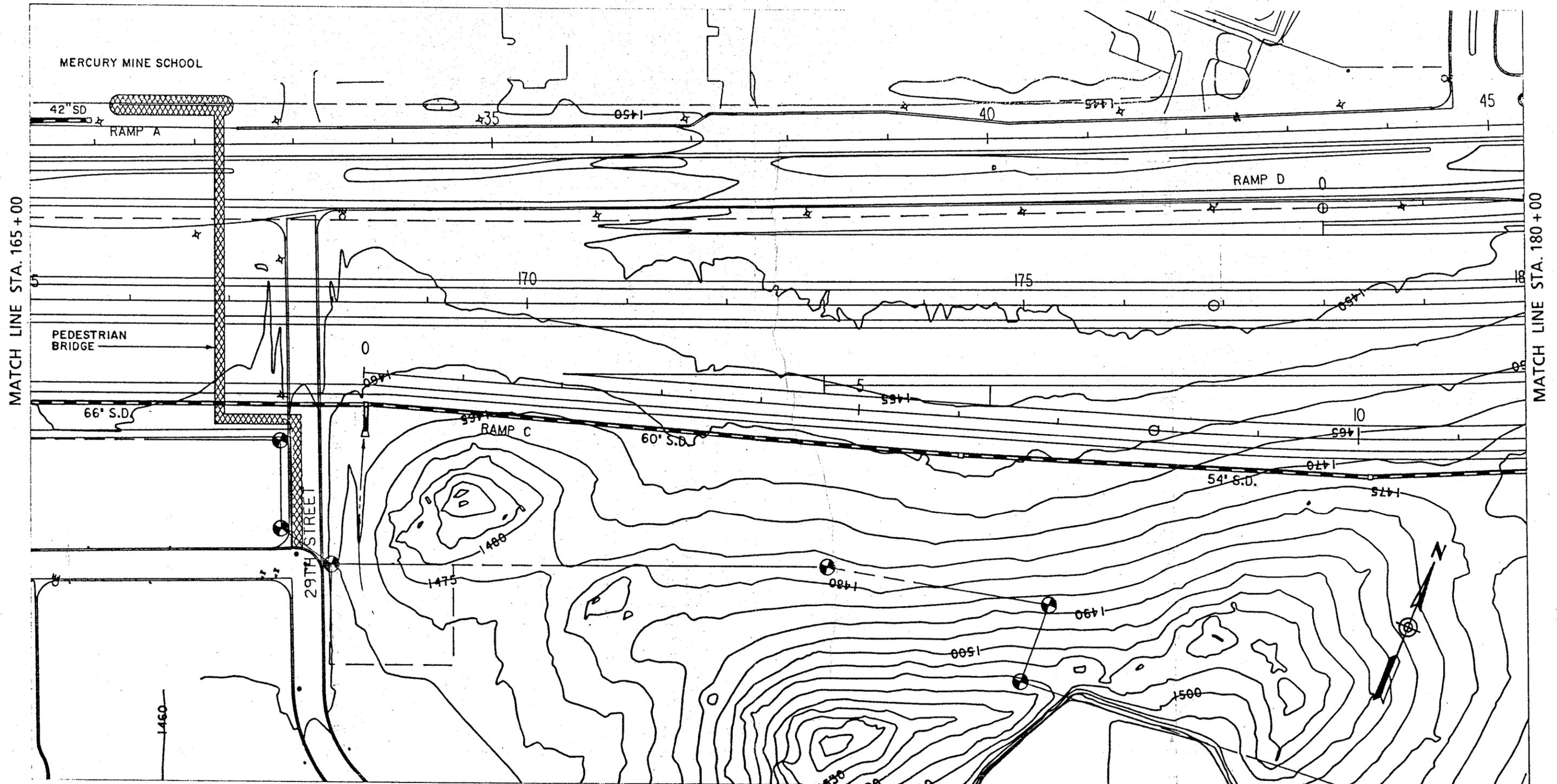
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.

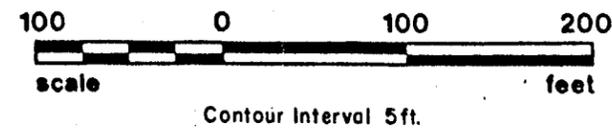


GENERAL PLAN
STA. 150+00 TO STA. 165+00

FIGURE 15

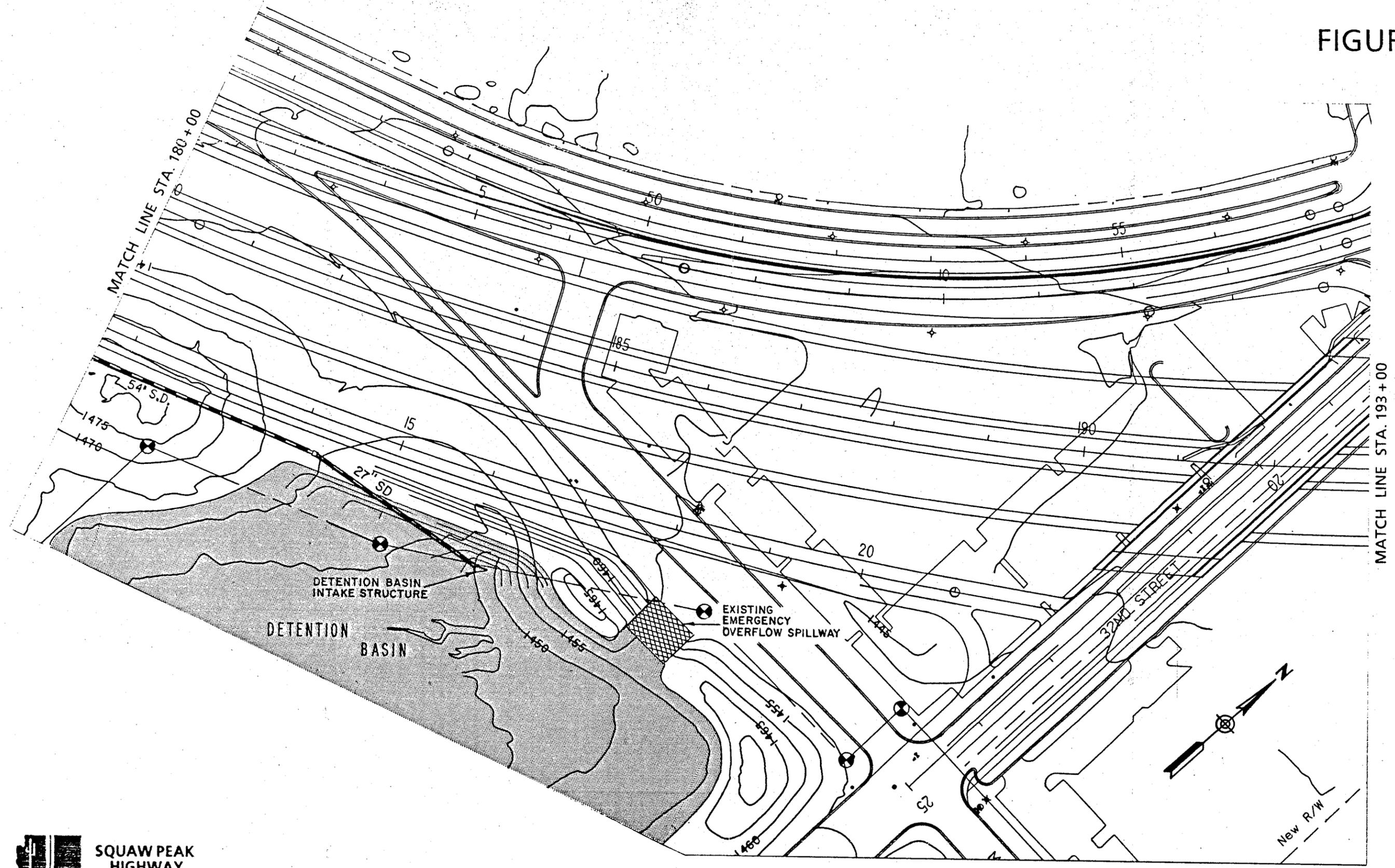


 **SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT**
ARIZONA DEPARTMENT
OF TRANSPORTATION
MICHAEL BAKER, JR., INC.



GENERAL PLAN
STA. 165 + 00 TO STA. 180 + 00

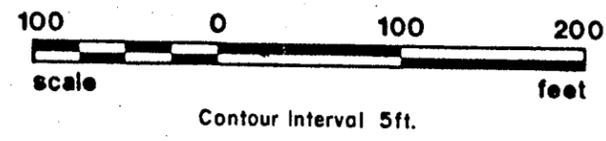
FIGURE 16



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

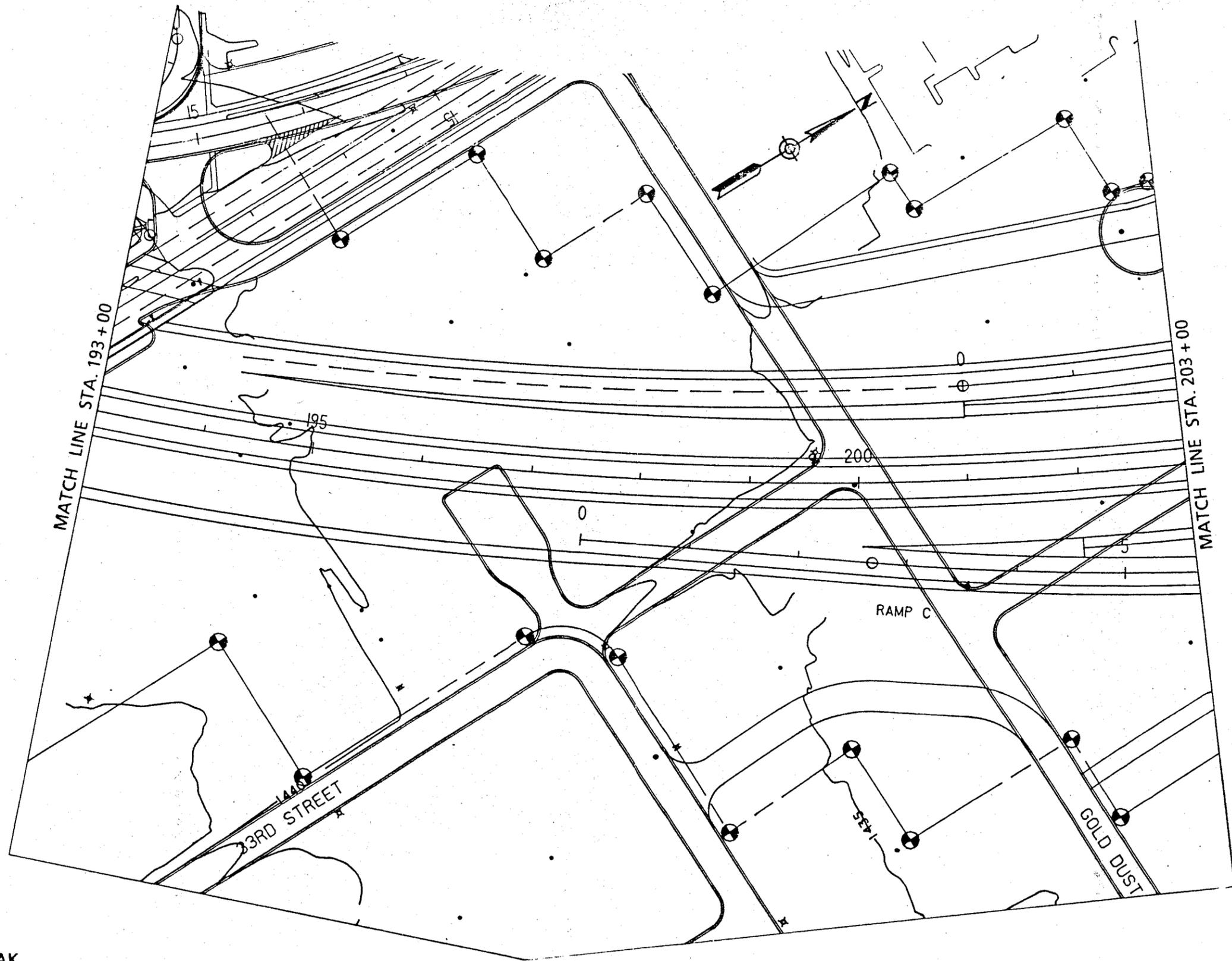
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC



GENERAL PLAN
STA. 180+00 TO STA. 193+00

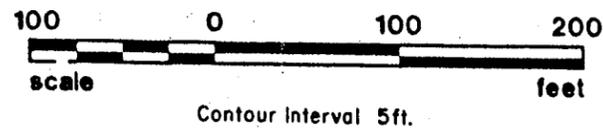
FIGURE 17



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

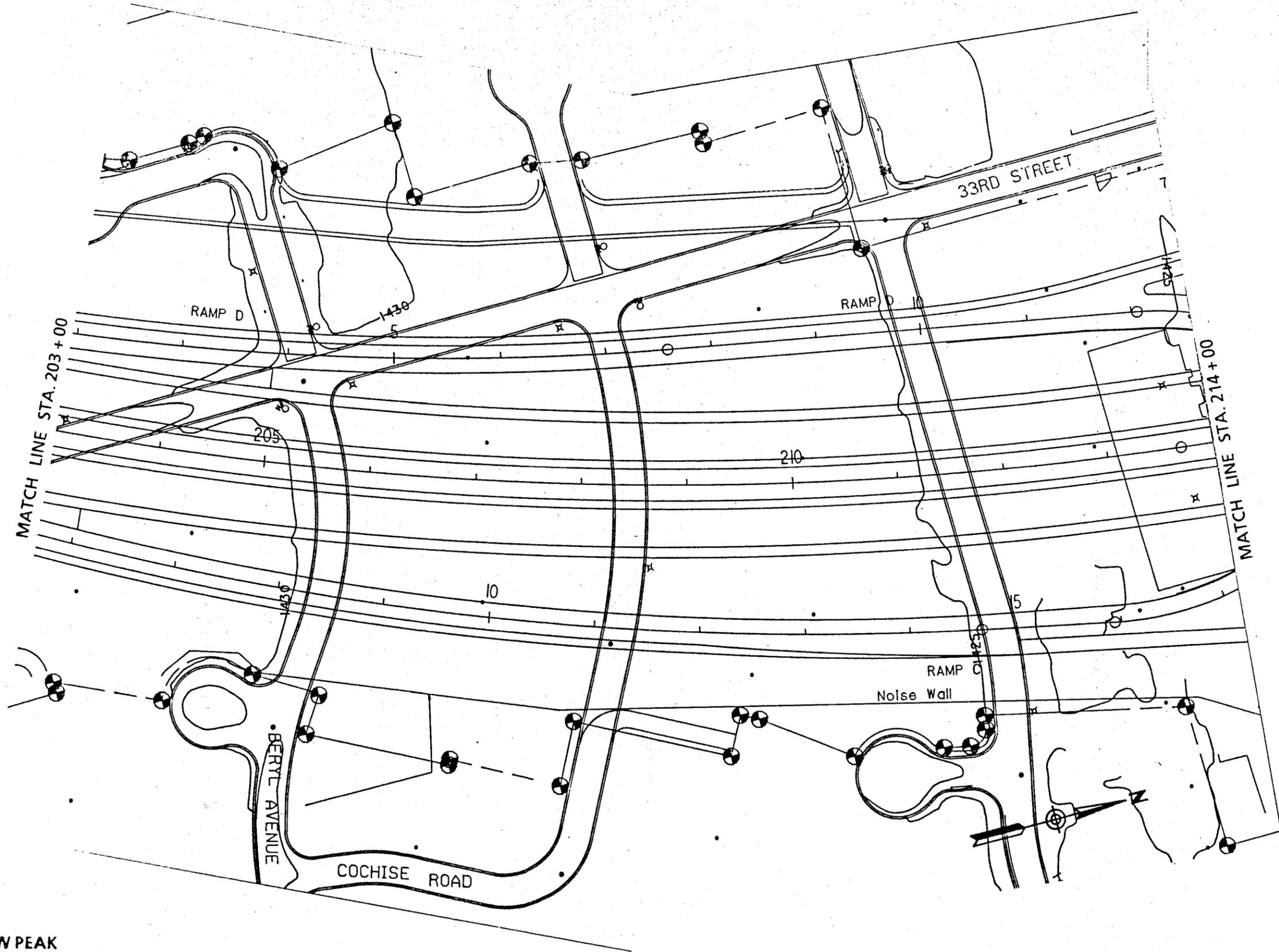
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



GENERAL PLAN
STA. 193 + 00 TO STA. 203 + 00

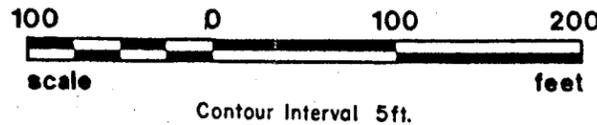
FIGURE 18



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

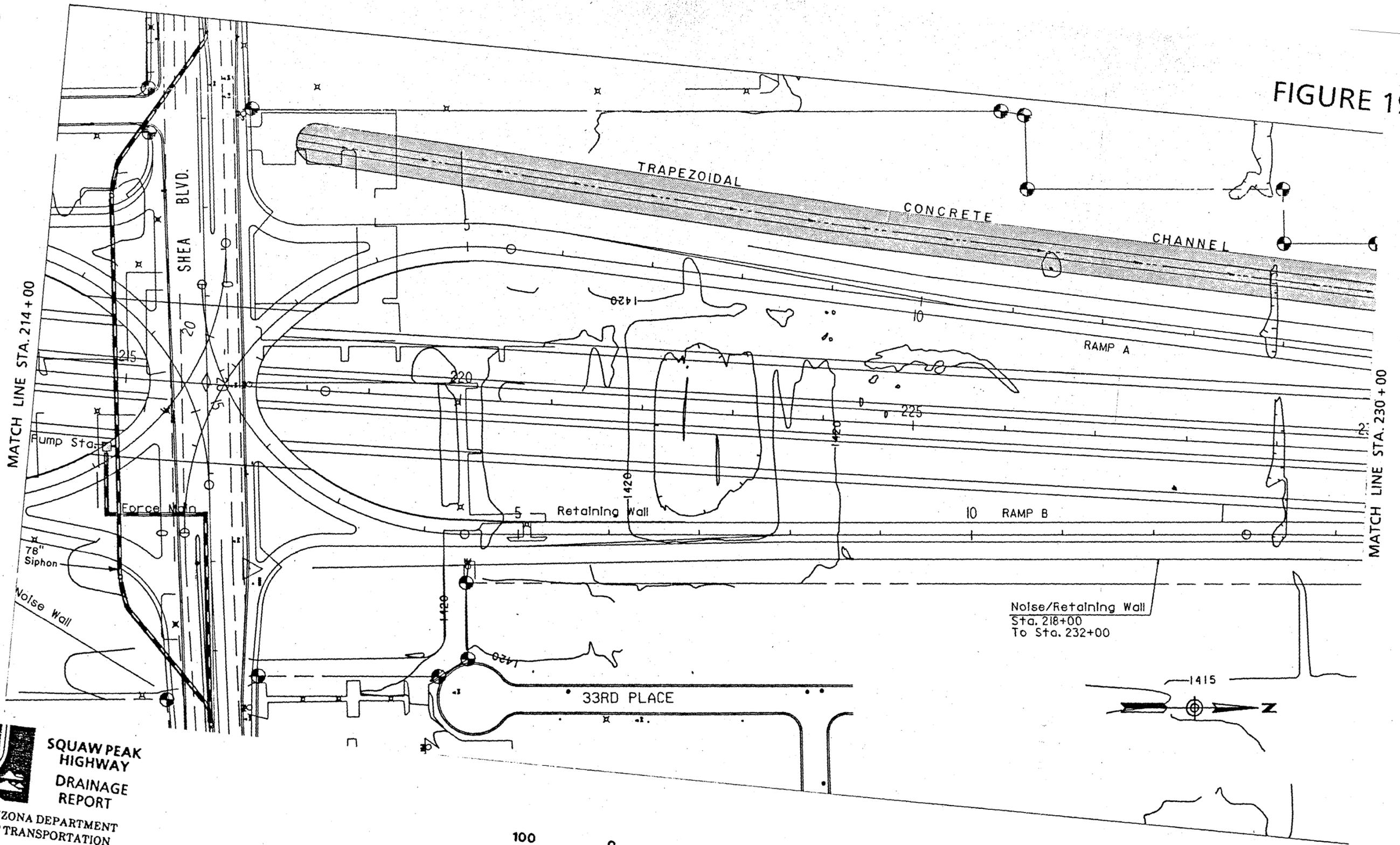
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



GENERAL PLAN
STA. 203 + 00 TO STA. 214 + 00

FIGURE 19



MATCH LINE STA. 214+00

MATCH LINE STA. 230+00

SHEA BLVD.

TRAPEZOIDAL

CONCRETE

CHANNEL

RAMP A

Retaining Wall

RAMP B

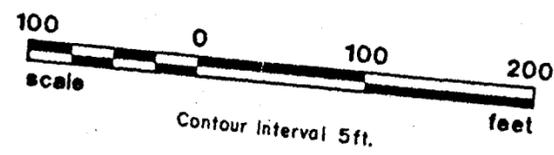
Noise/Retaining Wall
Sta. 218+00
To Sta. 232+00

33RD PLACE

1415

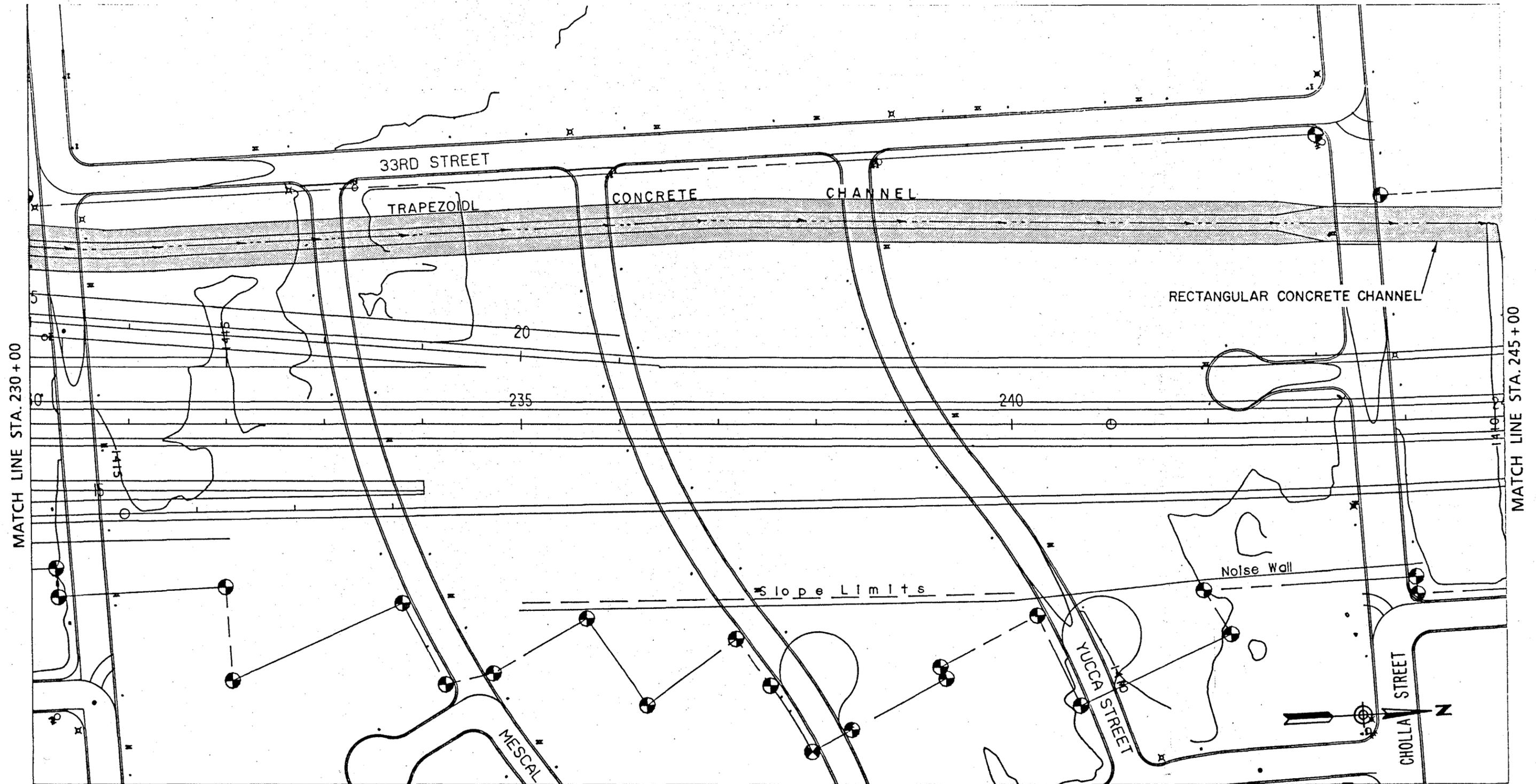


**SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT**
ARIZONA DEPARTMENT
OF TRANSPORTATION
MICHAEL BAKER, JR., INC.



STA. 214+00 TO STA. 230+00
GENERAL PLAN

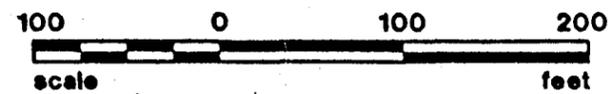
FIGURE 20



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

ARIZONA DEPARTMENT
OF TRANSPORTATION

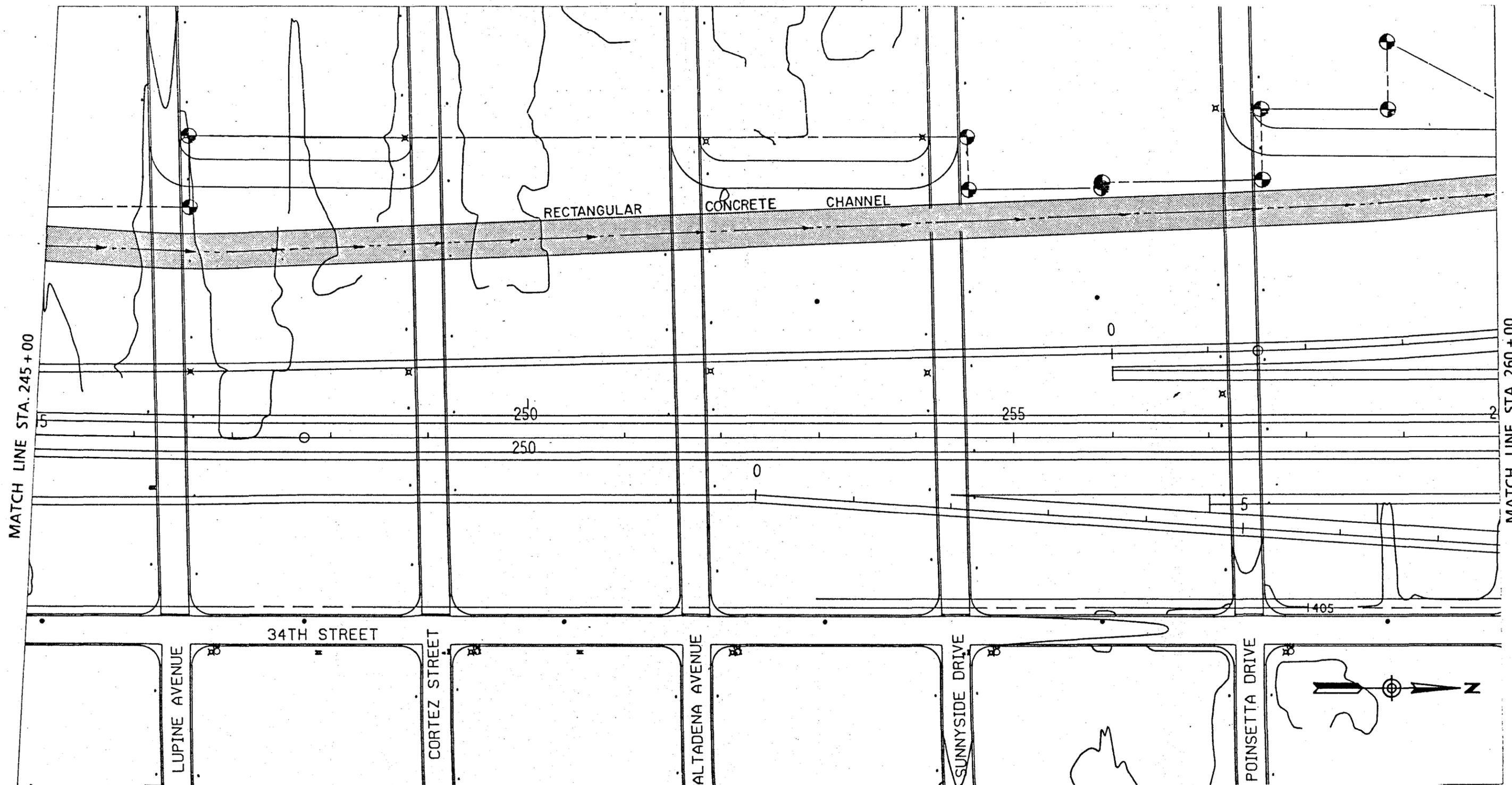
MICHAEL BAKER, JR., INC.



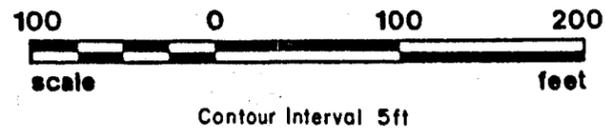
Contour Interval 5ft.

GENERAL PLAN
STA. 230 + 00 TO STA. 245 + 00

FIGURE 21

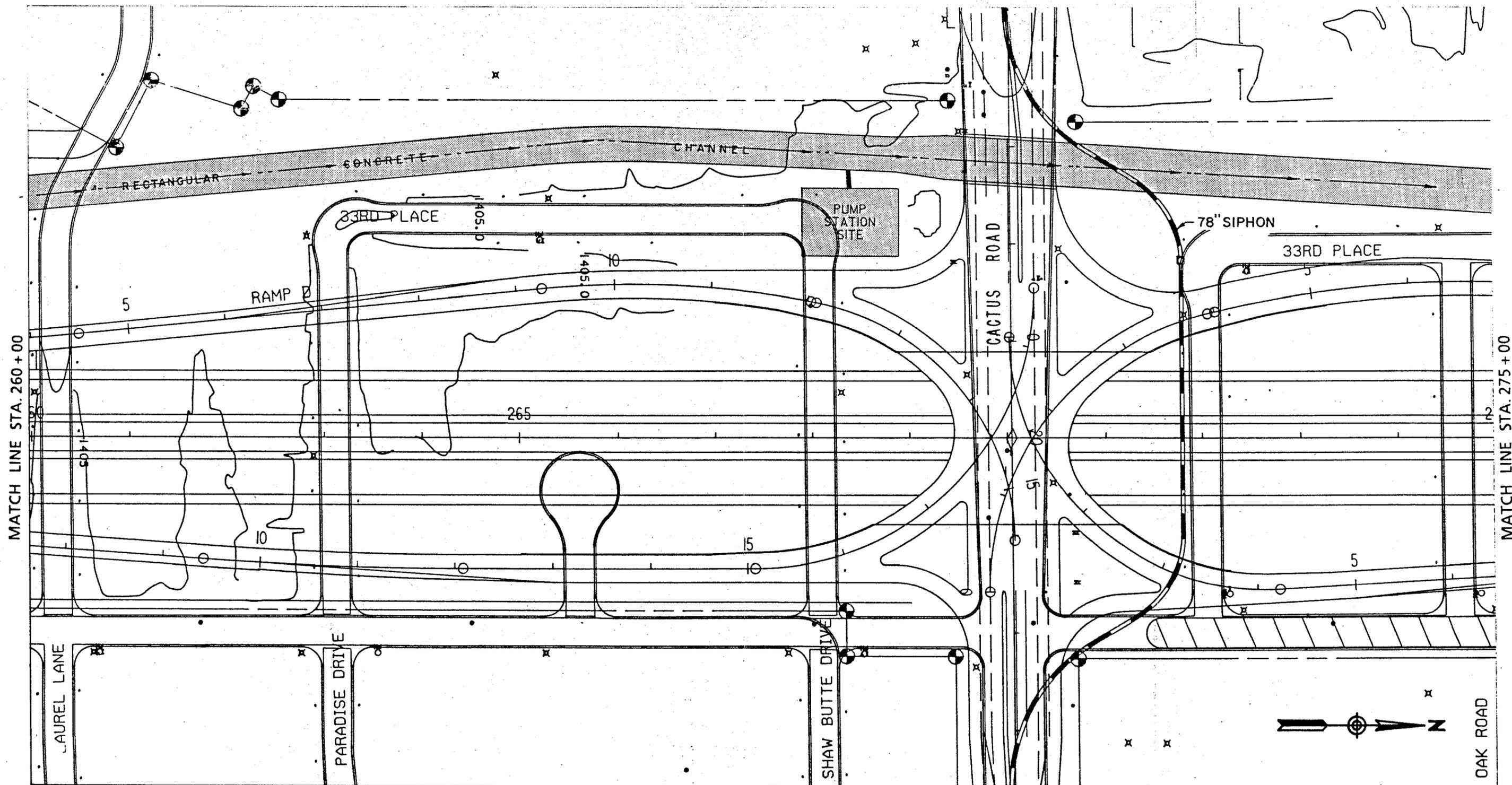


 **SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT**
ARIZONA DEPARTMENT
OF TRANSPORTATION
MICHAEL BAKER, JR., INC.



GENERAL PLAN
STA. 245 + 00 TO STA. 260 + 00

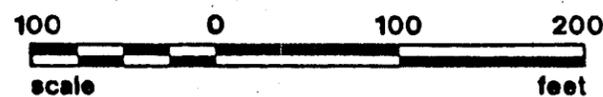
FIGURE 22



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

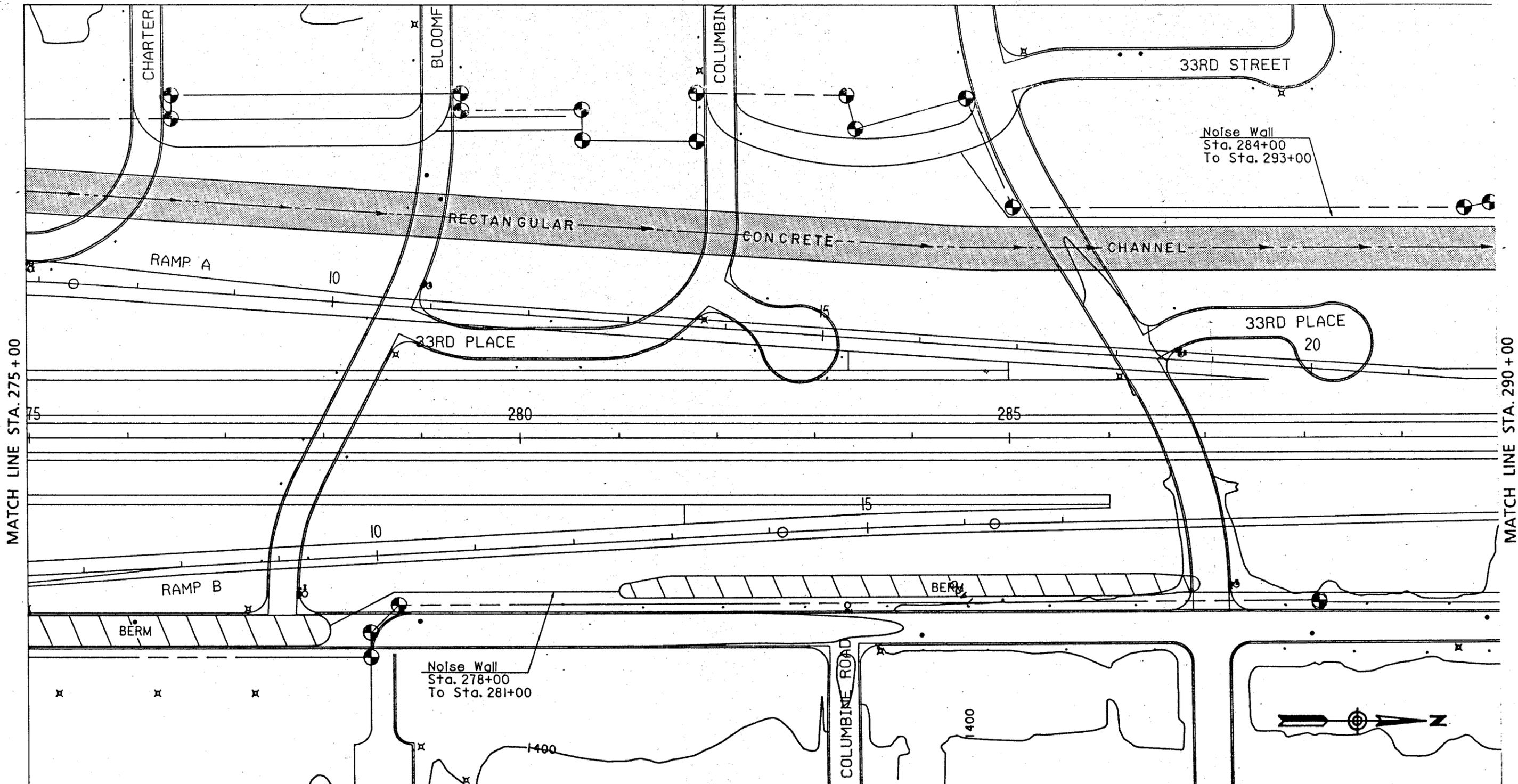
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.

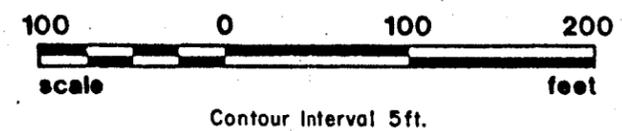


GENERAL PLAN
STA. 260 + 00 TO STA. 275 + 00

FIGURE 23

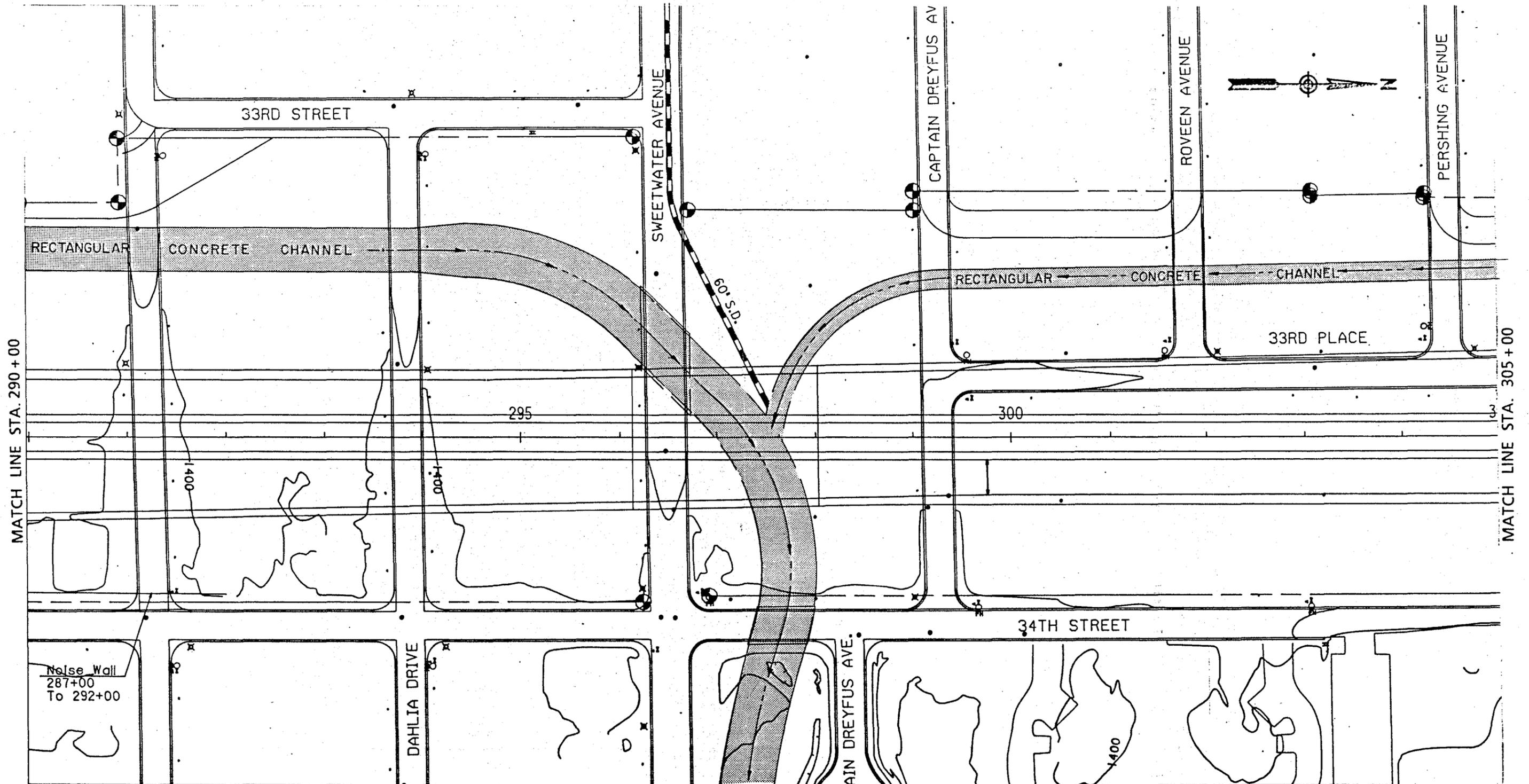



**SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT**
 ARIZONA DEPARTMENT
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 MICHAEL BAKER, JR., INC.

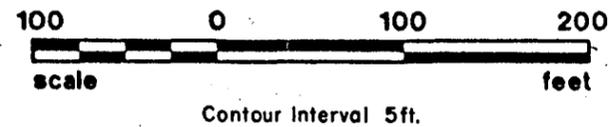


GENERAL PLAN
STA. 275+00 TO STA. 290+00

FIGURE 24



SEE FIGURE 43



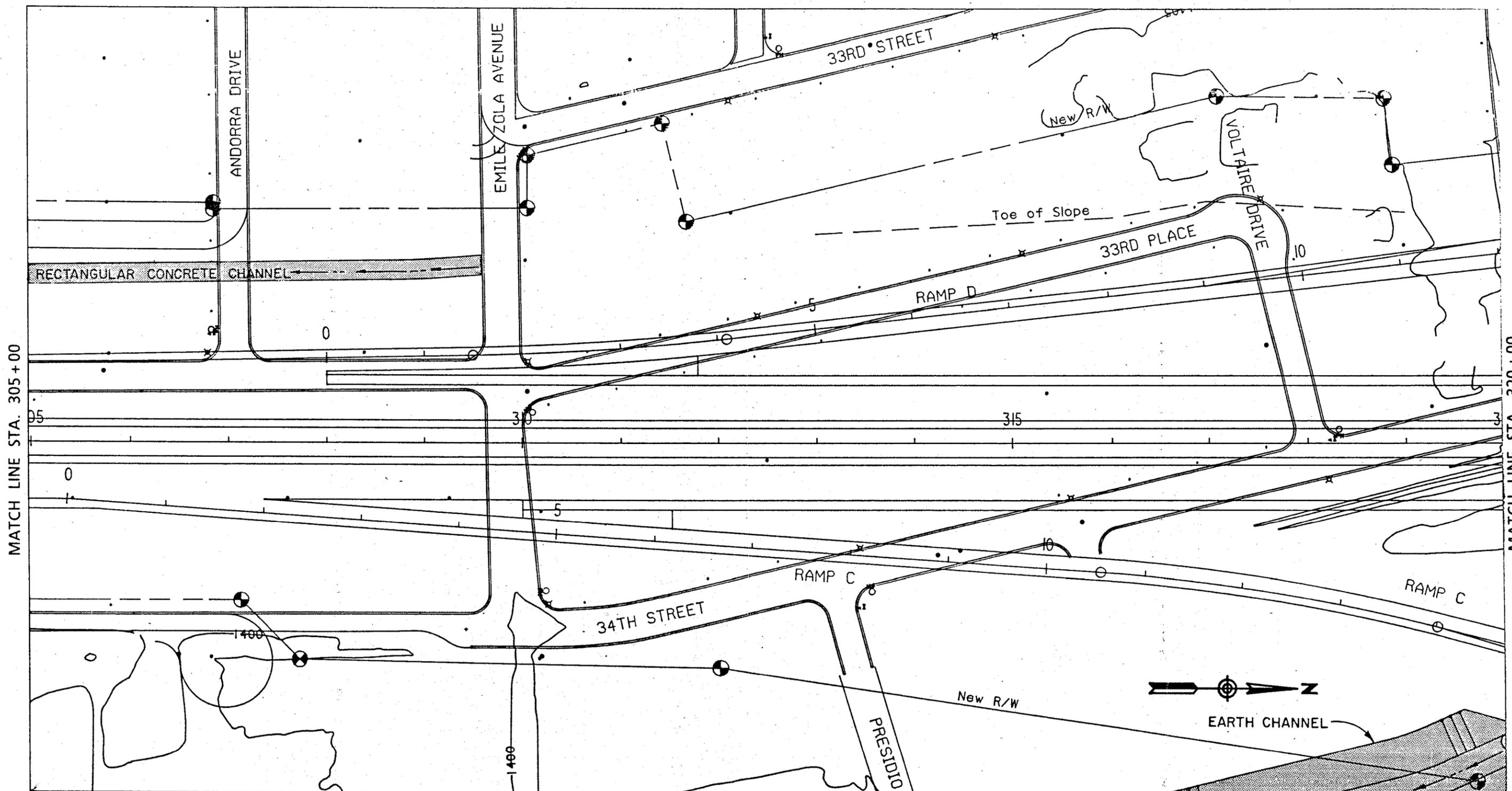
**SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT**

ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC

**GENERAL PLAN
STA. 290 + 00 TO STA. 305 + 00**

FIGURE 25



MATCH LINE STA. 305+00

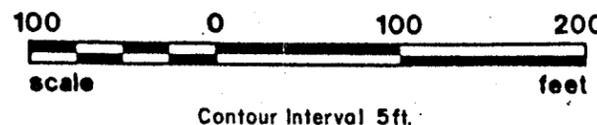
MATCH LINE STA. 320+00



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

ARIZONA DEPARTMENT
OF TRANSPORTATION

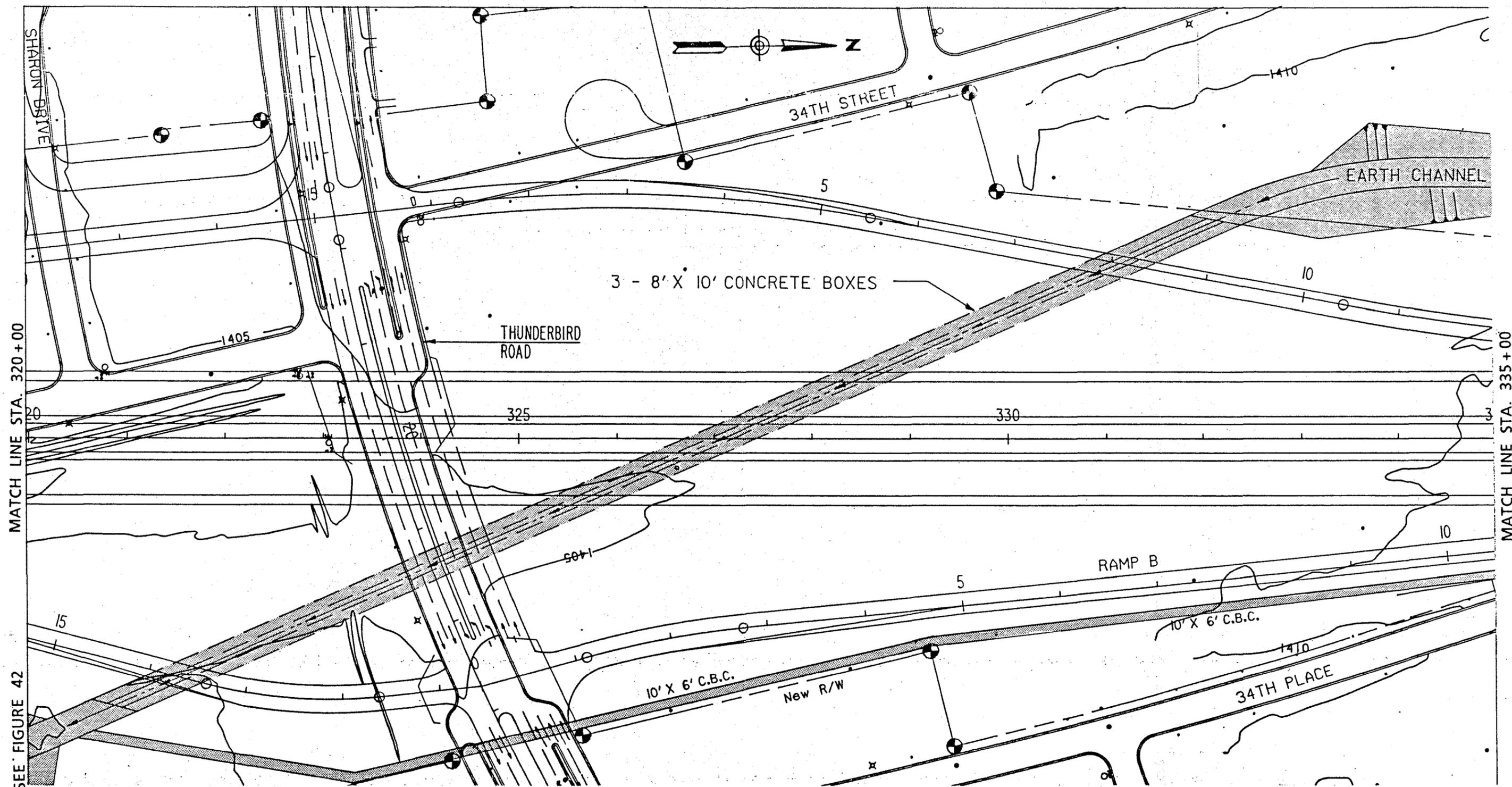
MICHAEL BAKER, JR., INC.



SEE FIGURE 42

GENERAL PLAN
STA. 305+00 TO STA. 320+00

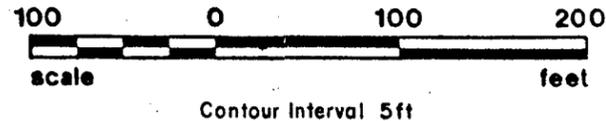
FIGURE 26



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

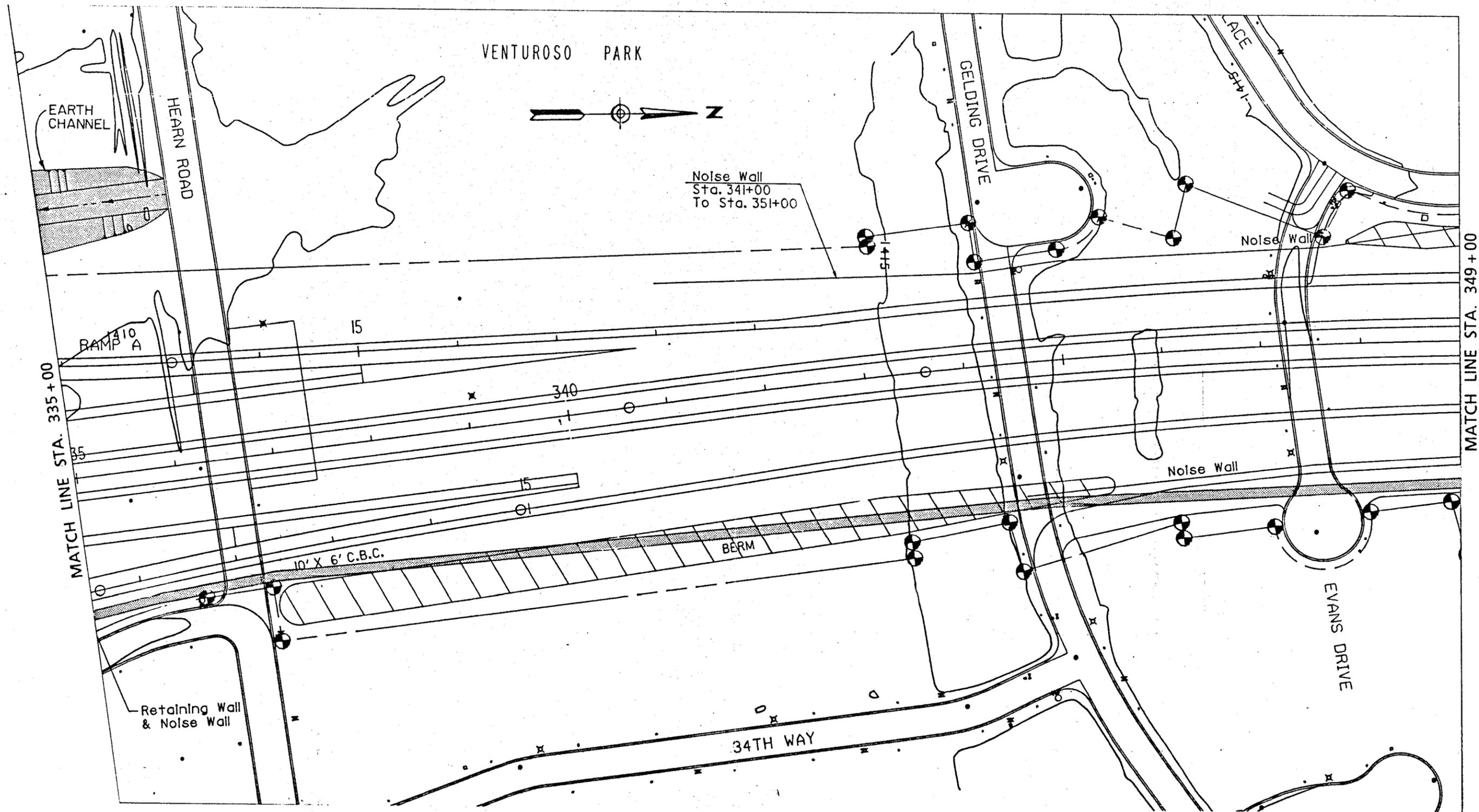
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



GENERAL PLAN
STA. 320 + 00 TO STA. 335 + 00

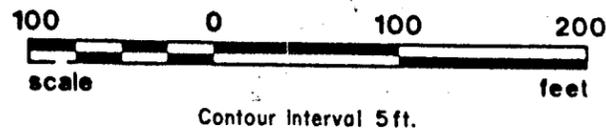
FIGURE 27



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

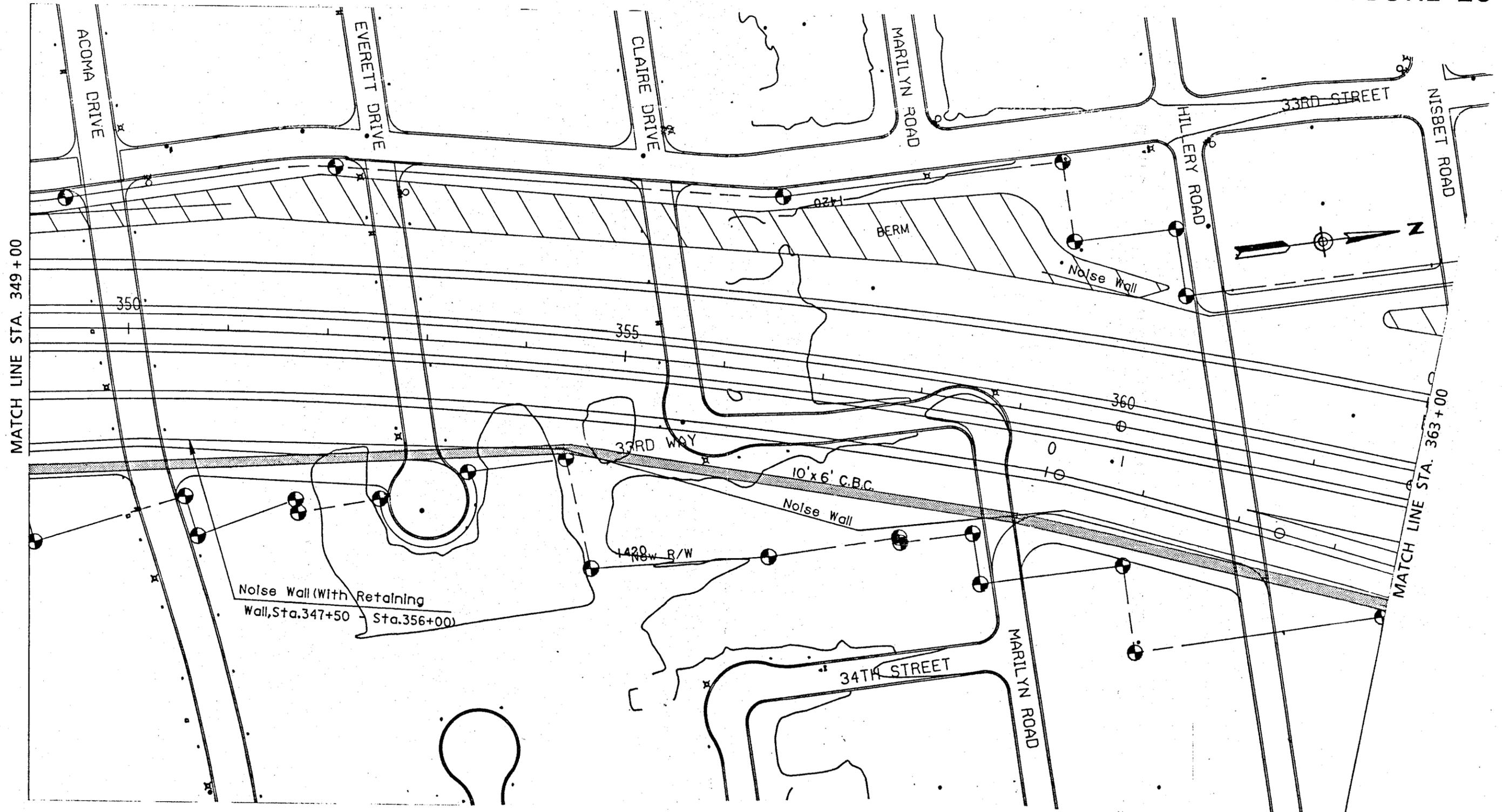
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



GENERAL PLAN
STA. 335 + 00 TO STA. 349 + 00

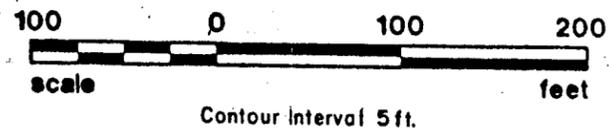
FIGURE 28



**SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT**

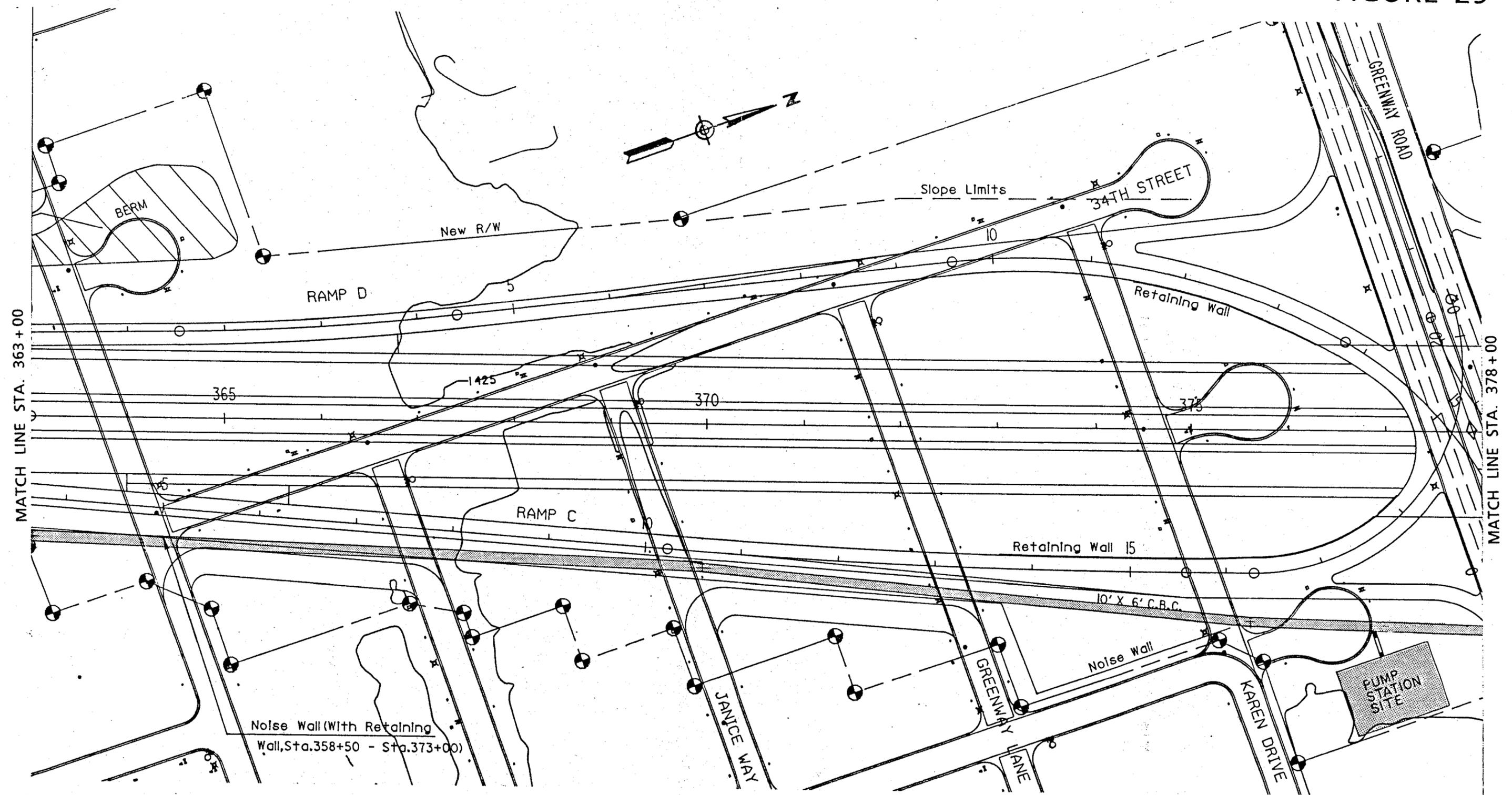
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.

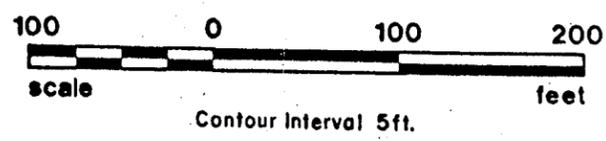


**GENERAL PLAN
STA. 349 + 00 TO STA. 363 + 00**

FIGURE 29

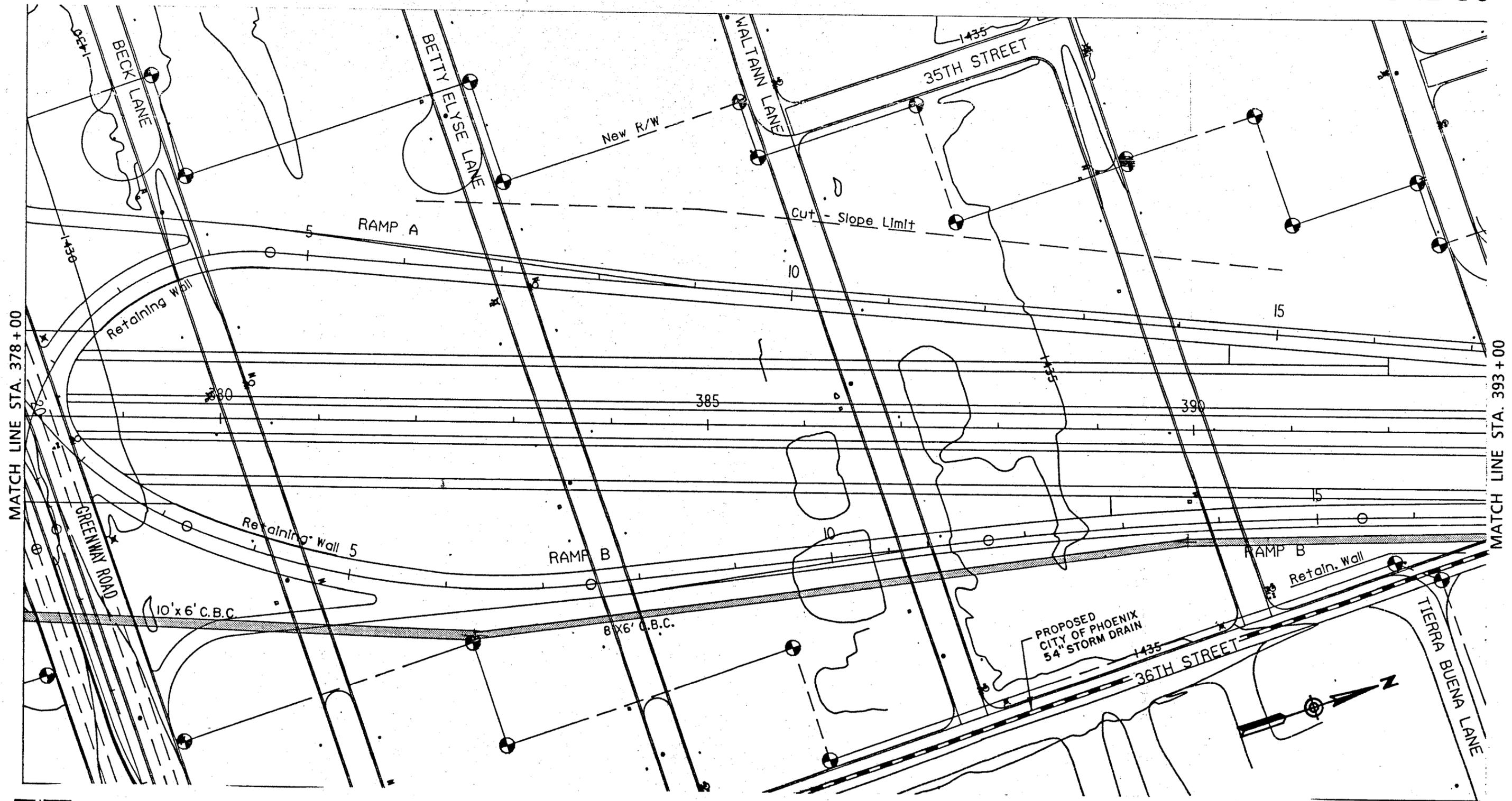


 **SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT**
ARIZONA DEPARTMENT
OF TRANSPORTATION
MICHAEL BAKER, JR., INC.



**GENERAL PLAN
STA. 363 + 00 TO STA. 378 + 00**

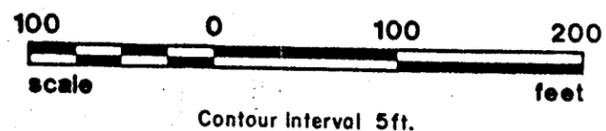
FIGURE 30



**SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT**

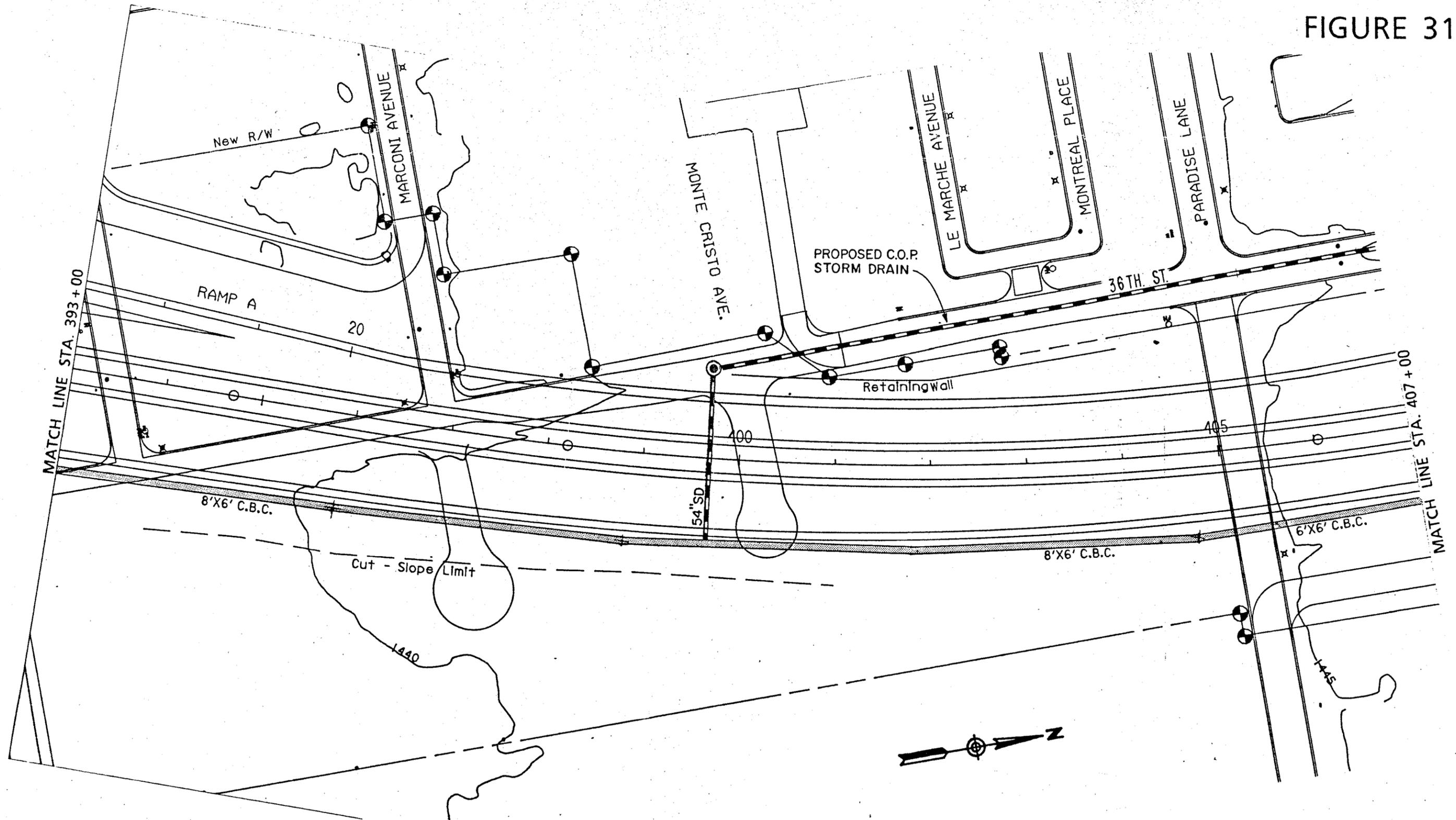
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



GENERAL PLAN
STA. 378 + 00 TO STA. 393 + 00

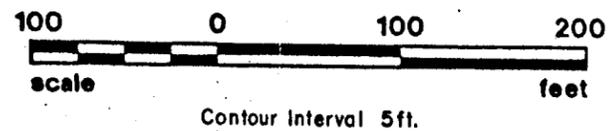
FIGURE 31



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

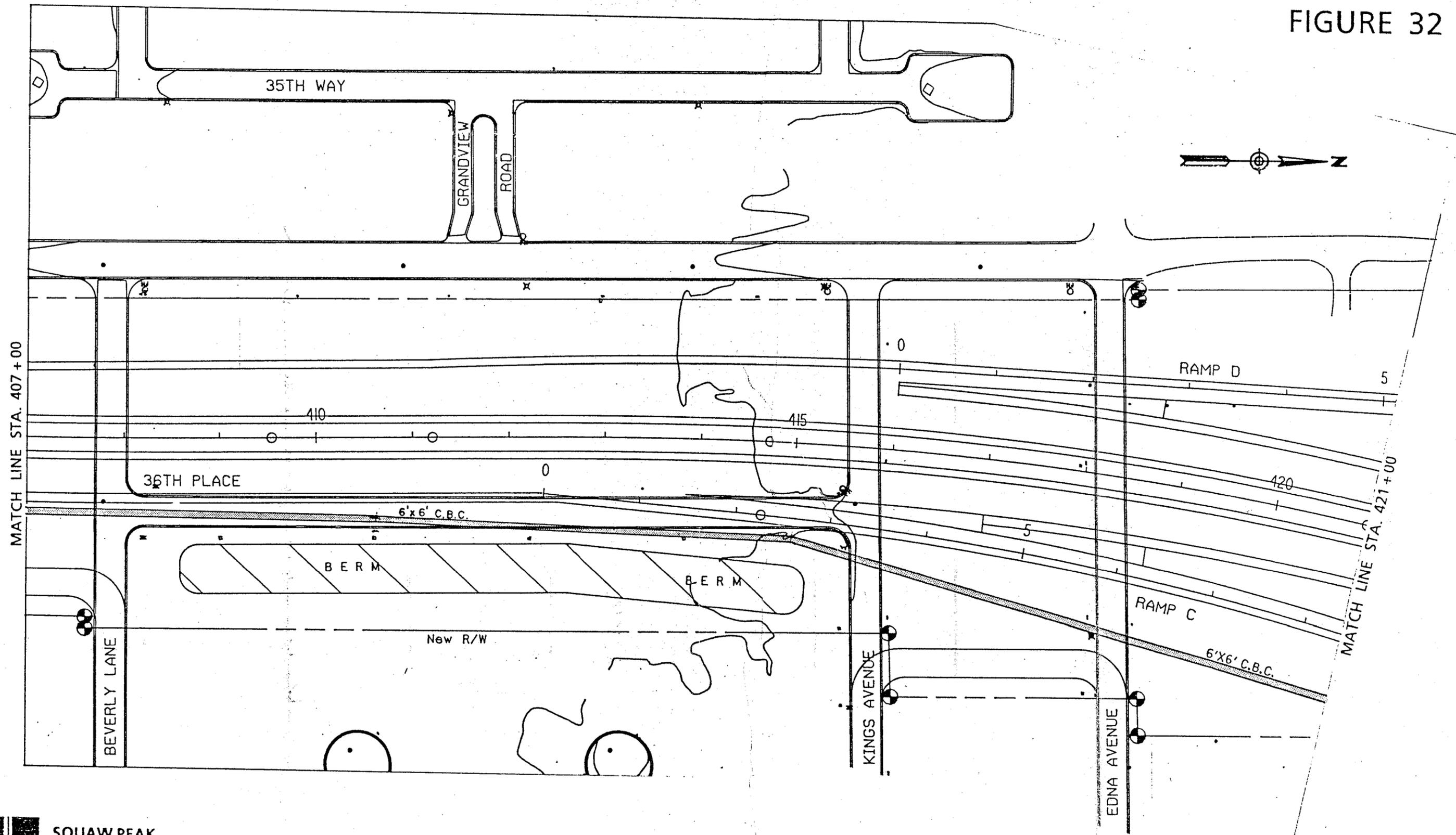
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



GENERAL PLAN
STA. 393 + 00 TO STA. 407 + 00

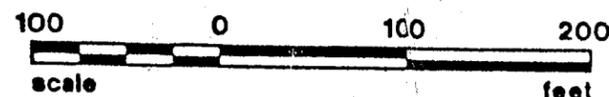
FIGURE 32



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

ARIZONA DEPARTMENT
OF TRANSPORTATION

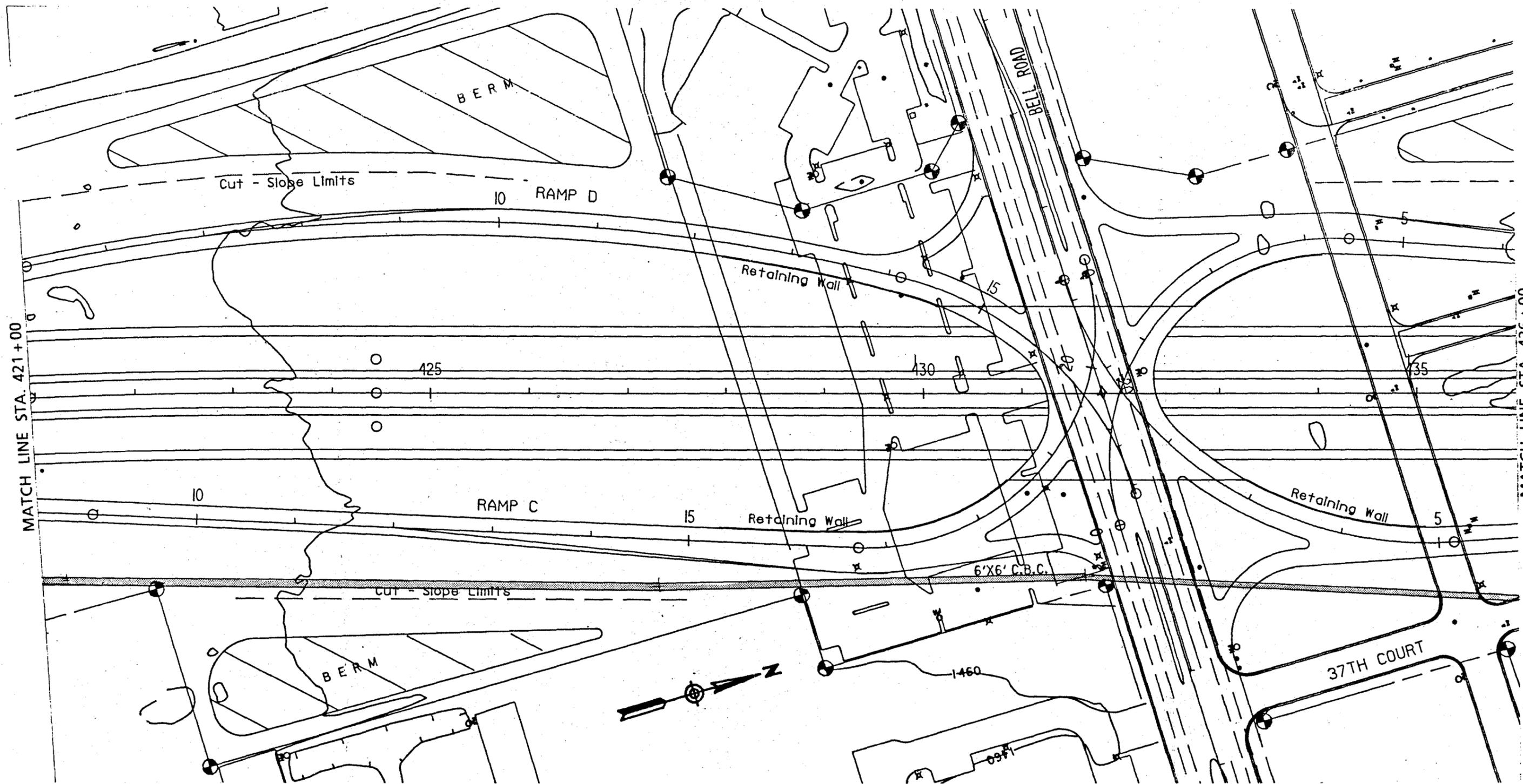
MICHAEL BAKER, JR., INC.



Contour Interval 5ft.

GENERAL PLAN
STA. 407 + 00 TO STA. 421 + 00

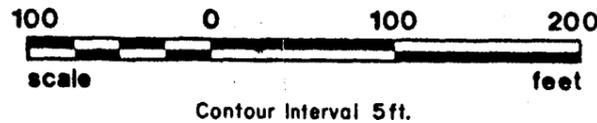
FIGURE 33



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

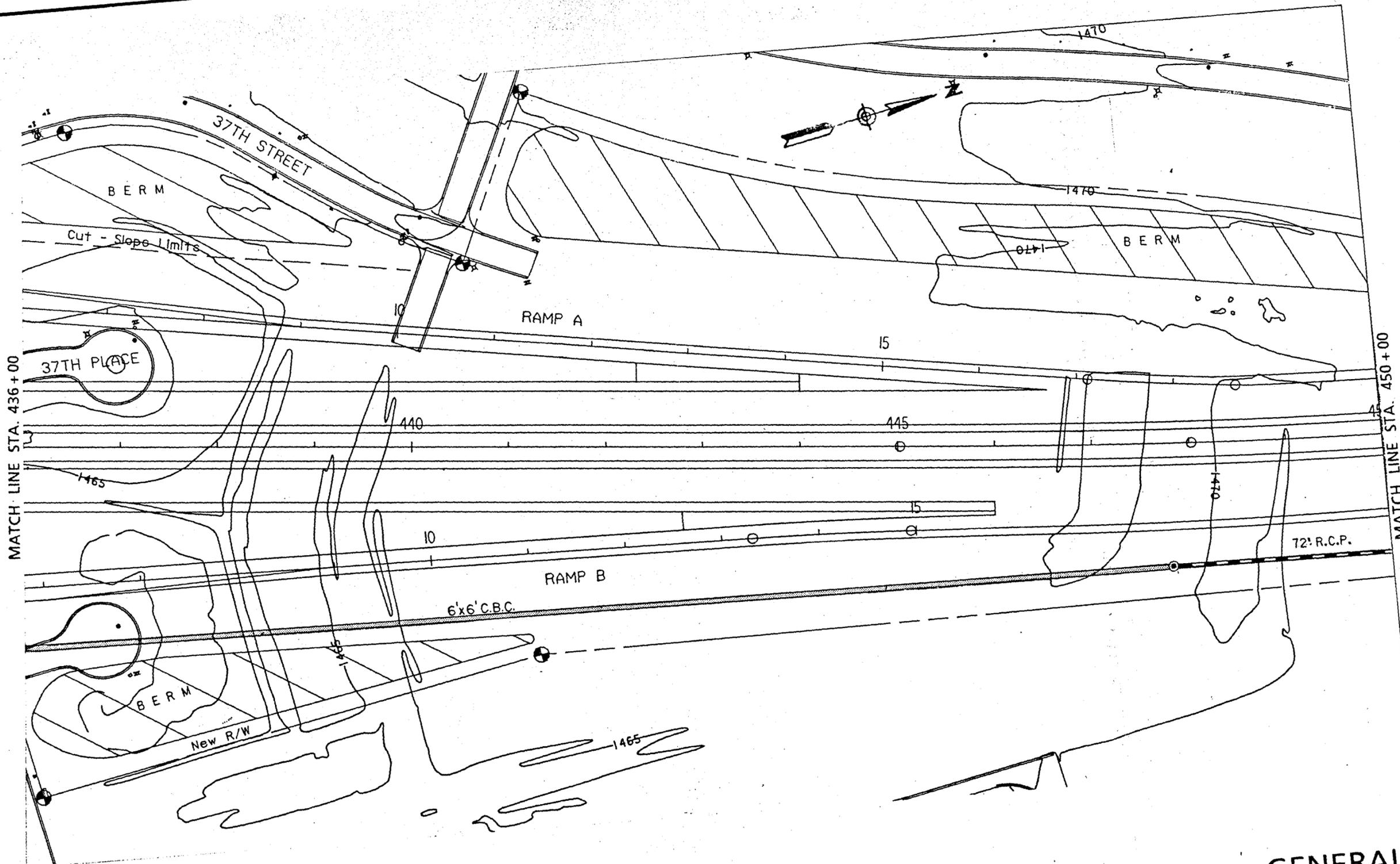
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.

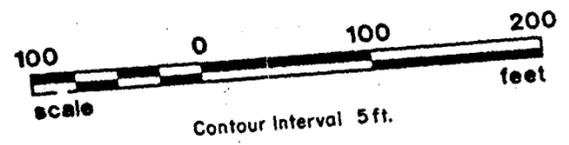


GENERAL PLAN
STA. 421 + 00 TO STA. 436 + 00

FIGURE 34

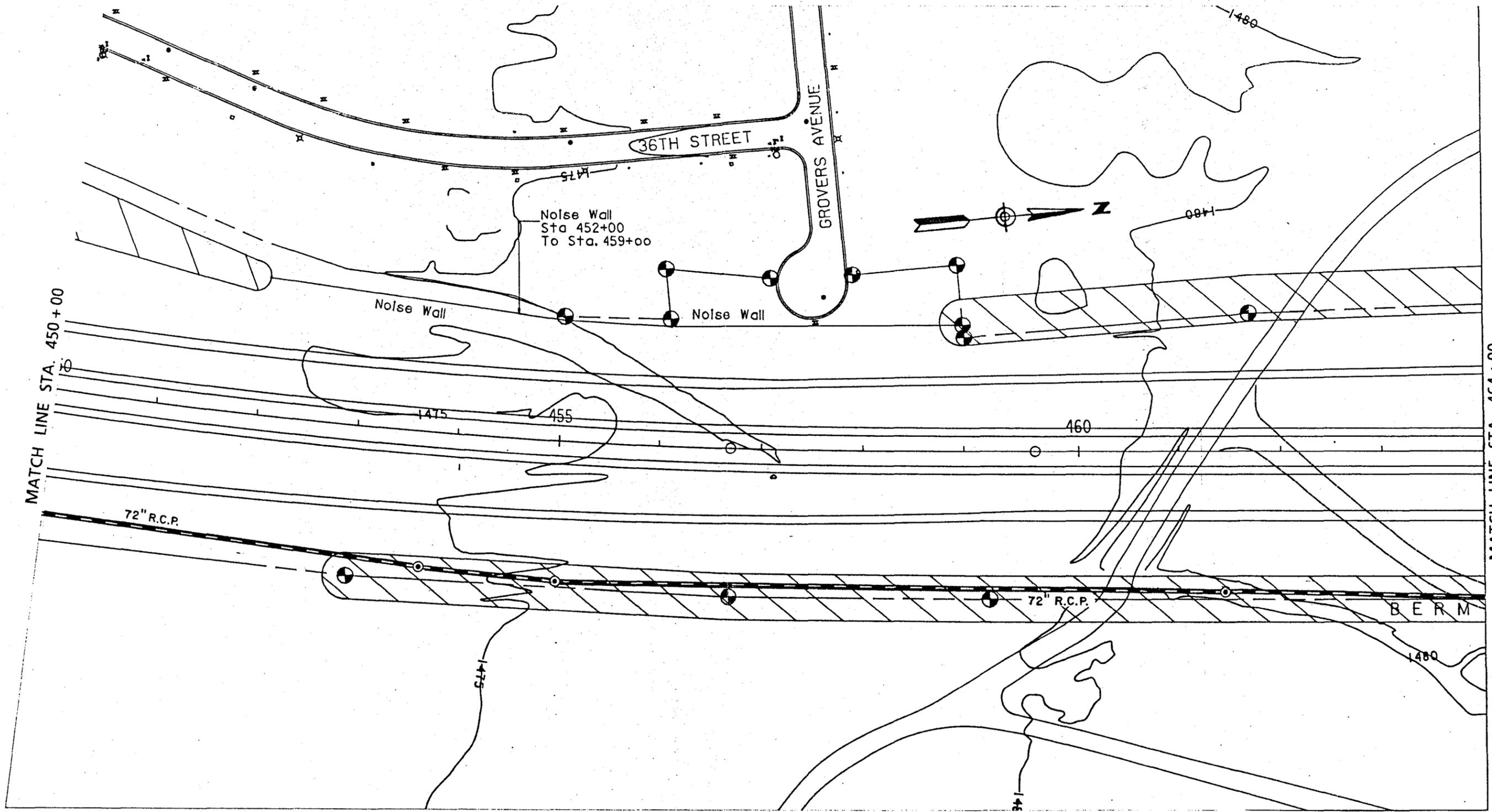



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT
ARIZONA DEPARTMENT
OF TRANSPORTATION
MICHAEL BAKER, JR., INC.



GENERAL PLAN
STA. 436 + 00 TO STA. 450 + 00

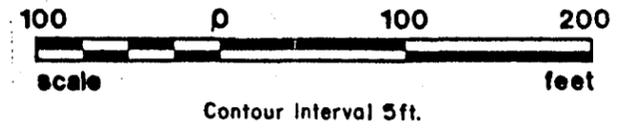
FIGURE 35



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

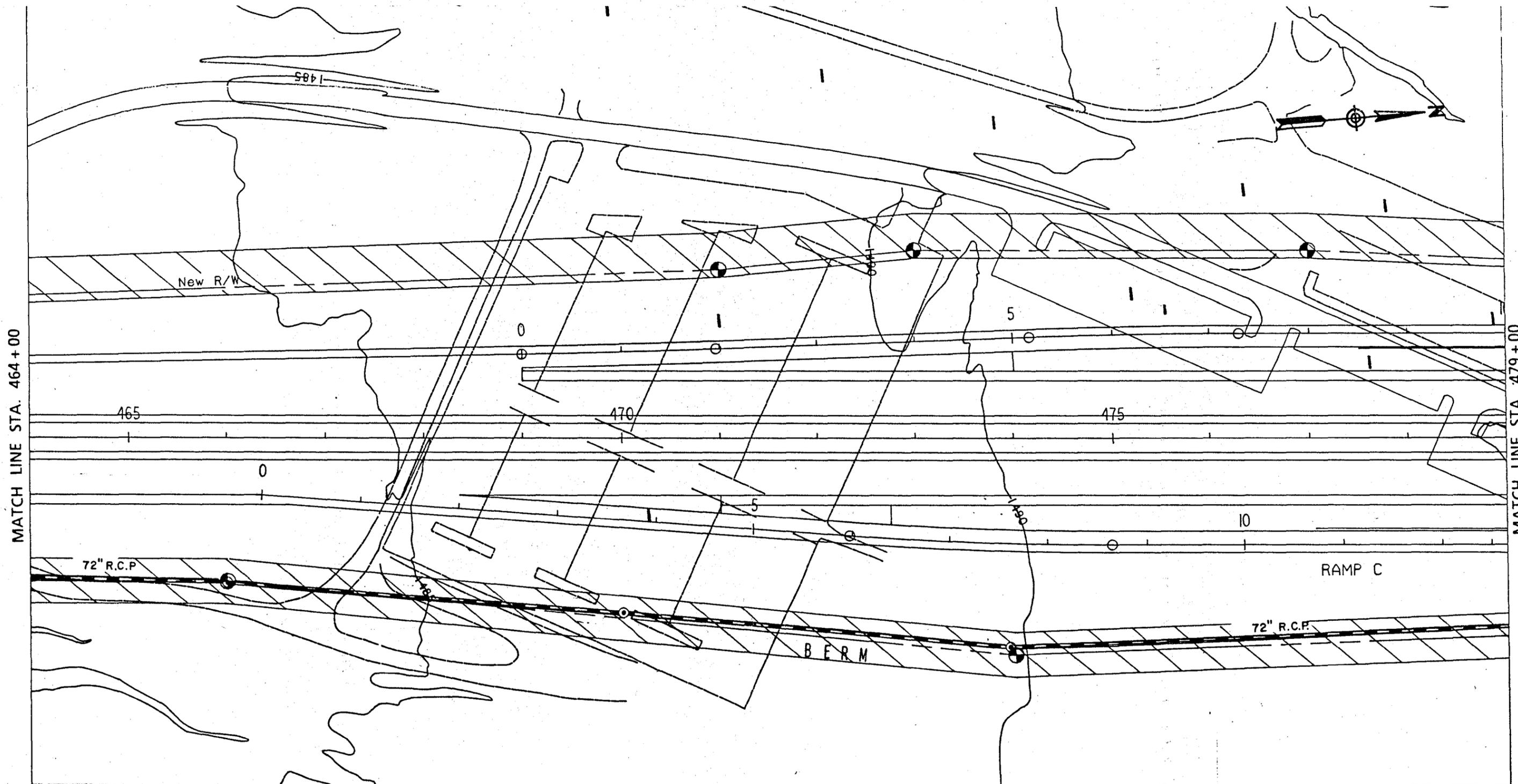
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



GENERAL PLAN
STA. 450 + 00 TO STA. 464 + 00

FIGURE 36

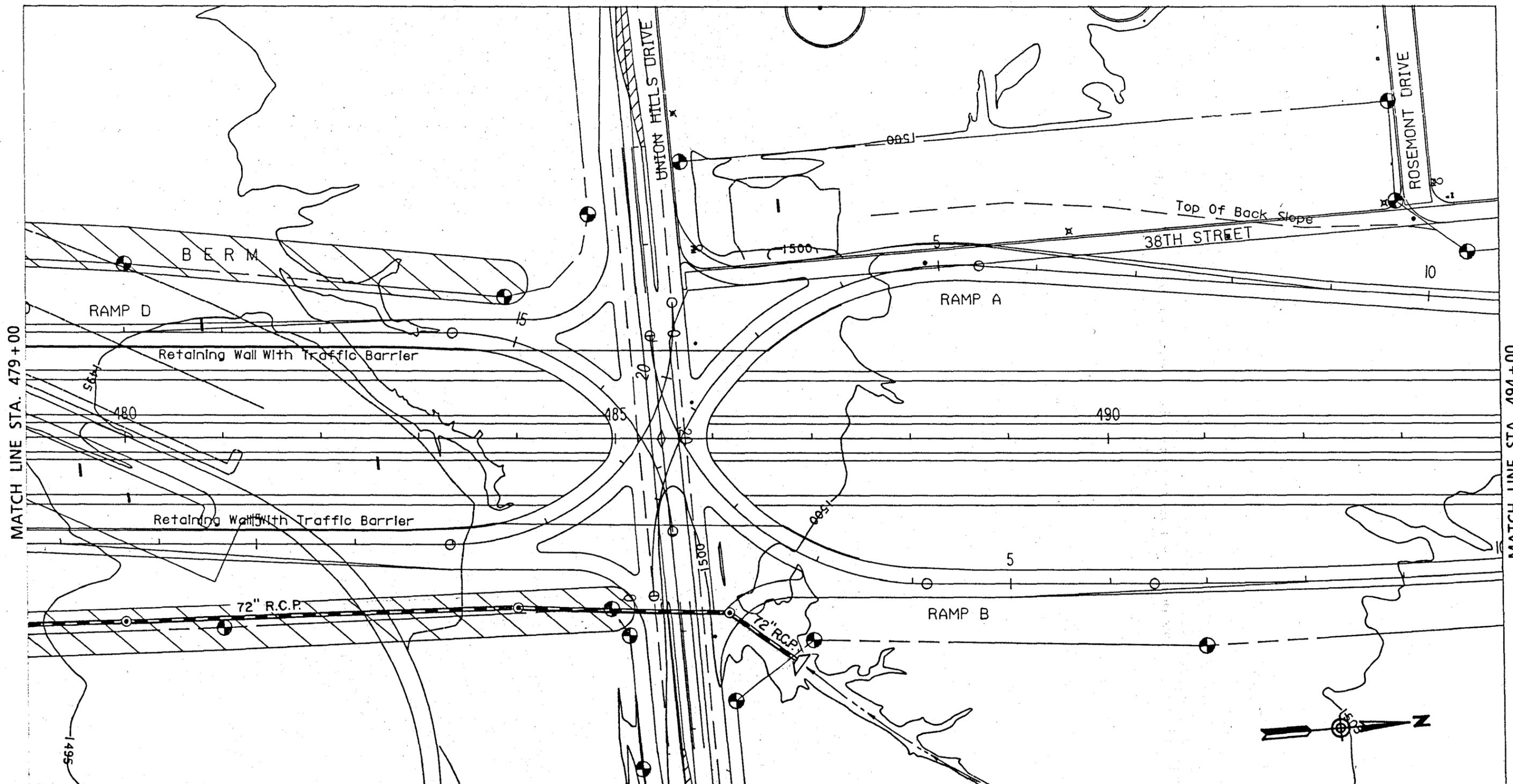


 **SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT**
ARIZONA DEPARTMENT
OF TRANSPORTATION
MICHAEL BAKER, JR., INC.



GENERAL PLAN
STA. 464+00 TO STA. 479+00

FIGURE 37



MATCH LINE STA. 479+00

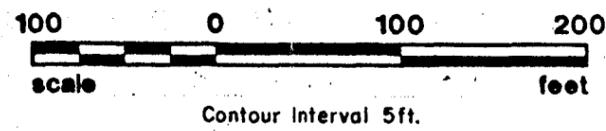
MATCH LINE STA. 494+00



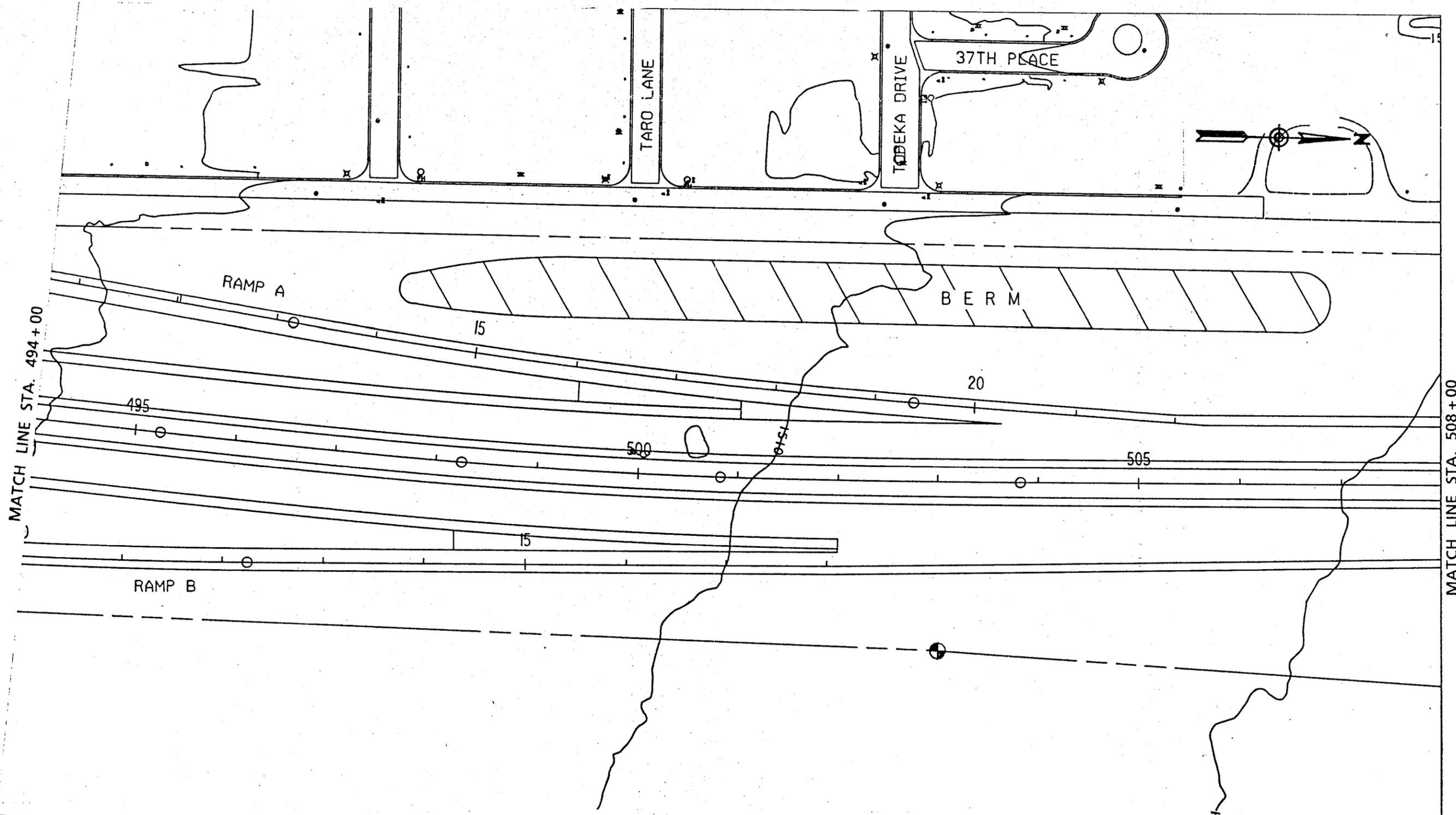
SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



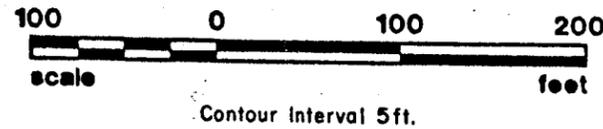
GENERAL PLAN
STA. 479 + 00 TO STA. 494 + 00



**SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT**

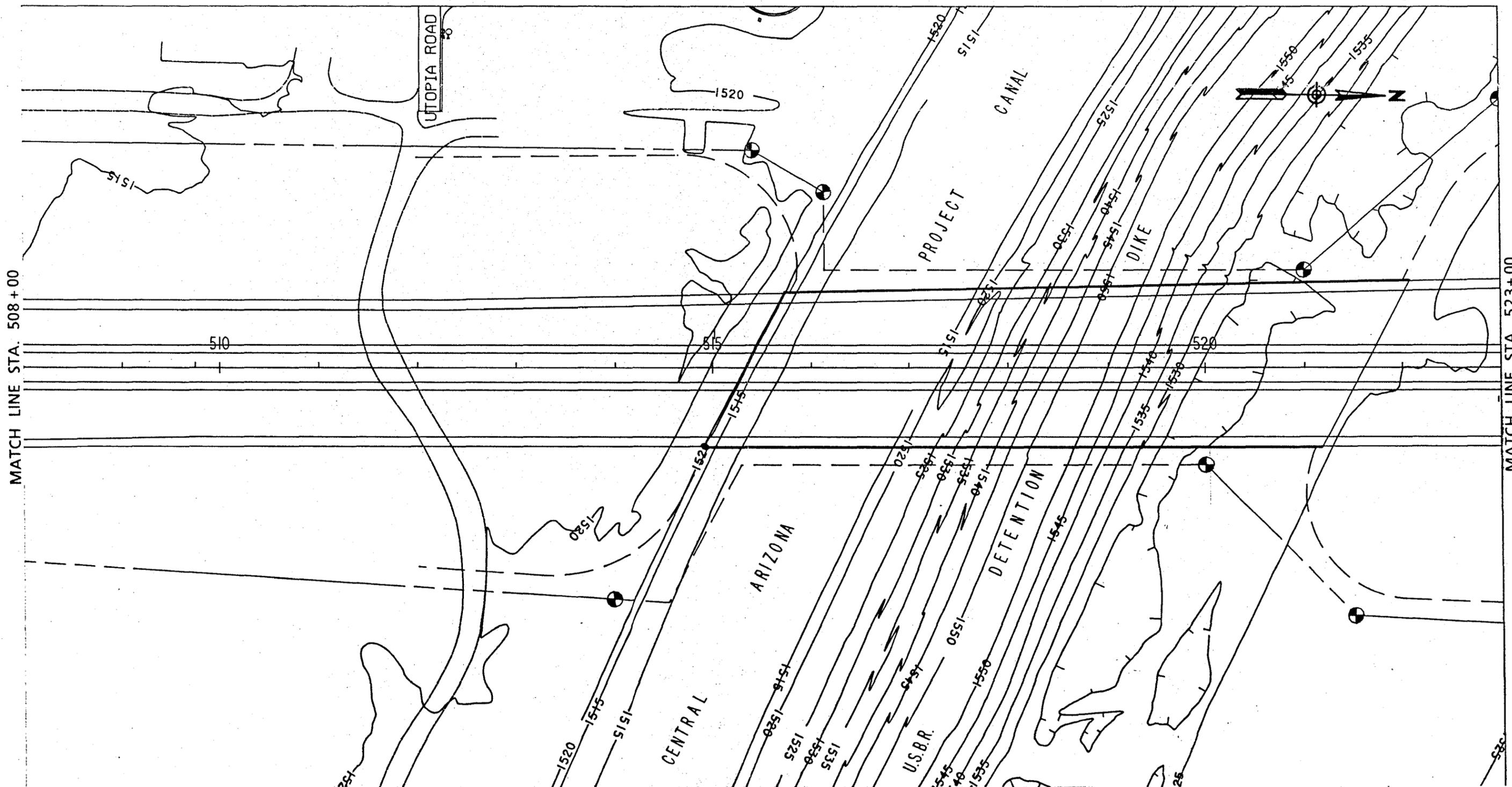
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



**GENERAL PLAN
STA. 494 + 00 TO STA. 508 + 00**

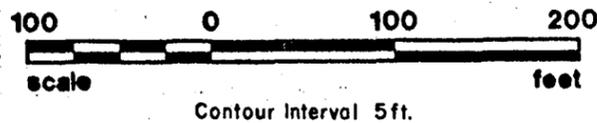
FIGURE 39



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

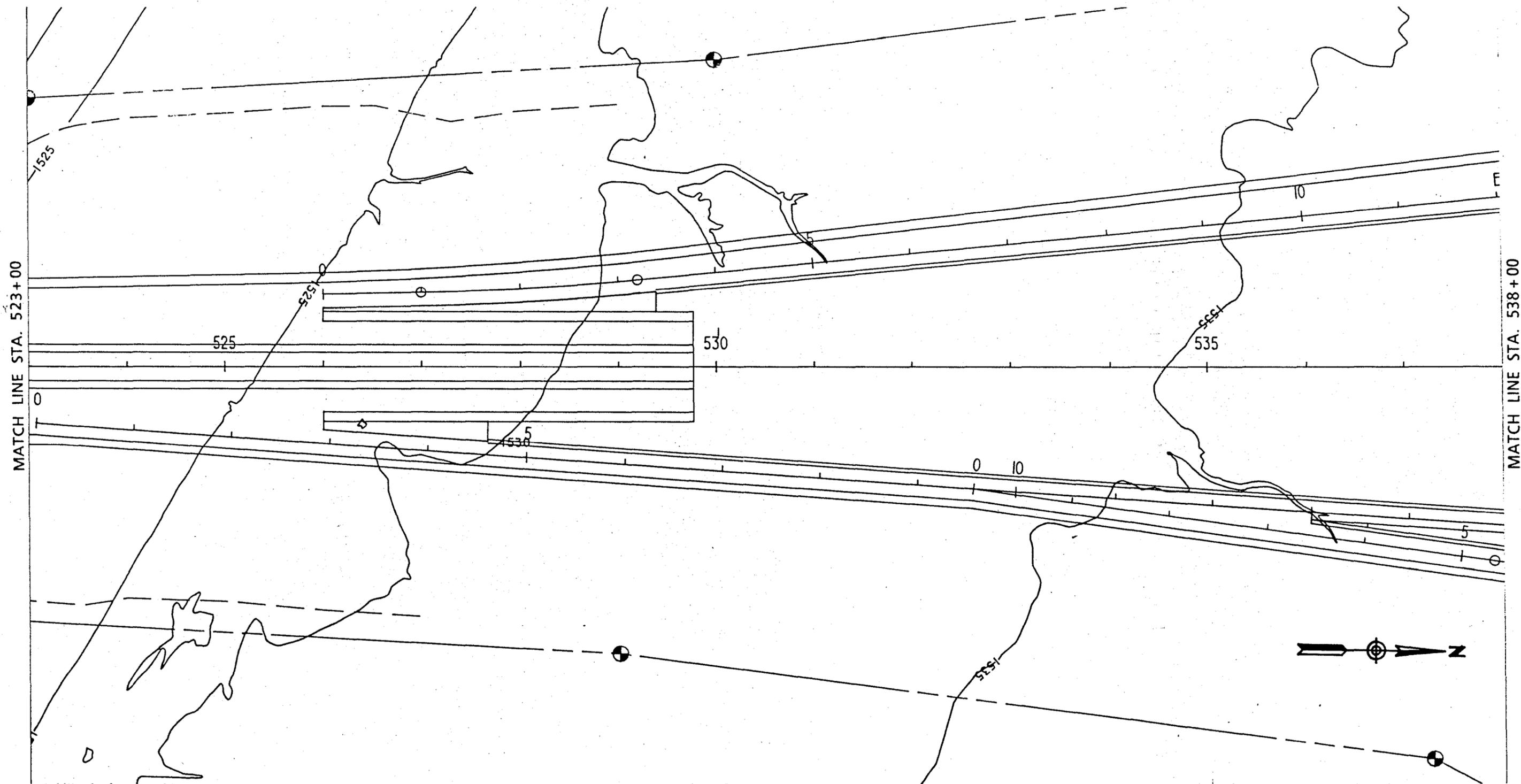
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



GENERAL PLAN
STA. 508 + 00 TO STA. 523 + 00

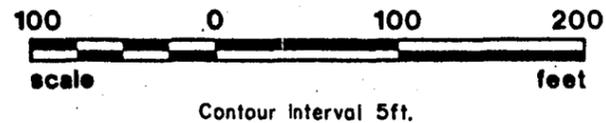
FIGURE 40



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

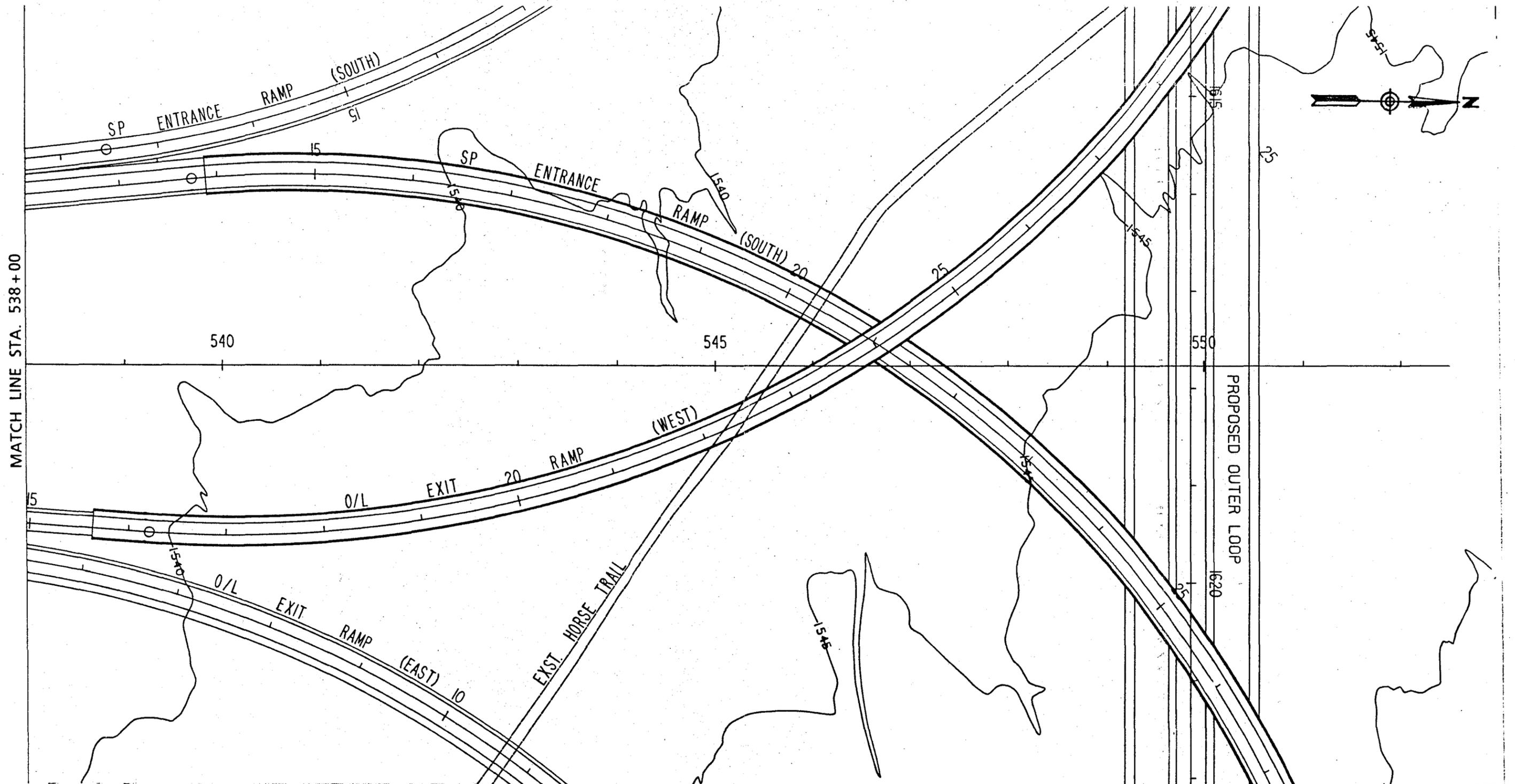
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



GENERAL PLAN
STA. 523 + 00 TO STA. 538 + 00

FIGURE 41



MATCH LINE STA. 538+00

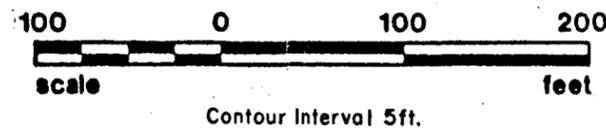
PROPOSED OUTER LOOP



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

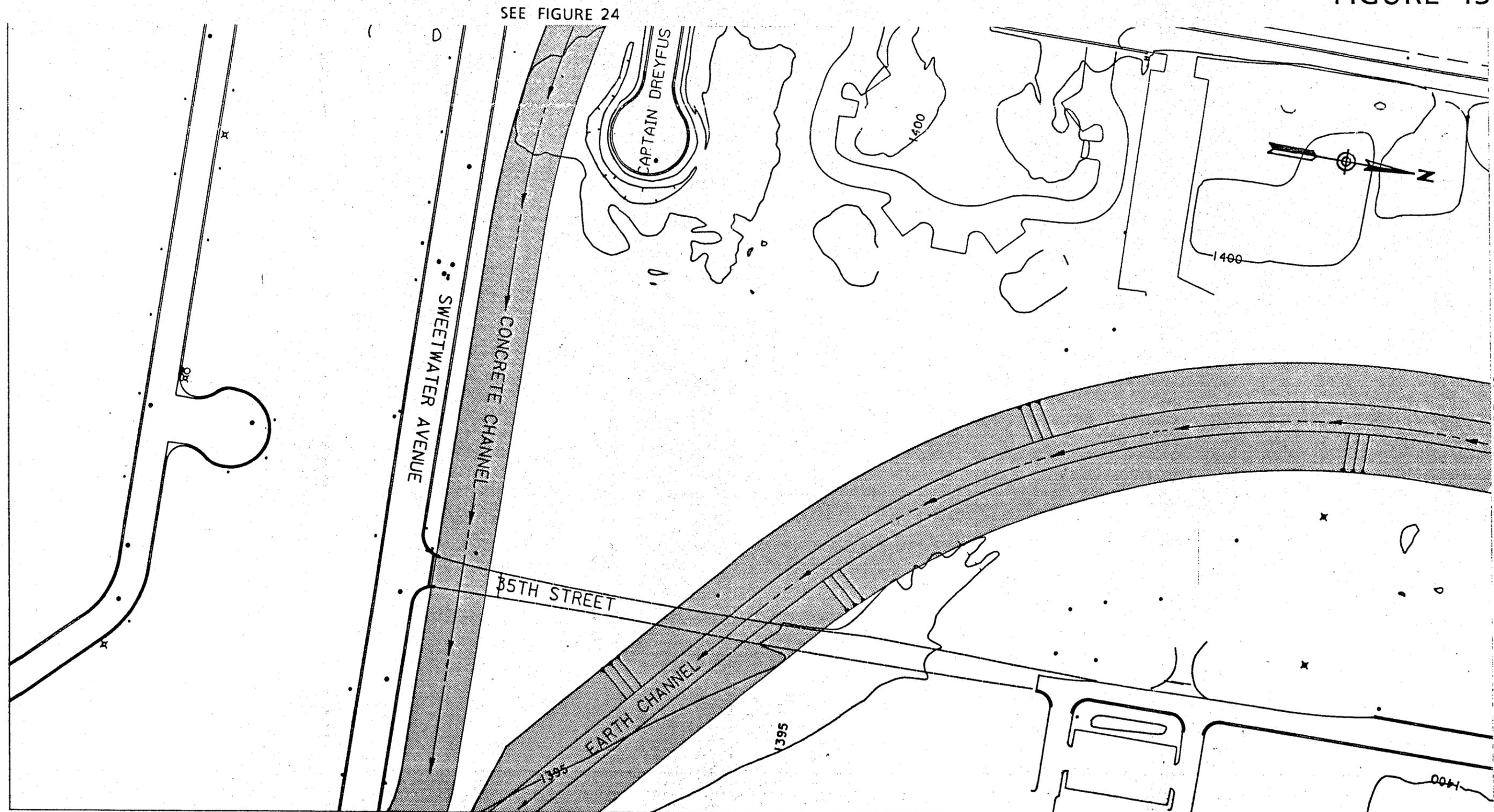
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



GENERAL PLAN
STA. 538+00 TO STA. 553+00

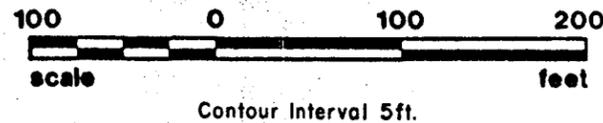
FIGURE 43



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

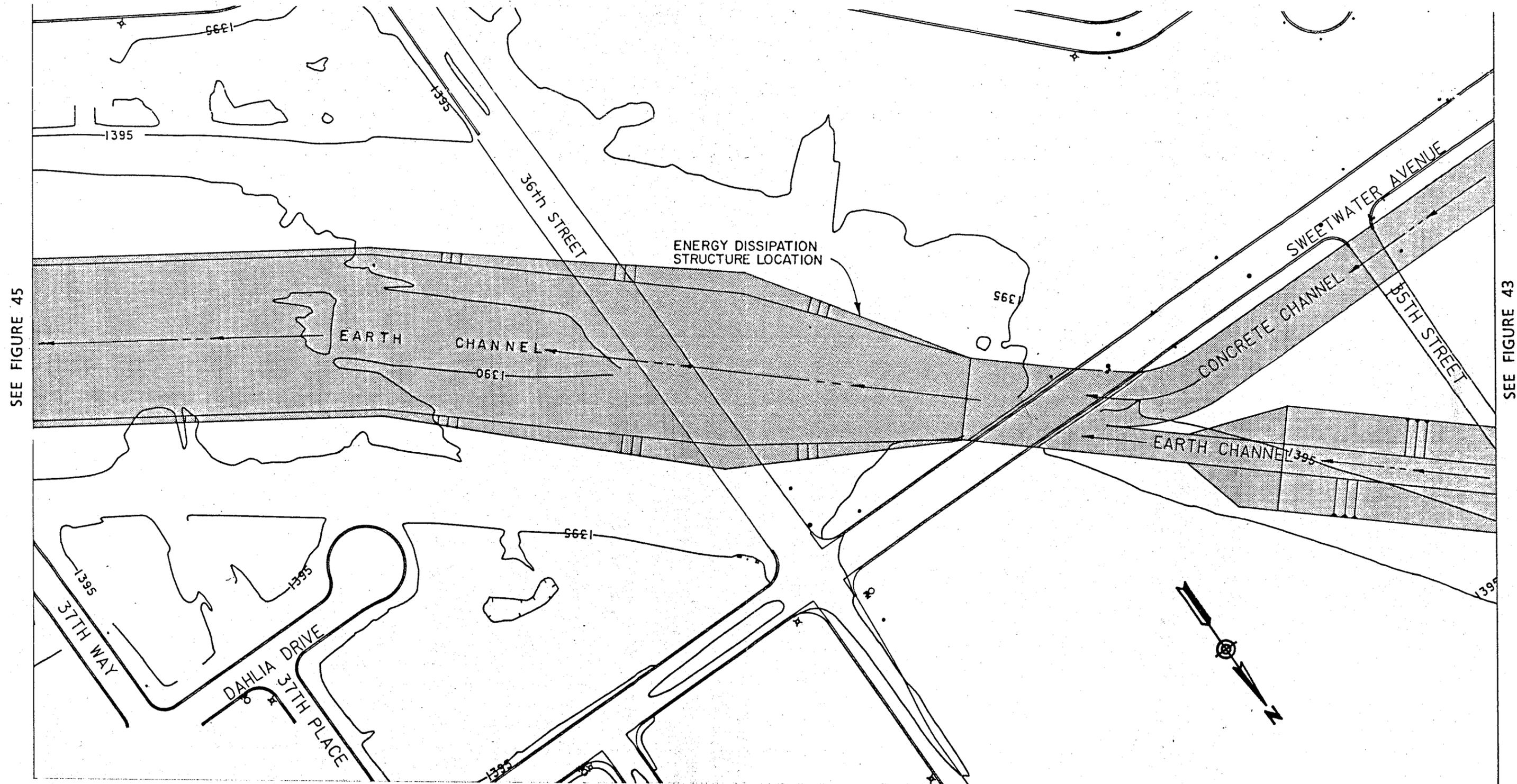
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



INDIAN BEND WASH
DRAINAGE CHANNEL

FIGURE 44



SEE FIGURE 45

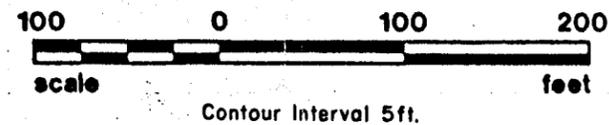
SEE FIGURE 43



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

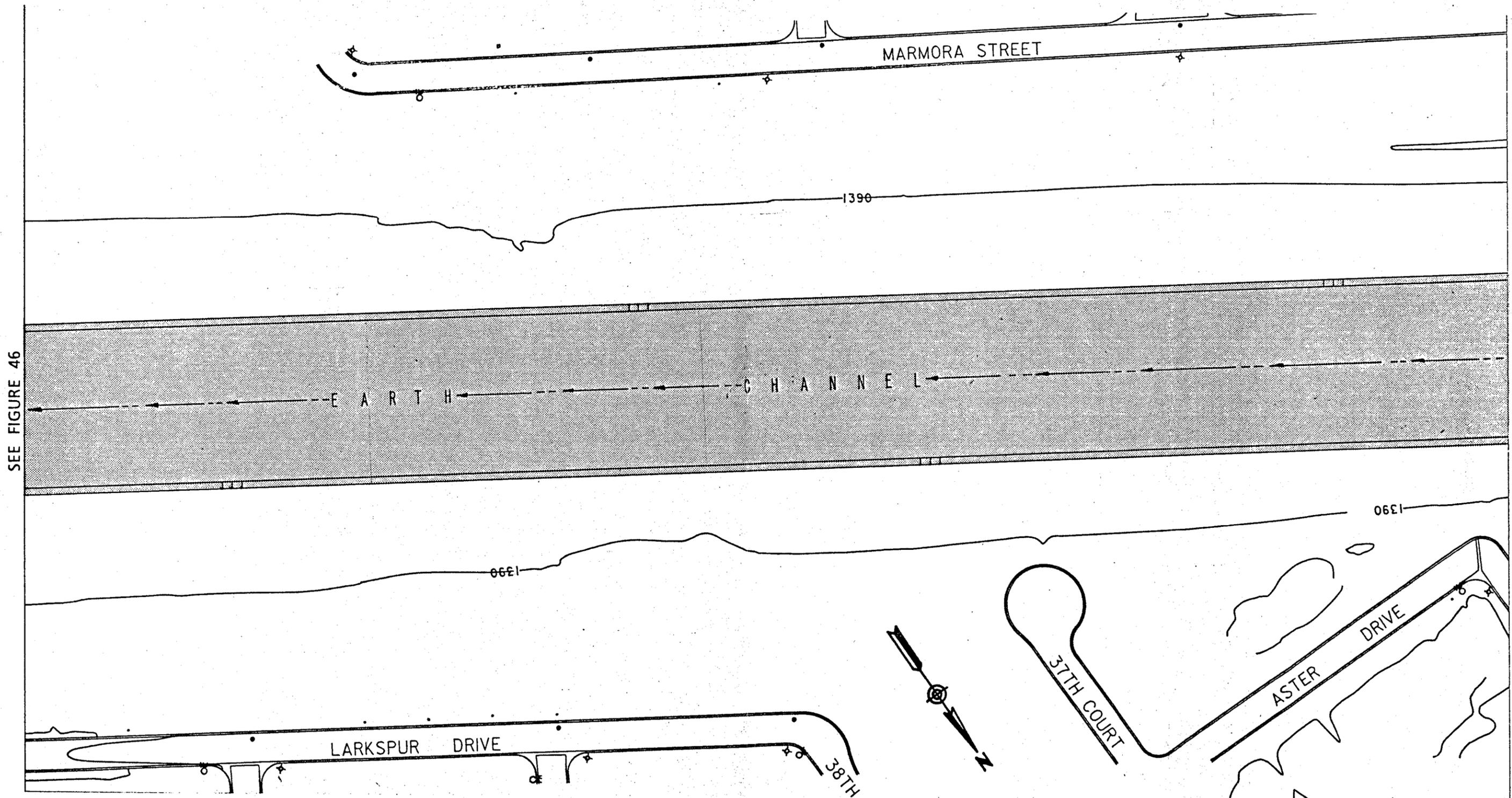
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



INDIAN BEND WASH
DRAINAGE CHANNEL

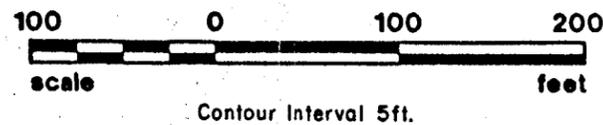
FIGURE 45



**SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT**

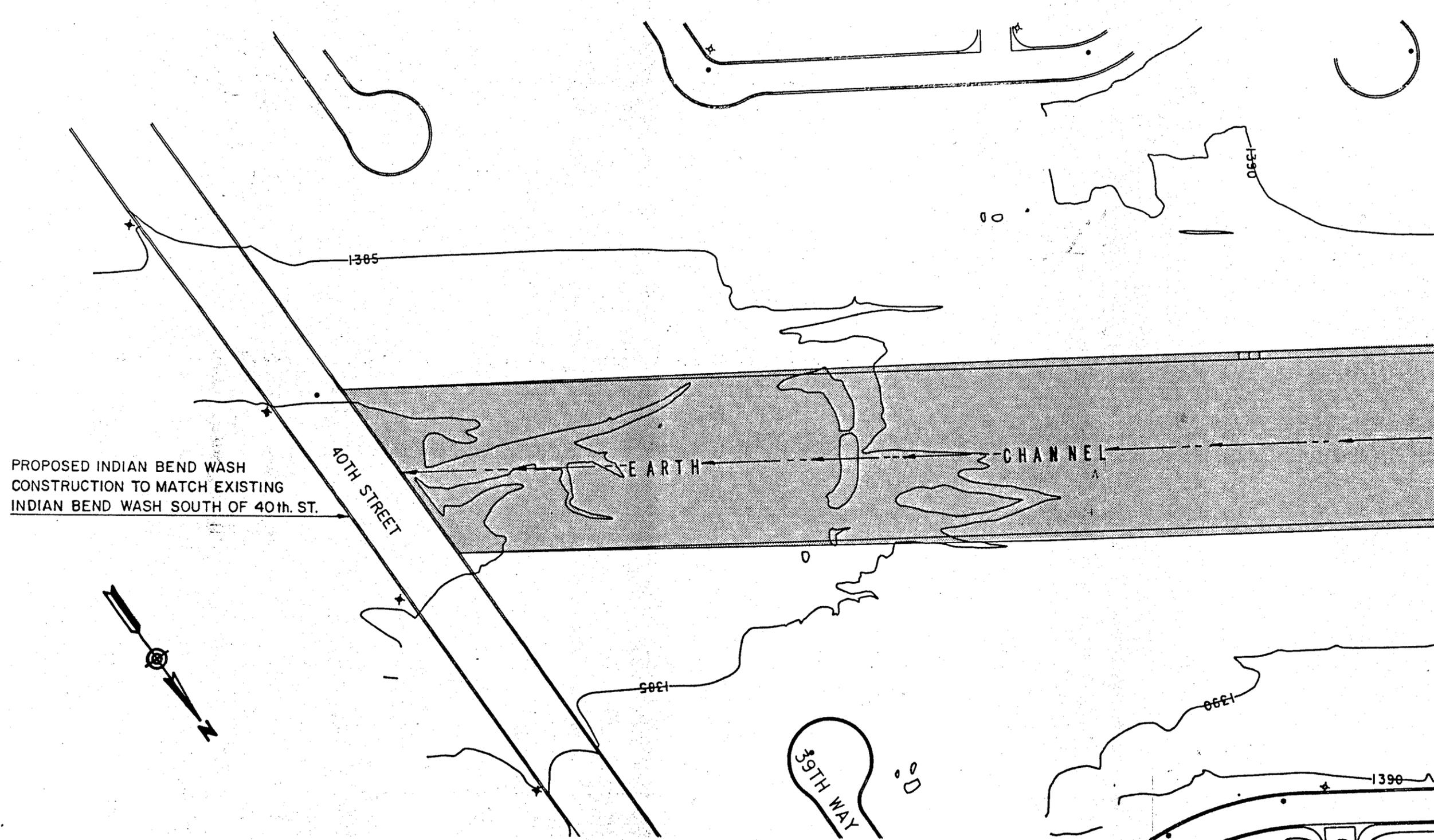
ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.



**INDIAN BEND WASH
DRAINAGE CHANNEL**

FIGURE 46



SEE FIGURE 45



SQUAW PEAK
HIGHWAY
DRAINAGE
REPORT

ARIZONA DEPARTMENT
OF TRANSPORTATION

MICHAEL BAKER, JR., INC.

INDIAN BEND WASH
DRAINAGE CHANNEL