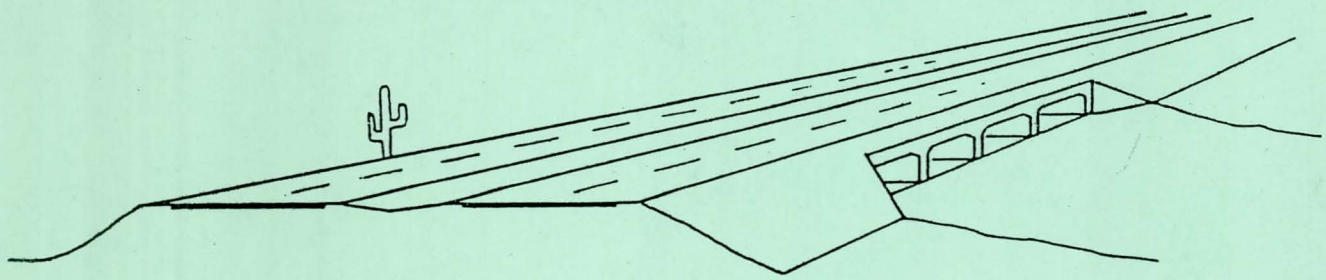
ARIZONA DEPARTMENT OF TRANSPORTATION

FINAL DRAINAGE STUDY REPORT



SUPERSTITION FREEWAY (SR 360)

Ironwood Drive to US 60

PROJECT NO. F-028-1-314 PE, 514C

CONTRACT NO. 86-35

Prepared by:

TUDOR ENGINEERING COMPANY

PHOENIX, ARIZONA

NOVEMBER, 1987

FINAL DRAINAGE STUDY REPORT

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IRONWOOD DRIVE TO US 60

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INTRODUCTION

The following report describes the drainage plan proposed for interception and removal of surface runoff incidental to construction and operation of the Superstition Freeway in Pinal County. The project entails extension of the Superstition Freeway from Ironwood Drive, in the vicinity of the City of Apache Junction, eastwards approximately 3.5 miles to and including the junction with US 60. An overall area map is presented as Figure 1.

Phase III location

The terrain through which the project passes can generally be described as typical desert rangeland. From Ironwood Drive to about Station 1315+00 the topographic relief is fairly even with about a one percent slope from northeast to southwest. East of Station 1315+00 the relief becomes more rugged with steeper ridges and well defined washes. Major drainage features through the project area include the North Diversion Dam, an earth dike constructed by the SCS to direct overland flow into the Powerline Dam forebay, the Weekes Wash drainage channel, and Siphon Draw east of the project.

Urban development, primarily in the form of trailer courts and single family dwellings, is on going on both sides of the project R/W, although mainly to the north. With construction of the Superstition Freeway, it is expected that the rate of development will increase significantly.

The report addresses the design of drainage facilities required to intercept both on-site and off-site generated storm runoff. On-site storm runoff is that portion of the surface runoff resulting from rainfall within the project R/W; principally from rainfall on the paved areas of the eastbound and westbound mainline roadways, the entrance and exit ramps, and the section line arterial crossroads included within the project, and also the non-paved areas of the mainline median and between the ramps and the mainline roadways. Hydrologic criteria for computing design discharges, together with other criteria governing pipe size and structure location are included in Appendix A of this report.

Off-site storm runoff is that portion of the surface runoff resulting from rainfall within the watershed upstream of the Superstition Freeway R/W, an area of approximately 12 square miles. This report does not address the hydrologic and hydraulic

modeling of the off-site watershed. Peak discharges and other hydrograph parameters used to design culverts, detention basins and other offsite runoff drainage facilities were based on information presented in a separate Offsite Drainage Plan report (Reference 10). The Offsite Drainage Report also contained preliminary Type, Size, and Location Plans for drainage structures that were used as a basis for final design.

Coordination with the following agencies was initiated prior to start of final design, and during the design process every effort was made to discuss alternatives and obtain approval for the work.

* Management Consultant Representatives - Arizona Department of Transportation

* Flood Control District of Maricopa County

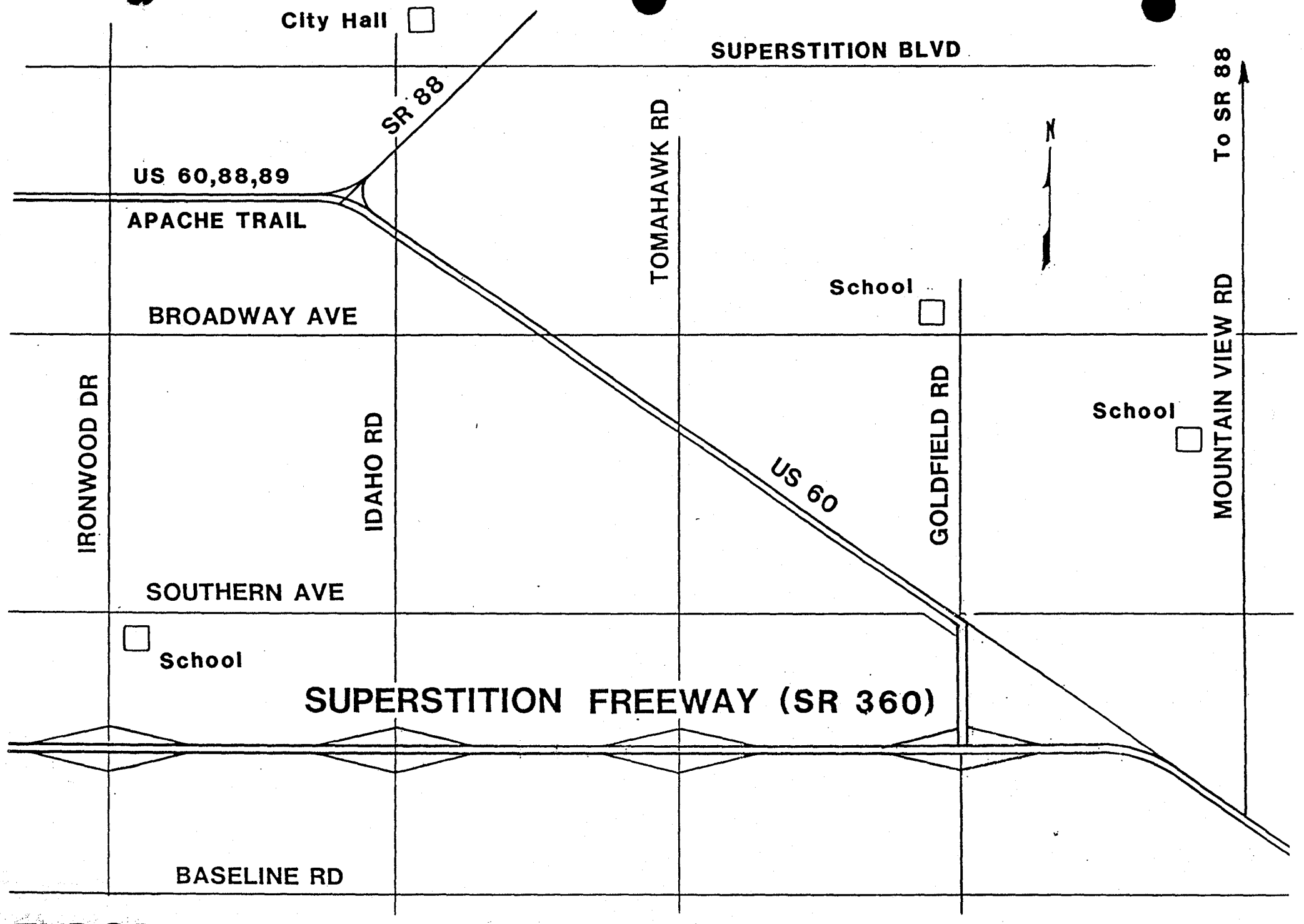
* Pinal County Department of Public Works

* City of Apache Junction Planning Department

* US Department of Agriculture, Soil Conservation Service

* Arizona State Land Department

This report supercedes the initial drainage study report for the Superstition Freeway (Ironwood Drive to US 60) issued in December, 1986.



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AREA MAP

FIGURE 1

SECTION I

ON-SITE DRAINAGE

1.0 Design Scheme:

The main eastbound and westbound lanes of Superstition Freeway, extending from Ironwood Drive to US 60, are designed to be constructed on fill material at an elevation above the natural grade. The height of fill varies from as little as one foot (+/-) to over twenty-four feet. The Freeway on-ramps and off-ramps are also to be constructed above grade on fill, with the exception of a short length where each ramp profile dips below grade prior to joining the existing or proposed arterial crossroad.

To prevent erosion of the embankment slope face, non-hazardous curbs are used to direct pavement runoff into a gutter extending the full length of the mainline roadways and the ramps. A typical cross section of the non-hazardous curb is shown as Detail A in Appendix B. Gutter flow is drawn off into catch basins which are spaced such that gutter flow spread does not exceed the criteria set forth in Section 102.3.1 of Appendix A. Stormwater enters catch basins through grated inlets and slotted drains.

Two schemes for removal of the pavement runoff were considered. In one scheme a series of catch basins would be connected together with storm drain pipe, and concentrated runoff would be discharged into the existing washes or swales which traverse the Freeway R/W. This scheme was not adopted, primarily because of concerns regarding the erosive effect of increased pavement runoff concentrated onto privately owned property downstream of the Freeway R/W.

A second scheme, which was adopted and is shown on the drainage plans in Appendix B, provide for releasing runoff from catch basins through a storm drain that outlets at the toe of the Freeway embankment. With the exception of catch basins that collect runoff from the crest point of Freeway underpasses and discharge peak flows of up to 6 cubic feet per second (cfs), discharges from individual catch basins in other locations throughout the alignment are generally less than 1 cfs. It is assumed that discharges on the south side, i.e., downstream of the Freeway, will have sufficient space

to spread out and become distributed into existing overland drainageways so that flow patterns at the edge of the R/W will closely approximate natural conditions.

On the north side of the Freeway, the on-site drainage scheme is integrated with the off-site drainage scheme. That is to say, pavement runoff is discharged into facilities designed primarily to handle off-site runoff intercepted by the project. These drainage features are fully described in Section II. The following narrative briefly describes the drainage interface on the north side of the Freeway from the beginning of the project to the termination at US 60.

i)Between Ironwood Drive and the North Diversion Dam, the pavement runoff will be discharged into an interception ditch. Runoff west of Station 1250+00 will be conveyed westwards to Ironwood Drive where it will pass into a culvert and enter a drainage system designed under a separate contract. Runoff between Station 1250+00 and the North Diversion Dam (Station 1262+00) will enter a culvert at Station 1250+35 and pass under the Freeway into an existing wash.

ii)Pavement runoff between the North Diversion Dam and Idaho Road will be discharged into a detention basin. Flows from the detention basin empty into the North Diversion Dam collection channel and are taken under the Freeway in a culvert located at approximately Station 1262+00.

iii)Between Idaho Road and Tomahawk Road, the pavement runoff will flow into the Weekes Wash detention basin. Runoff from the ramps at each end of this reach will flow into the detention basin through interception ditches which extend from arterial crossroads. Flow from the basin passes under the Freeway in a culvert at Station 1315+00 and enters a concrete lined channel.

iv)Between Tomahawk Road and the junction with US 60, the off-site drainage scheme calls for surface runoff to pass under the Freeway in a series of culverts located in well defined washes and natural swales. In this reach, pavement runoff discharged through storm drains will be collected by a system of ditches at the toe of the Freeway embankment and conveyed to the nearest culvert.

2.0Storm Drain System:

The on-site drainage design procedure and methodology follow the criteria set forth in References 1 and 2 listed in Section III. A discussion of that criteria is presented in Appendix A. This sub-section of the report describes the on-site drainage features and summarizes the applicable criteria.

The storm drain system for the eastbound and westbound roadways and ramps consist mainly of a series of strategically located single catch basins connected to a downdrain that outlets at the toe of the Freeway embankment. At some locations, generally immediately upstream of the gore sections and at the sag points, up to three catch basins are linked together so that both roadways and the median are connected to a single downdrain. Mainline catch basins are a non-standard special structure as shown in Detail AA of Figure B-2 in Appendix B. Median catch basins are standard ADOT Standard C-15.80.

In general, catch basins are located so as to maintain the maximum gutter flow spread criteria previously referenced. On the milder slopes, however, where gutter capacity is reduced, 50-foot lengths of slotted drain are used to minimize the number of catch basin/downdrain installations. On the steeper slopes, slotted drains are used to supplement the interception capacity of the catch basin grate inlets. Gutter flow hydraulic parameters, i.e., flow depth, velocity, and topwidth, are calculated using the Manning's Equation with a roughness coefficient of 0.015. On vertical curves, the slope used in the equation is the average of the computed instantaneous slope at points 25 feet upstream and downstream of the point of interception. Great inlet and slotted drain capacities are calculated using the criteria discussed in Section 102.3.3, Appendix A.

Most downdrains are outletted at the toe of the embankment fill so that runoff can enter existing drainageways. At some locations, however, the fill height does not provide sufficient head and the downdrain is either extended into a ditch (or detention basin), or a shallow ditch is excavated from the embankment toe to daylight. A flared end-section is provided for each downdrain to reduce the potential for erosion. When the slope of the downdrain exceeds two or three percent, an elbow is provided about 12 feet from the end-section and the remaining stormdrain is flattened out to reduce the outlet velocity.

The storm drain system for the crossroads will consist of the ADOT Standard C-15.10 catch basins with curb inlet and interconnecting pipe conduit. Outlets for the system are generally into roadside ditches or into culvert manholes.

The location and configuration of all on-site drainage facilities are shown on the plan sheets presented in Appendix B.

SECTION II

OFF-SITE DRAINAGE

1.0 General:

The section of Superstition Freeway from Ironwood Drive to US 60 traverses a known flood plain and, because of its elevated construction, acts as a dike to floodwaters flowing in a generally northeast to southwest direction. An extensive hydrologic and hydraulic study was performed to analyze upper watershed runoff characteristics, to model existing overland flow patterns, and to estimate the magnitude and duration of hydrographs flowing into the project R/W. The results of this study are published in a separate document entitled "Superstition Freeway - Comprehensive Off-site Drainage Plan", (Reference 10). The Plan also includes preliminary Type, Size and Location (T,S & L) Plans for drainage structures considered necessary to pass surface runoff through the project with least impact to downstream properties. The off-site drainage facilities described in this report are based on the preliminary T, S & L Plans; modified as necessary to reflect updated topographic information and freeway design.

2.0 Design Scheme:

Formulation and design of an off-site drainage scheme was predicated on the philosophy that floodplain characteristics and flow patterns outside of the project R/W should be maintained wherever possible, especially in those areas where abutting properties are residentially or commercially developed. These goals were difficult to achieve, partly because of the nature of the project, the terrain, and the extremely high rates of flow to be handled, and partly because development of private property outside of the R/W has not, in many cases, maintained the pattern of existing drainage channels approaching and continuing downstream from the project area. For these reasons, the Plan concluded that construction of peak-attenuating detention basins would provide the optimum drainage solution for two reaches of the Freeway alignment; between the North Diversion Dam and Idaho Road, and between Idaho Road and Tomahawk Road. In the former, discharges from the basin would be released into an existing channel; in the latter, a new channel would be constructed to remove basin releases. In both instances,

the result of detention basin construction will be to relieve flooding concerns in downstream properties by removing the threat of off-site generated floodwaters.

The off-site drainage Plan concluded that for the remainder of the Freeway alignment, i.e., from Ironwood Drive to the North Diversion Dam and from Tomahawk Road to US 60, the off-site generated surface runoff can be passed through culverts located under the Freeway in existing drainageways, and that this method would not significantly impact existing floodplain conditions outside of the Freeway R/W.

3.0 Design Methodology:

This section of the report describes the methodology associated with final design of the following off-site drainage facilities.

- North Diversion Dam detention basin
- Weekes Wash detention basin
- Pass-through culverts

Design of the detention basins was based on providing sufficient storage capacity and oulet capability to attenuate and safely pass through the 100-year, 24 hour duration storm runoff hydrograph. Culverts were sized using the 50-year, 24-hour duration storm peak discharge. A check was then made to ensure that headwater elevations required to pass the 100-year peak discharge through the culverts would not produce flooding conditions outside of the R/W or cause inundation of any portion of the Freeway traveled way.

Detention basin design does not incorporate dead storage capacity. The outlet is located at the low point and the bottom of the basin is sloped to provide complete drainage. To protect against erosion, the side slope cuts are maintained at a minimum 4 horizontal to 1 vertical. For additonal protection, the slopes perpendicular to the path of the incoming surface runoff are reinforced using soil cement. Other criteria and standards governing hydrologic and hydraulic design of off-site drainage facilities are presented in Appendix E of Reference 10.

3.1 North Diversion Dam Detention Basin:

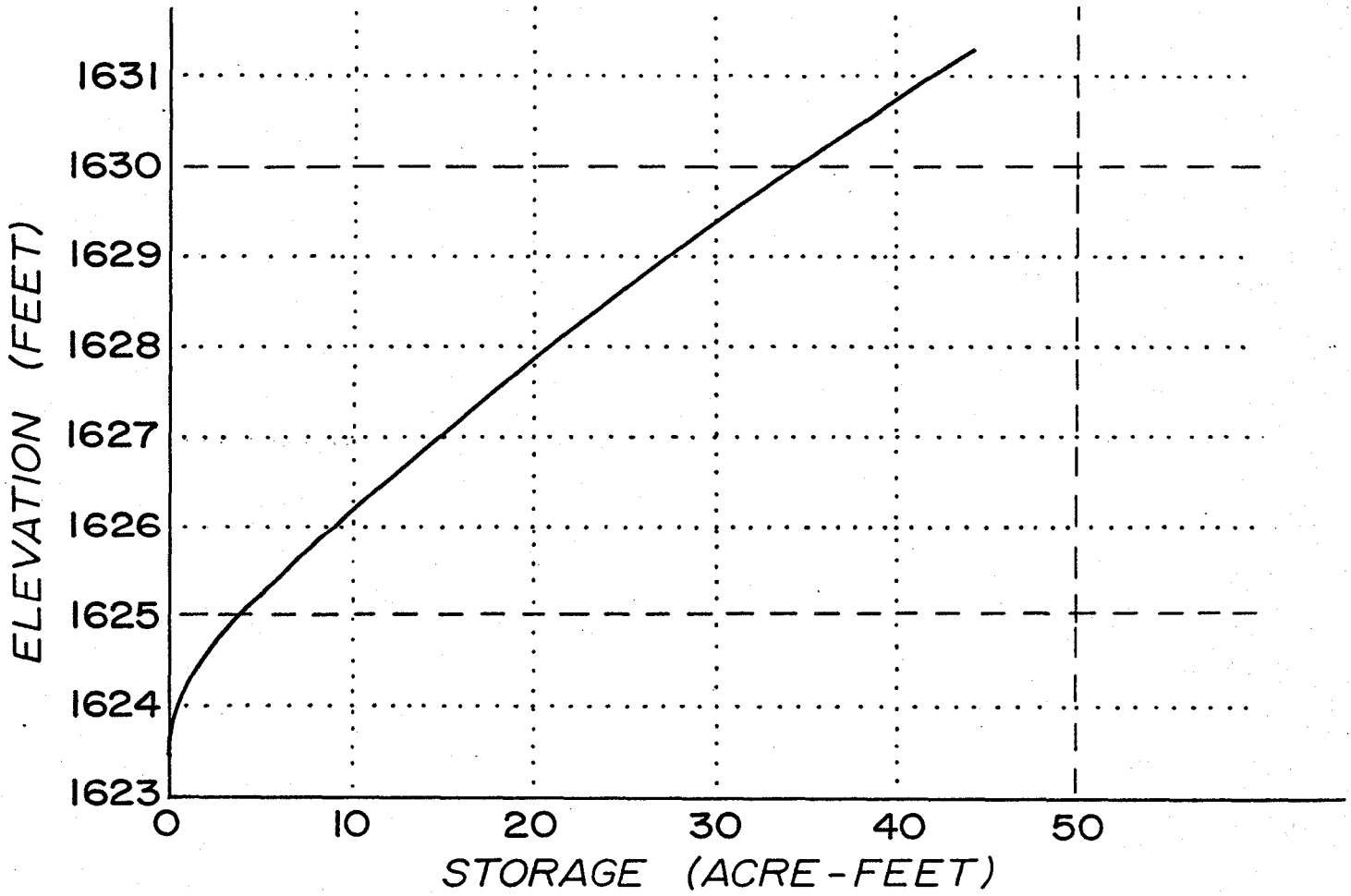
The North Diversion Dam detention basin will be constructed parallel to the Freeway and will extend from the North Diversion Dam at about Station 1262+00 to Station 1285+00, near the Idaho Road underpass. The basin will intercept all overland flow entering the R/W from the north and northeast between these stations. Several different configurations were evaluated during the process of establishing the optimum basin layout. A single basin configuration utilizing all the available surface area between the Freeway embankment and the north R/W was found to provide sufficient storage capacity with minimum maintenance requirements. Basin discharges will pass into an existing collector channel located at the toe of the upstream side of the North Diversion Dam and be conveyed south towards Baseline Road. This receiving channel is hereinafter referred to as the North Diversion Dam channel.

A storage capacity vs. elevation curve for the basin is provided as Figure II-1. At the spillway crest elevation of 1630.0 feet, the surface area of the basin is approximately 7 acres, and the storage volume is about 35 acre-feet.

A graphical representation of the design inflow hydrograph is presented in Figure II-2. The graph shows that the main stem of the hydrograph rises sharply to a peak discharge of a little over 500 cfs and then recedes almost as quickly.

The mass curve method was used to route the design inflow hydrograph through the basin. Routings were performed for different outlet conditions based on alternative outlet conduit geometry and tailwater considerations.

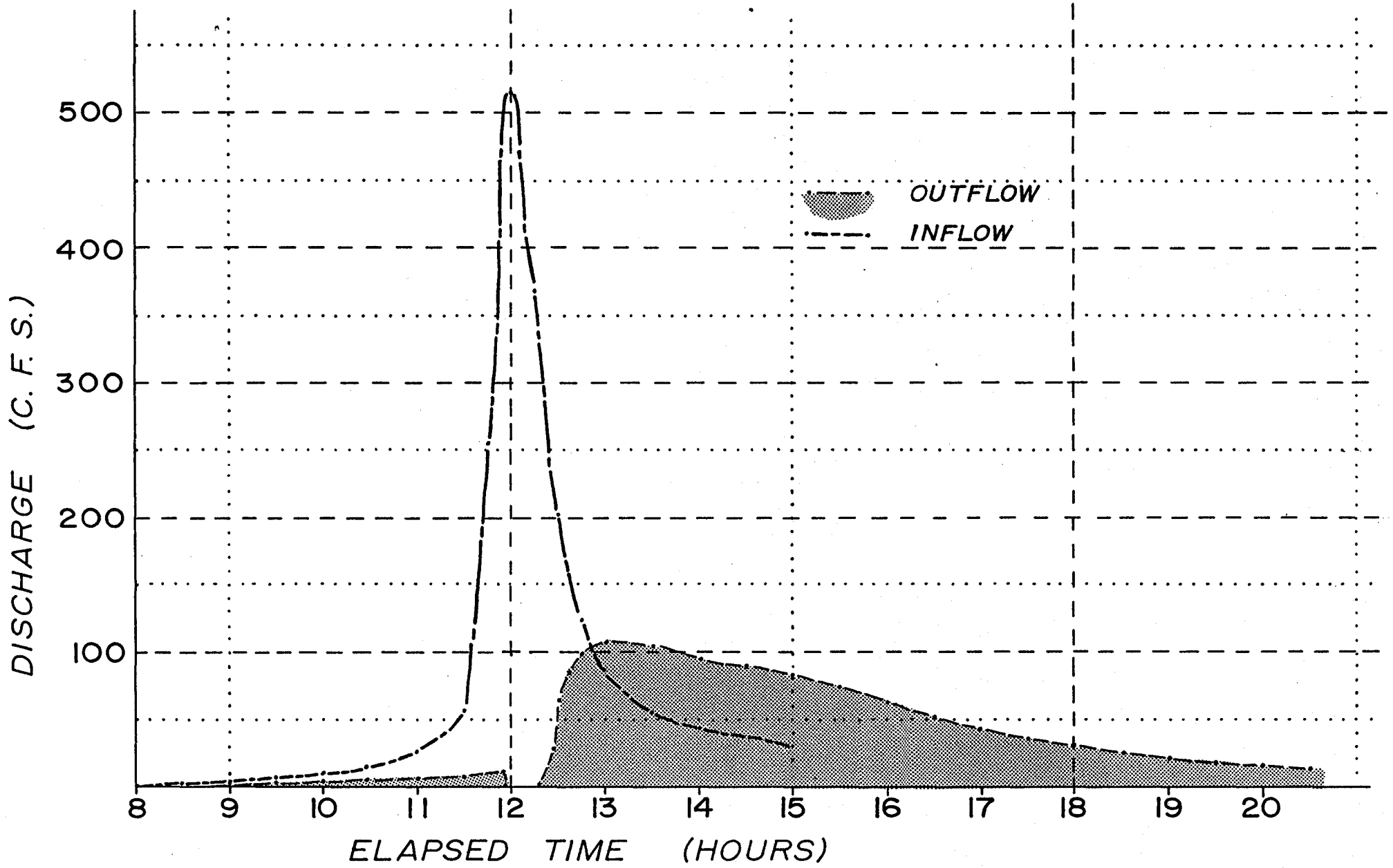
Tailwater conditions affect the rate of outflow from the basin and consequently impact the maximum depth of ponding. Tailwater conditions used in the routings ranged from those produced by a 100-year in-channel hydrograph, (provided in the off-site drainage report), to those produced by basin discharge only, i.e., no additional in-channel discharge. Figure II-3 presents a stage vs. discharge curve for the North Diversion Dam channel at the detention basin outlet. The curve was established by computing a series of backwater profiles for different rates of flow in the channel from downstream of the Freeway culverts. At the basin outlet, the water surface profiles for the higher discharges are controlled by the headwater depths necessary to pass flows through the Freeway culvert.



SUPERSTITION FREEWAY PROJECT

NORTH DIVERSION DAM DETENTION BASIN STORAGE vs ELEVATION CURVE

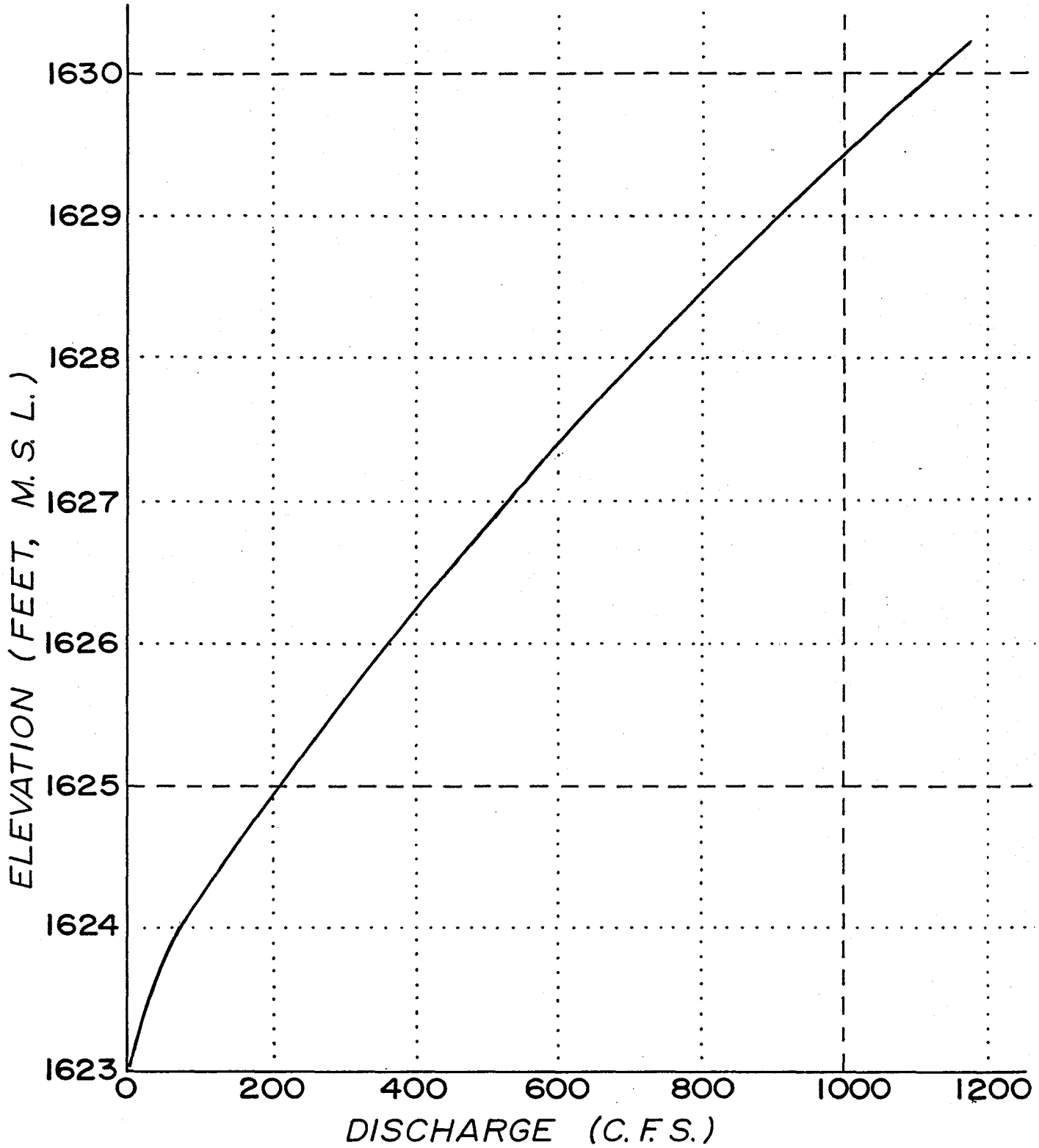
FIGURE II-1



SUPERSTITION FREEWAY PROJECT

NORTH DIVERSION DAM DETENTION BASIN
100-YEAR INFLOW/OUTFLOW HYDROGRAPHS

FIGURE II-2



SUPERSTITION FREEWAY PROJECT

NORTH DIVERSION DAM DRAINAGE CHANNEL STAGE-DISCHARGE CURVE AT DETENTION BASIN OUTLET

FIGURE II-3

Outlet conduit geometry is a function of pipe size and shape. To obtain the conduit geometry considered most suitable for the basin, a variety of circular and rectangular shaped pipes were analyzed under all tailwater conditions. Based on criteria such as maximum depth of ponding, peak basin discharge, and time to empty the basin, a 48-inch diameter concrete pipe outlet conduit was selected. A flapgate will be provided at the outlet of the conduit. This valve will prevent backflow from the channel into the basin during those times when water surface elevations in the channel exceed those in the basin.

A graphical representation of the basin outflow hydrograph is shown in Figure II-2. Tailwater conditions affecting this hydrograph are those produced by the 100-year in-channel hydrograph. The discontinuity in the hydrograph is the result of high in-channel water surface elevations causing a closure of the flapgate and subsequent non-discharge from the basin. A tabular display of the routing parameters is presented in Table II-1. It can be seen that the maximum basin discharge is approximately 107 cfs and occurs at a basin water surface elevation of about 1629.2 feet. This elevation provides for a freeboard of about 1 foot to the spillway crest. The routing data of Table II-1 also indicates that the basin operation cycle for the 100-year flood will be in the order of about 13 hours; 4 hours to reach the maximum ponding level and about 9 hours to empty.

An important consideration in design of the basin outlet was the need to prevent high outflow rates combining with high in-channel flows to produce overburdening rates of discharge in the existing channel. Figure II-4 shows that for the selected configuration, the 100-year peak flow in the channel upstream of the basin outlet is not increased by basin discharges. A similar result was obtained when the 50-year flood condition was analyzed. If a zero discharge condition is assumed in the channel upstream of the basin outlet, then a maximum basin discharge of about 98 cfs will result when the 100-year flood hydrograph is routed. This rate of flow is well within the capacity of the existing North Diversion Dam channel.

3.2 Weekes Wash Detention Basin:

The Weekes Wash detention basin is designed to intercept overland floodflows associated with Weekes Wash, a major drainage route conveying storm runoff from the watershed headwater areas on the slopes of the Superstition and the Goldfield Mountains. The basin will be constructed parallel to the Freeway and will extend from

TABLE II-1

SUPERSTITION FREEWAY PROJECT
JOB NO: 1154.01
NORTH DIVERSION DAM DETENTION BASIN
100-YEAR FLOOD ROUTING
48-INCH DIAMETER OUTLET PIPE
100-YEAR IN-CHANNEL HYDROGRAPH
RUN DATE : 08-24-1987

TIME (HR)	ACCUM. INFLOW (AC-FT)	ASSUME Q_{AVE} FOR DT (CFS)	ASSUME ACCUM. OUTFLOW (AC-FT)	BASIN STORAGE VOLUME (AC-FT)	BASIN SURFACE ELEVATION (FEET)	TAILWATER DISCHARGE (CFS)	TAILWATER SURFACE ELEVATION (FEET)	BASIN OUTFLOW INST. (CFS)	BASIN OUTFLOW AVE (CFS)	COMPUTE OUTFLOW FOR DT (AC-FT)	OUTFLOW TOTAL (AC-FT)
8.00	0.00	0.0	0.00	0.00	1623.51	1	1623.02	0.1	0.0	0.00	0.00
8.20	0.02	0.1	0.00	0.02	1623.53	2	1623.03	0.2	0.2	0.00	0.00
8.40	0.05	0.2	0.00	0.04	1623.57	4	1623.05	0.6	0.4	0.01	0.01
8.60	0.09	0.6	0.01	0.07	1623.61	5	1623.07	0.9	0.8	0.01	0.02
8.80	0.14	1.2	0.03	0.10	1623.66	6	1623.09	1.3	1.1	0.02	0.04
9.00	0.20	1.6	0.06	0.14	1623.72	9	1623.12	1.7	1.5	0.03	0.07
9.20	0.27	2.0	0.09	0.18	1623.77	10	1623.15	2.2	2.0	0.03	0.10
9.40	0.36	2.5	0.13	0.22	1623.85	13	1623.18	2.8	2.5	0.04	0.14
9.60	0.46	3.2	0.19	0.27	1623.92	14	1623.21	3.5	3.1	0.05	0.19
9.80	0.58	3.8	0.25	0.33	1624.00	18	1623.26	4.1	3.8	0.06	0.25
10.00	0.71	4.1	0.32	0.40	1624.02	20	1623.29	4.3	4.2	0.07	0.32
10.20	0.88	4.3	0.39	0.49	1624.05	23	1623.32	4.4	4.3	0.07	0.40
10.40	1.08	4.6	0.46	0.62	1624.09	27	1623.38	4.7	4.6	0.08	0.47
10.60	1.31	4.9	0.54	0.77	1624.13	31	1623.44	5.1	4.9	0.08	0.55
10.80	1.59	5.3	0.63	0.96	1624.19	37	1623.54	5.5	5.3	0.09	0.64
11.00	1.94	5.8	0.73	1.21	1624.26	45	1623.64	6.1	5.8	0.10	0.73
11.20	2.36	6.4	0.83	1.52	1624.35	54	1623.77	6.7	6.4	0.11	0.84
11.40	2.90	7.2	0.95	1.95	1624.47	70	1624.00	7.7	7.2	0.12	0.96
11.60	3.64	8.4	1.09	2.55	1624.65	98	1624.19	9.1	8.4	0.14	1.10
11.80	5.71	4.5	1.17	4.55	1625.15	261	1625.26	0.0	4.5	0.07	1.17
12.00	11.21	0.0	1.17	10.04	1626.19	612	1627.33	0.0	0.0	0.00	1.17
12.20	19.33	0.0	1.17	18.16	1627.52	859	1628.66	0.0	0.0	0.00	1.17
12.40	26.16	14.3	1.40	24.75	1628.53	766	1628.15	28.9	14.4	0.24	1.41
12.60	30.36	58.7	2.37	27.99	1629.02	590	1627.21	86.9	57.9	0.96	2.37
12.80	33.14	96.9	3.97	29.17	1629.19	454	1626.45	106.3	96.6	1.60	3.97
13.00	35.05	106.3	5.73	29.31	1629.21	354	1625.86	107.3	106.8	1.77	5.73
13.20	36.48	107.3	7.50	28.97	1629.16	292	1625.47	106.7	107.0	1.77	7.50
13.40	37.64	106.1	9.26	28.38	1629.07	253	1625.21	105.5	106.1	1.75	9.25
13.60	38.61	104.4	10.98	27.62	1628.96	226	1625.04	103.4	104.5	1.73	10.98
13.80	39.48	101.1	12.66	26.82	1628.84	204	1624.89	98.8	101.1	1.67	12.65
14.00	40.24	97.6	14.27	25.97	1628.71	188	1624.79	96.5	97.6	1.61	14.27
14.20	40.95	95.1	15.84	25.11	1628.58	178	1624.72	93.9	95.2	1.57	15.84
14.40	41.62	92.6	17.37	24.24	1628.45	169	1624.66	91.3	92.6	1.53	17.37
14.60	42.24	90.1	18.86	23.38	1628.33	163	1624.62	88.9	90.1	1.49	18.86
14.80	42.84	87.6	20.31	22.53	1628.20	156	1624.58	86.4	87.6	1.45	20.31
15.00	43.40	85.1	21.71	21.68	1628.07	150	1624.53	83.8	85.1	1.41	21.71
15.20	43.53	82.1	23.07	20.46	1627.88	80	1624.07	80.4	82.1	1.36	23.07
15.40	43.53	78.0	24.36	19.17	1627.68	76	1624.04	75.8	78.1	1.29	24.36
15.60	43.53	73.3	25.57	17.96	1627.49	71	1624.01	71.0	73.4	1.21	25.58
15.80	43.53	68.7	26.71	16.82	1627.31	67	1623.95	66.6	68.8	1.14	26.71
16.00	43.53	64.4	27.77	15.75	1627.15	62	1623.89	62.4	64.5	1.07	27.78
16.20	43.53	60.5	28.77	14.76	1626.99	59	1623.84	58.7	60.6	1.00	28.78
16.40	43.53	56.7	29.71	13.82	1626.83	55	1623.78	54.7	56.7	0.94	29.72
16.60	43.53	52.8	30.58	12.95	1626.68	51	1623.73	51.0	52.9	0.87	30.59
16.80	43.53	49.4	31.40	12.13	1626.54	48	1623.68	47.6	49.3	0.82	31.41
17.00	43.53	46.0	32.16	11.37	1626.41	45	1623.64	44.6	46.1	0.76	32.17
17.20	43.53	43.0	32.87	10.66	1626.29	42	1623.59	41.6	43.1	0.71	32.88
17.40	43.53	40.2	33.54	9.99	1626.18	39	1623.55	38.8	40.2	0.66	33.55

TABLE II-1 (cont.)

SUPERSTITION FREEWAY PROJECT
JOB NO: 1154.01
NORTH DIVERSION DAM DETENTION BASIN
100-YEAR FLOOD ROUTING
48-INCH DIAMETER OUTLET PIPE
100-YEAR IN-CHANNEL HYDROGRAPH
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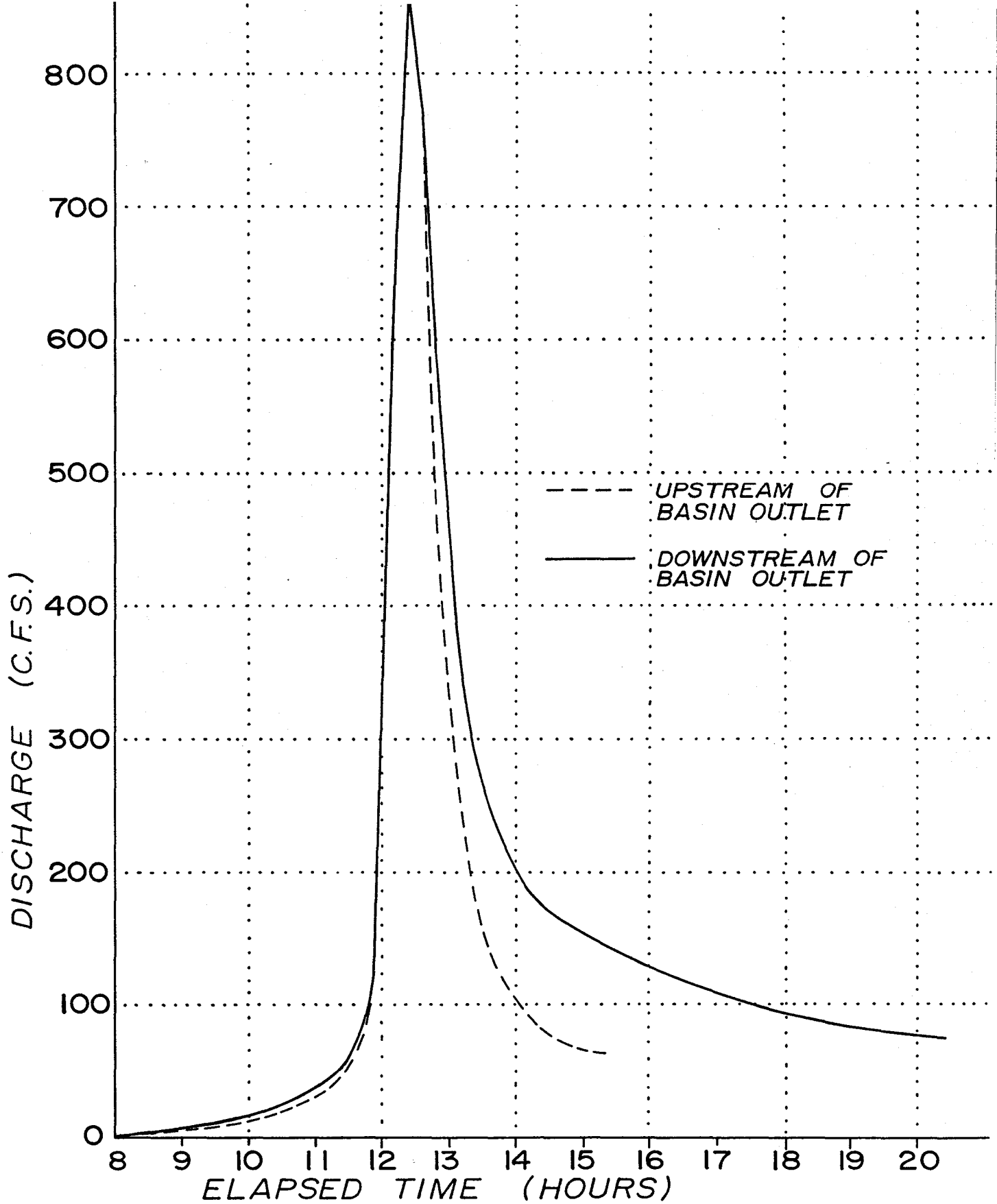
TIME (HR)	ACCUM. INFLOW (AC-FT)	ASSUME Q_{AVE} FOR DT (CFS)	ASSUME ACCUM. OUTFLOW (AC-FT)	BASIN STORAGE VOLUME (AC-FT)	BASIN SURFACE ELEVATION (FEET)	TAILWATER DISCHARGE (CFS)	TAILWATER SURFACE ELEVATION (FEET)	BASIN OUTFLOW INST. (CFS)	BASIN OUTFLOW AVE (CFS)	COMPUTE OUTFLOW FOR DT (AC-FT)	OUTFLOW TOTAL (AC-FT)
17.60	43.53	37.4	34.15	9.37	1626.08	36	1623.52	36.1	37.4	0.62	34.16
17.80	43.53	35.0	34.73	8.80	1625.97	34	1623.48	33.8	35.0	0.58	34.74
18.00	43.53	32.6	35.27	8.26	1625.87	31	1623.45	31.2	32.5	0.54	35.28
18.20	43.53	30.0	35.77	7.76	1625.77	29	1623.41	28.8	30.0	0.50	35.78
18.40	43.53	28.8	36.24	7.28	1625.68	27	1623.39	26.5	27.7	0.46	36.23
18.60	43.53	25.5	36.67	6.86	1625.60	25	1623.35	24.5	25.5	0.42	36.66
18.80	43.53	23.5	37.05	6.47	1625.52	23	1623.32	22.6	23.6	0.39	37.05
19.00	43.53	21.7	37.41	6.12	1625.46	21	1623.30	20.9	21.8	0.36	37.41
19.20	43.53	20.3	37.75	5.78	1625.39	20	1623.28	19.7	20.3	0.34	37.74
19.40	43.53	19.3	38.07	5.46	1625.33	19	1623.27	18.8	19.3	0.32	38.06
19.60	43.53	18.4	38.37	5.16	1625.27	18	1623.26	18.0	18.4	0.30	38.36
19.80	43.53	17.6	38.66	4.87	1625.21	17	1623.25	17.2	17.6	0.29	38.66
20.00	43.53	16.8	38.94	4.59	1625.16	16	1623.23	16.4	16.8	0.28	38.93
20.20	43.53	16.1	39.21	4.32	1625.11	16	1623.22	15.7	16.1	0.27	39.20
20.40	43.53	15.3	39.46	4.07	1625.06	15	1623.21	15.0	15.3	0.25	39.45
20.60	43.53	14.7	39.70	3.83	1625.01	14	1623.20	14.3	14.7	0.24	39.69
20.80	43.53	13.9	39.93	3.60	1624.95	13	1623.19	13.5	13.9	0.23	39.92
21.00	43.53	13.0	40.15	3.38	1624.89	13	1623.18	12.6	13.0	0.22	40.14
21.20	43.53	12.1	40.35	3.18	1624.83	12	1623.17	11.7	12.2	0.20	40.34
21.40	43.53	11.3	40.53	2.99	1624.78	11	1623.16	11.0	11.4	0.19	40.53
21.60	43.53	10.6	40.71	2.82	1624.73	10	1623.15	10.2	10.6	0.18	40.70
21.80	43.53	10.2	40.88	2.65	1624.68	10	1623.14	9.7	10.0	0.16	40.87

MAXIMUM BASIN WATER SURFACE ELEVATION : 1629.21 Feet
MAXIMUM TAILWATER ELEVATION : 1628.66 Feet
PEAK BASIN DISCHARGE : 107.3 Cfs @ 13.0 Hours
PEAK TAILWATER DISCHARGE : 859.0 Cfs @ 12.2 Hours
** BASIN OPERATION CYCLE = 13.80 Hours **

NOTES:
1) Basin Inflow Hydrograph : FILE "NDBA100"
2) Basin Storage-Elevation Data : FILE "NDBASIN"
3) Tailwater Inflow Hydrograph : FILE "NDCH100"
4) Tailwater Stage-Discharge Data : FILE "NDCHAN"
5) Spillway Discharge Data : FILE "NDSPILL"
6) OUTLET CONDUIT : 48" Diam Pipe
Inlet Control Headwater-Discharge Data : FILE "48INRCP"
Conduit Length = 102 Inlet Invert = 1623.5 Outlet Invert = 1623
Headloss Coefficient [k] =0.0002114; where $H_{Loss} = k * Q^2$
Full Flow Discharge Coefficient [C] = 68.80; where $Q_{Outlet} = C * H_{Eff}^{0.5}$
Maximum Flapgate Loss (Submerged) = .2064 Ft



SUPERSTITION FREEWAY PROJECT

NORTH DIVERSION DAM DRAINAGE CHANNEL 100-YEAR HYDROGRAPH, UPSTREAM AND DOWNSTREAM OF BASIN OUTLET

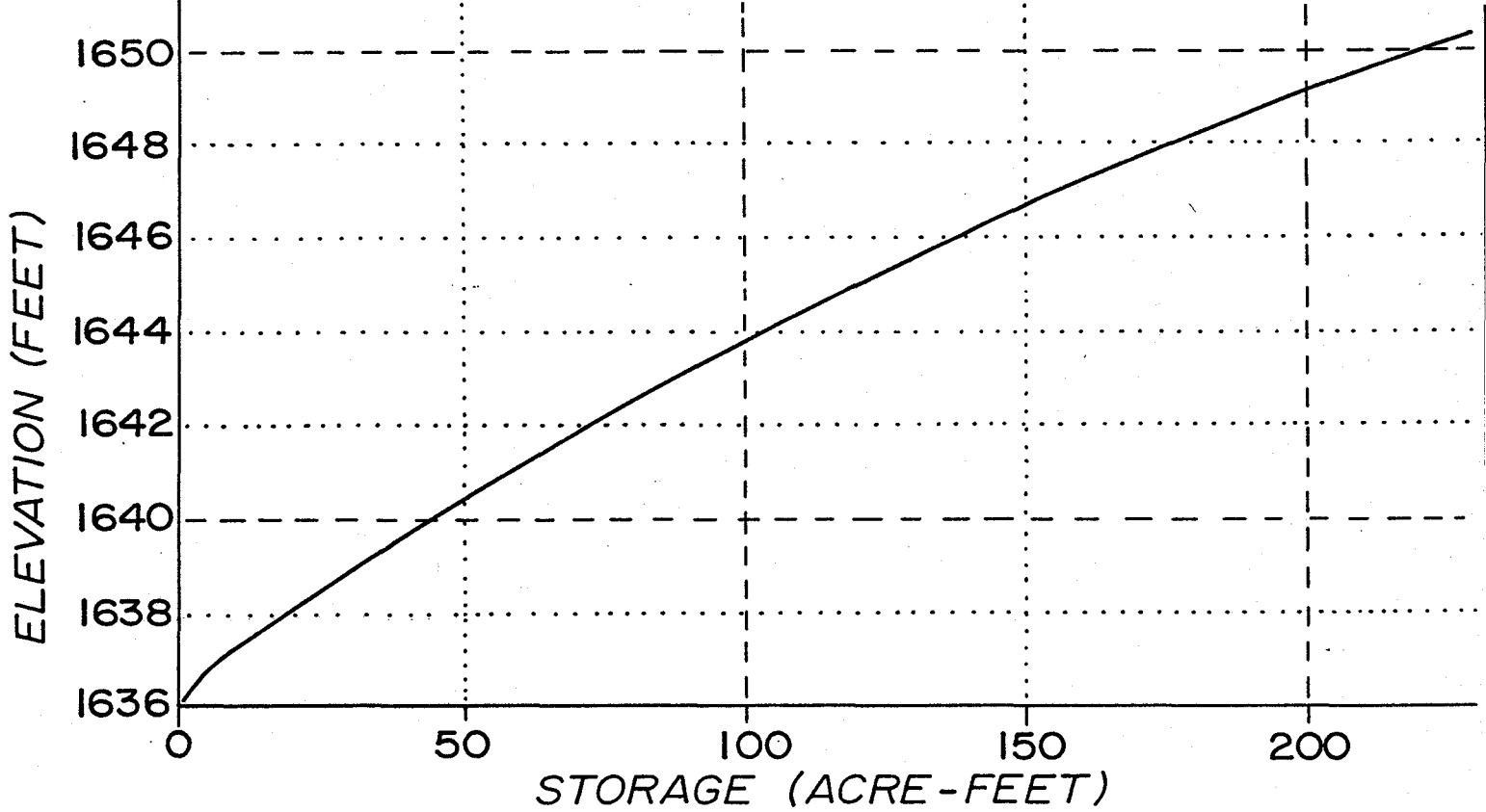
FIGURE II-4

about Station 1295+00, near the Idaho Road underpass, to approximately Station 1336+00, just west of the Tomahawk Road underpass.

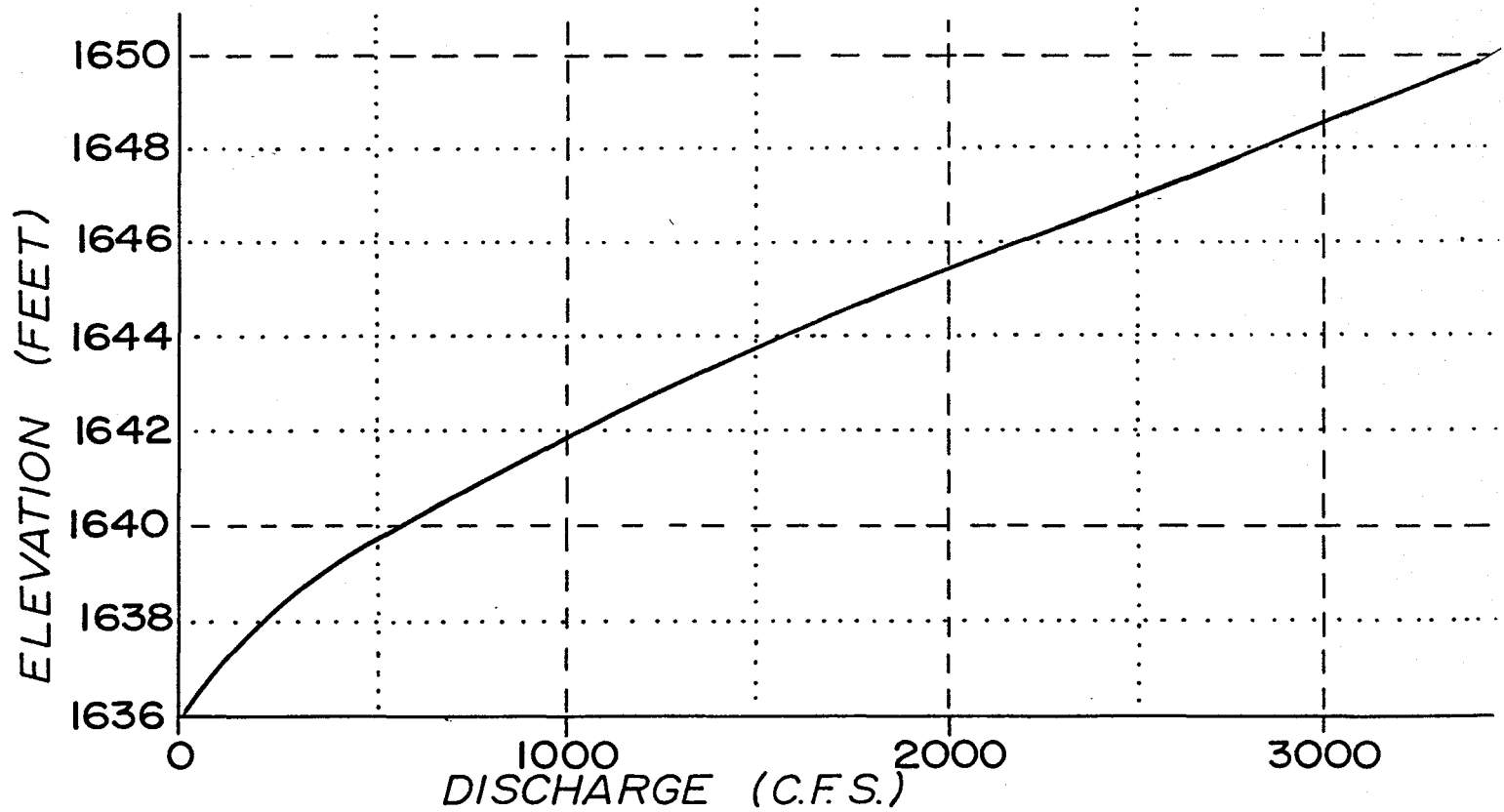
Weekes Wash is currently channelized from north of US 60 to Southern Avenue. From Southern Avenue to the Freeway R/W the channel has been filled in and graded over. This work was done previously during an aborted attempt to residentially develop what is now a portion of the Freeway R/W. From the south edge of the R/W, the channel remains in its natural condition, and extends southwards past Baseline Road towards the Powerline Dam forebay. Hydraulic analyses indicate that the existing channel capacity increases from under 100 cfs at the R/W to about 2,000 cfs south of Baseline Road. Because of the high velocities associated with those discharges and the nature of the underlying soil characteristics, the potential for severe erosion and scour in the natural channel during a major flood event is substantial. Exist. Cond.

Several different basin layout configurations and outlet channel alternatives were evaluated during final design. The existing Weekes Wash was evaluated for use as the outlet channel, however, this option was discarded when basin configuration alternatives failed to provide the storage required for sustaining acceptable rates of outflow. The feasibility of enlarging and lining the existing channel was then evaluated. However, this alternative was discarded because of R/W considerations. The existing channel alignment passes diagonally through several small private holdings between the Freeway and Baseline Road. Acquisition of R/W for the new channel would fragment properties and would, in all likelihood, result in condemnation and purchase of substantially more real estate than necessary.

The detention basin/outlet channel configuration shown in the drainage plans in Appendix C is considered to be the most cost-effective and hydraulically efficient alternative. A storage capacity vs. elevation curve for the basin is provided in Figure II-5. At the top-of-basin elevation of 1650.0 feet, the surface area of the basin is approximately 24 acres and the storage volume is about 220 acre-feet. An outflow discharge vs. elevation curve is also provided in Figure II-5. The curve is based on the headwater requirements to push water into the two 12-ft. by 12-ft. concrete box culverts which comprise the outlet. A graphical representation of the design inflow hydrograph is presented in Figure II-6. The peak rate of inflow is shown to be about 4,300 cfs. The mass curve method was used to route the design inflow hydrograph through the basin using the storage and discharge curves of Figure II-5. A tabular display of the routing



STORAGE vs ELEVATION CURVE

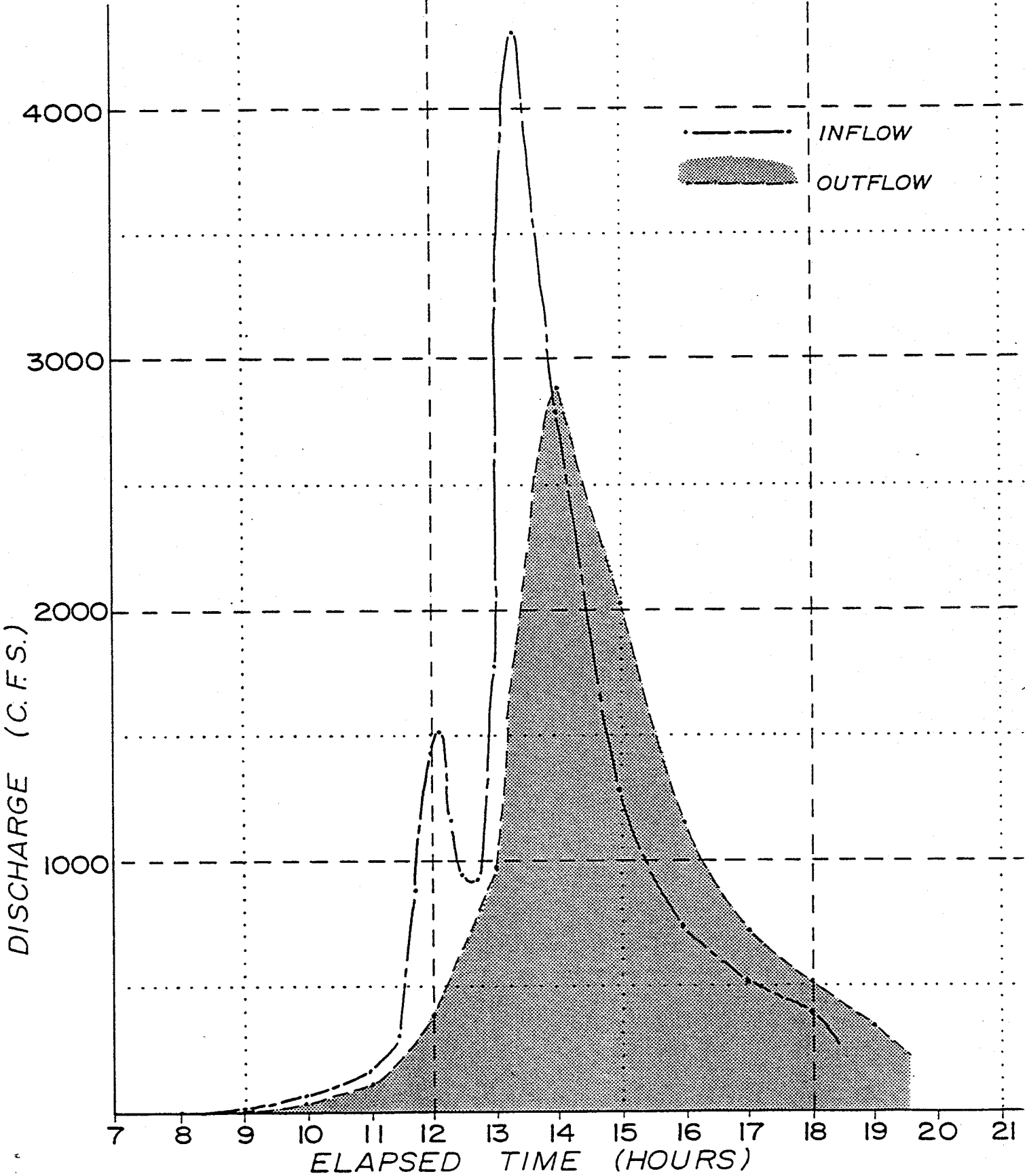


STAGE vs DISCHARGE CURVE

SUPERSTITION FREEWAY PROJECT

WEEKES WASH DETENTION BASIN

FIGURE II-5



SUPERSTITION FREEWAY PROJECT

WEEKES WASH DETENTION BASIN
100-YEAR INFLOW/OUTFLOW HYDROGRAPHS

FIGURE II-6

parameters is presented in Table II-2. It can be seen that the maximum basin discharge will be approximately 2,875 cfs and will occur at a water surface elevation of 1648.00 feet. At this elevation, which provides a freeboard of about two feet to the top of the basin, approximately 178 acre-feet of runoff is stored. The routing data of Table II-2 also indicates that the basin operation cycle for the 100-year flood will be in the order of about 14 hours; 6 hours to reach the maximum ponding level and about 8 hours to empty.

BASIN/ AC-ft

The outlet channel will follow the Royal Palm Road alignment from the Freeway to Baseline Road. Just south of Baseline Road, the channel will curve and connect into the existing Weekes Wash channel. Several different cross-sectional configurations were evaluated for the channel. To minimize construction costs, cross-sections with sideslopes of four horizontal to one vertical that could be reinforced with soil cement were considered. However, because of the depth of channel excavation, this configuration would cause excessively wide R/W requirements. A channel with steeper sideslopes would require less R/W, but would have to be concrete lined and consequently would be more costly to construct. Based on discussions between ADOT representatives, adjacent land owners, the City of Apache Junction, and Pinal County, it was determined that design of the channel should reflect a balance between hydraulic efficiency and land requirements, and that incorporation of steep sideslopes to achieve this goal would be appropriate. As shown in the Figures of Appendix C, the selected channel will have a reinforced concrete lined trapezoidal cross section, with a bottom width of 35 feet and one and one-half horizontal to one vertical sideslopes. A R/W requirement of 120 feet, 60 feet each side of the channel centerline, is proposed and would provide for future development of paralleling access/maintenance roads. The channel will be about 3,150 feet long.

New channel

Bleed-out channel

Bleed-out channel

Baseline Road currently passes through Weekes Wash in a dip section. When the new channel is constructed, the dip section will be replaced with a two-lane bridge structure. No provision is made for runoff from adjacent properties to be drained into the new channel. Since the existing Weekes Wash will continue to be used as a drainage facility between the southerly Freeway R/W and the connection to the new channel, two 5-foot diameter pipe culverts will be installed to pass runoff into the new channel. These culverts will intercept the new channel just upstream from the Baseline Road bridge.

Baseline X-Sect. with Wash.

TABLE II-2

SUPERSTITION FREEWAY PROJECT
JOB NO: 1154.01
WEEKES WASH DETENTION BASIN
100-YEAR FLOOD ROUTING
2- 12' X 12' BOX CULVERT OUTLET
RUN DATE : 08-24-1987

TIME (HR)	ACCUM. INFLOW (AC-FT)	ASSUME Q_{AVE} FOR DT (CFS)	ASSUME ACCUM. OUTFLOW (AC-FT)	BASIN STORAGE VOLUME (AC-FT)	BASIN SURFACE ELEVATION (FEET)	BASIN INST. (CFS)	OUTFLOW AVE (CFS)	COMPUTE OUTFLOW FOR DT (AC-FT)	OUTFLOW TOTAL (AC-FT)
7.20	0.01	0.0	0.00	0.01	1636.00	0.2	0.1	0.00	0.00
7.40	0.03	0.2	0.00	0.03	1636.01	0.7	0.5	0.01	0.01
7.60	0.07	1.1	0.02	0.05	1636.01	1.3	1.0	0.02	0.03
7.80	0.14	1.8	0.05	0.09	1636.02	2.1	1.7	0.03	0.05
8.00	0.23	2.8	0.10	0.13	1636.02	3.2	2.7	0.04	0.10
8.20	0.35	4.0	0.16	0.18	1636.03	4.4	3.8	0.06	0.16
8.40	0.50	5.4	0.25	0.25	1636.04	6.1	5.2	0.09	0.25
8.60	0.70	7.2	0.37	0.33	1636.06	8.0	7.0	0.12	0.36
8.80	0.95	9.1	0.52	0.43	1636.08	10.3	9.1	0.15	0.51
9.00	1.26	11.7	0.72	0.55	1636.10	13.2	11.8	0.19	0.71
9.20	1.64	14.8	0.96	0.68	1636.12	16.5	14.9	0.25	0.96
9.40	2.11	18.3	1.26	0.84	1636.15	20.4	18.4	0.30	1.26
9.60	2.68	22.6	1.64	1.04	1636.19	25.1	22.7	0.38	1.64
9.80	3.42	28.3	2.10	1.32	1636.24	31.8	28.4	0.47	2.11
10.00	4.40	36.1	2.70	1.69	1636.30	40.9	36.3	0.60	2.71
10.20	5.63	46.3	3.47	2.16	1636.39	52.2	46.5	0.77	3.47
10.40	7.14	58.8	4.44	2.70	1636.48	65.2	58.7	0.97	4.44
10.60	8.95	72.6	5.64	3.31	1636.59	79.9	72.6	1.20	5.64
10.80	11.12	88.6	7.10	4.02	1636.72	97.0	88.5	1.46	7.11
11.00	13.69	106.7	8.87	4.82	1636.86	116.3	106.7	1.76	8.87
11.20	16.67	126.3	10.95	5.72	1637.01	136.4	126.4	2.09	10.96
11.40	20.19	143.6	13.33	6.86	1637.11	149.4	142.9	2.36	13.32
11.60	24.50	158.8	15.95	8.55	1637.25	168.4	158.9	2.63	15.95
11.80	34.12	203.3	19.31	14.81	1637.77	238.9	203.6	3.37	19.31
12.00	53.13	312.9	24.48	28.65	1638.86	386.9	312.9	5.17	24.48
12.20	77.45	487.9	32.55	44.90	1640.07	588.2	487.5	8.06	32.54
12.40	99.62	680.1	43.79	55.83	1640.84	771.4	679.8	11.24	43.78
12.60	117.09	805.0	57.09	60.00	1641.13	839.8	805.6	13.32	57.10
12.80	132.57	850.9	71.16	61.41	1641.22	862.4	851.1	14.07	71.16
13.00	154.92	919.7	86.36	68.56	1641.70	976.6	919.5	15.20	86.36
13.20	200.02	1199.9	106.19	93.82	1643.32	1421.8	1199.2	19.82	106.18
13.40	265.99	1756.1	135.22	130.77	1645.49	2090.7	1756.2	29.03	135.21
13.60	333.73	2337.5	173.85	159.87	1647.07	2584.5	2337.6	38.64	173.85
13.80	393.21	2703.4	218.54	174.67	1647.83	2821.7	2703.1	44.68	218.53
14.00	443.53	2847.3	265.60	177.93	1648.00	2873.8	2847.8	47.07	265.60
14.20	486.00	2838.1	312.51	173.49	1647.77	2802.7	2838.2	46.91	312.51
14.40	521.95	2729.1	357.62	164.33	1647.30	2655.9	2729.3	45.11	357.62
14.60	552.59	2559.8	399.93	152.65	1646.69	2464.3	2560.1	42.32	399.94
14.80	578.88	2357.8	438.90	139.98	1646.00	2251.3	2357.8	38.97	438.91
15.00	601.58	2140.7	474.29	127.29	1645.30	2029.9	2140.6	35.38	474.29
15.20	621.47	1923.1	506.07	115.40	1644.61	1816.1	1923.0	31.79	506.08
15.40	639.07	1717.0	534.45	104.62	1643.98	1617.8	1716.9	28.38	534.46
15.60	654.69	1529.2	559.73	94.96	1643.39	1441.1	1529.4	25.28	559.74
15.80	668.50	1365.8	582.31	86.19	1642.85	1290.4	1365.8	22.57	582.31
16.00	680.98	1221.8	602.50	78.48	1642.35	1153.0	1221.7	20.19	602.51
16.20	692.38	1093.2	620.57	71.81	1641.92	1033.4	1093.2	18.07	620.58
16.40	702.63	983.9	636.83	65.80	1641.52	932.5	982.9	16.25	636.82
16.60	712.21	891.3	651.56	60.65	1641.17	850.3	891.4	14.73	651.56
16.80	721.39	815.1	665.04	56.35	1640.88	780.2	815.2	13.47	665.03

TABLE II-2 (cont.)

SUPERSTITION FREEWAY PROJECT
JOB NO: 1154.01
WEEKES WASH DETENTION BASIN
100-YEAR FLOOD ROUTING
2- 12' X 12' BOX CULVERT OUTLET
RUN DATE : 08-24-1987

TIME (HR)	ACCUM. INFLOW (AC-FT)	ASSUME Q_{AVE} FOR DT (CFS)	ASSUME ACCUM. OUTFLOW (AC-FT)	BASIN STORAGE VOLUME (AC-FT)	BASIN SURFACE ELEVATION (FEET)	BASIN OUTFLOW INST. (CFS)	BASIN OUTFLOW AVE (CFS)	COMPUTE OUTFLOW FOR DT (AC-FT)	OUTFLOW TOTAL (AC-FT)
17.00	730.07	749.1	677.42	52.65	1640.62	718.1	749.1	12.38	677.41
17.20	738.33	691.5	688.85	49.48	1640.39	665.0	691.6	11.43	688.84
17.40	746.26	642.5	699.47	46.80	1640.20	620.0	642.5	10.62	699.46
17.60	753.87	600.9	709.40	44.47	1640.04	580.9	600.5	9.93	709.39
17.80	761.14	563.2	718.71	42.43	1639.89	545.5	563.2	9.31	718.70
18.00	768.00	528.9	727.45	40.55	1639.75	512.4	528.9	8.74	727.44
18.20	774.36	500.2	735.72	38.64	1639.61	487.9	500.1	8.27	735.71
18.40	780.31	477.4	743.61	36.71	1639.47	468.5	478.2	7.90	743.61
18.60	786.10	459.5	751.20	34.89	1639.33	450.4	459.5	7.59	751.21
18.80	788.99	429.5	758.30	30.69	1639.02	408.3	429.3	7.10	758.30
19.00	788.99	375.8	764.52	24.48	1638.54	342.9	375.6	6.21	764.51
19.20	788.99	315.6	769.73	19.26	1638.13	287.8	315.3	5.21	769.72
19.40	788.99	263.8	774.09	14.90	1637.77	239.9	263.8	4.36	774.09
19.60	788.99	219.6	777.72	11.27	1637.47	199.0	219.4	3.63	777.71
19.80	788.99	182.0	780.73	8.26	1637.22	165.1	182.0	3.01	780.72
20.00	788.99	151.0	783.23	5.76	1637.01	137.0	151.0	2.50	783.22
20.20	788.99	114.9	785.13	3.86	1636.69	93.3	115.1	1.90	785.12
20.40	788.99	77.6	786.41	2.58	1636.46	62.3	77.8	1.29	786.41
20.60	788.99	51.9	787.27	1.72	1636.31	41.6	52.0	0.86	787.26
20.80	788.99	35.0	787.84	1.15	1636.20	27.7	34.6	0.57	787.84
21.00	788.99	23.0	788.23	0.77	1636.14	18.5	23.1	0.38	788.22
21.20	788.99	14.8	788.47	0.52	1636.09	12.6	15.5	0.26	788.48
21.40	788.99	10.6	788.64	0.35	1636.06	8.4	10.5	0.17	788.65
21.60	788.99	6.7	788.76	0.24	1636.04	5.7	7.0	0.12	788.76
21.80	788.99	5.7	788.85	0.14	1636.03	3.4	4.6	0.08	788.84
22.00	788.99	2.7	788.89	0.10	1636.02	2.3	2.9	0.05	788.89

MAXIMUM BASIN WATER SURFACE ELEVATION : 1648.00 Feet PEAK BASIN DISCHARGE : 2873.8 Cfs @ 14.0 Hours

** BASIN OPERATION CYCLE = 14.80 Hours **

NOTES: 1) Basin Inflow Hydrograph : FILE "WKWS100"
2) Basin Storage-Elevation Data : FILE "WKBASIN"
3) Spillway Discharge Data : FILE "WKSOUT"

The new channel will empty into the existing Weekes Wash approximately 400 feet south of Baseline Road. At this point, the existing Wash is estimated to have a full bank capacity of about 2,000 cfs. All discharges in excess of this rate will overflow the cut banks and continue towards the Powerline Dam forebay in the form of surface sheet flow. End of New Channel

3.2 Culverts:

The Freeway from Ironwood Drive to the North Diversion Dam and from Tomahawk Road to US 60 will be served by culverts.

Surface runoff entering the R/W between Ironwood Drive and the North Diversion Dam will be collected in a ditch paralleling the north side of the Freeway. A portion of the runoff will be taken through the Freeway embankment in a single 42-inch diameter CMP culvert located at Station EB 1250+35. The remaining runoff will be conveyed westwards to a 30-inch diameter culvert located under Ironwood Drive at Station 18+50.

Surface runoff entering the R/W east of Tomahawk Road is fairly well contained in a network of existing washes. The washes naturally concentrate runoff at locations where culverts can pass peak discharges through the Freeway embankment without impacting the upstream floodplain.

Some of the privately owned properties which abut the south R/W between Tomahawk Road and Goldfield Road have been developed commercially and/or residentially. These developments all include some provision for intercepting and removing surface runoff passing through the R/W. Capacities of the private drainage facilities were not investigated, and no attempt was made to reconcile the hydrologic criteria used for culvert design with that used for the drainage of private developments outside of the Freeway R/W.

The location of all mainline Freeway culverts together with relevant culvert data is presented in Table II-3. The Plan and Profiles for all culverts are presented in Appendix D.

TABLE II-3

MAINLINE CULVERT DATA

LOCATION (Station)	NO. OF BARRELS SIZE & TYPE	LENGTH (Ft)	INVERT ELEVATION Entrance	INVERT ELEVATION Exit	DESIGN DISCHARGE (cfs)
EB 1250+37	1 - 42" Pipe Clv	203	1617.5	1617.0	29
EB 1261+95	2 - 10' x 6' RCB	156	1622.6	1622.0	717
EB 1315+05	2 - 12' x 12' RCB	204	1636.0	1635.6	2,875
EB 1351+20	2 - 8' x 6' RCB	388	1663.6	1661.5	515
EB 1354+99	1 - 8' x 6' RCB	285	1665.0	1663.5	178
EB 1357+00	6 - 10' x 6' RCB	262	1664.5	1663.5	1,607
EB 1364+82	1 - 24" Pipe Clv	177	1671.8	1670.7	8
EB 1370+76	1 - 36" Pipe Clv	176	1675.1	1673.2	21
EB 1374+92	1 - 6' x 6' RCB	208	1674.8	1673.5	138
EB 1379+54	1 - 6' x 6' RCB	337	1672.7	1670.9	89
EB 1382+28	2 - 6' x 6' RCB	413	1674.0	1671.0	348
EB 1403+14	2 - 8' x 6' RCB	409	1685.0	1682.5	408
EB 1410+35	1 - 48" Pipe Clv	245	1688.5	1686.5	43
EB 1414+45	2 - 30" Pipe Clv	195	1688.3	1686.2	36
EB 1416+50	3 - 30" Pipe Clv	200	1686.9	1685.1	36
EB 1420+16	4 - 24" Pipe Clv	206	1687.0	1684.9	38
EB 1424+53	3 - 42" Pipe Clv	240	1686.2	1684.8	***
EB 1428+37	2 - 36" Pipe Clv	177	1688.6	1686.5	***

*** Existing Conveyance Matched.

SECTION III.

REFERENCES

1. Arizona Highway Department Bridge Division, "Hydrologic Design for Highway Drainage in Arizona." (ADOT Manual I)

2. Arizona Highway Department Structures Section Hydraulics Division, "Hydrologic and Hydraulic Training Session", Revised December 1973. (ADOT Manual II)

3. State of Arizona Department of Transportation, "Construction Division of Highways Standard Drawings", June 1986.

4. U.S. Department of Transportation, Federal Highway Administration, "Hydraulic Charts for the Selection of Highway Culverts", Hydraulic Engineering Circular No. 5, January 1964 (HEC No. 5).

5. U.S. Department of Transportation, Federal Highways Administration, "Drainage of Highway Pavements", Hydraulic Engineering Circular No. 12, March 1984 (HEC No. 12)

6. Handbook of Hydraulics, E. Brater and H. King, 1976.

7. Open Channel Hydraulics, V.T. Chow, 1959.

8. City of Apache Junction, "Apache Junction Development Guide", July 1984.

9. Arizona Statewide Management Program, Arizona Department of Transportation, "Project Design Guidelines", October 1986.

10. "Superstition Freeway - Comprehensive Offsite Drainage Plan", February 1987, Prepared by A-N West, Inc., Phoenix, Arizona

APPENDIX A

DRAINAGE DESIGN CRITERIA

The following criteria format is based upon the Project Design Guideline's (Reference 9) instructions:

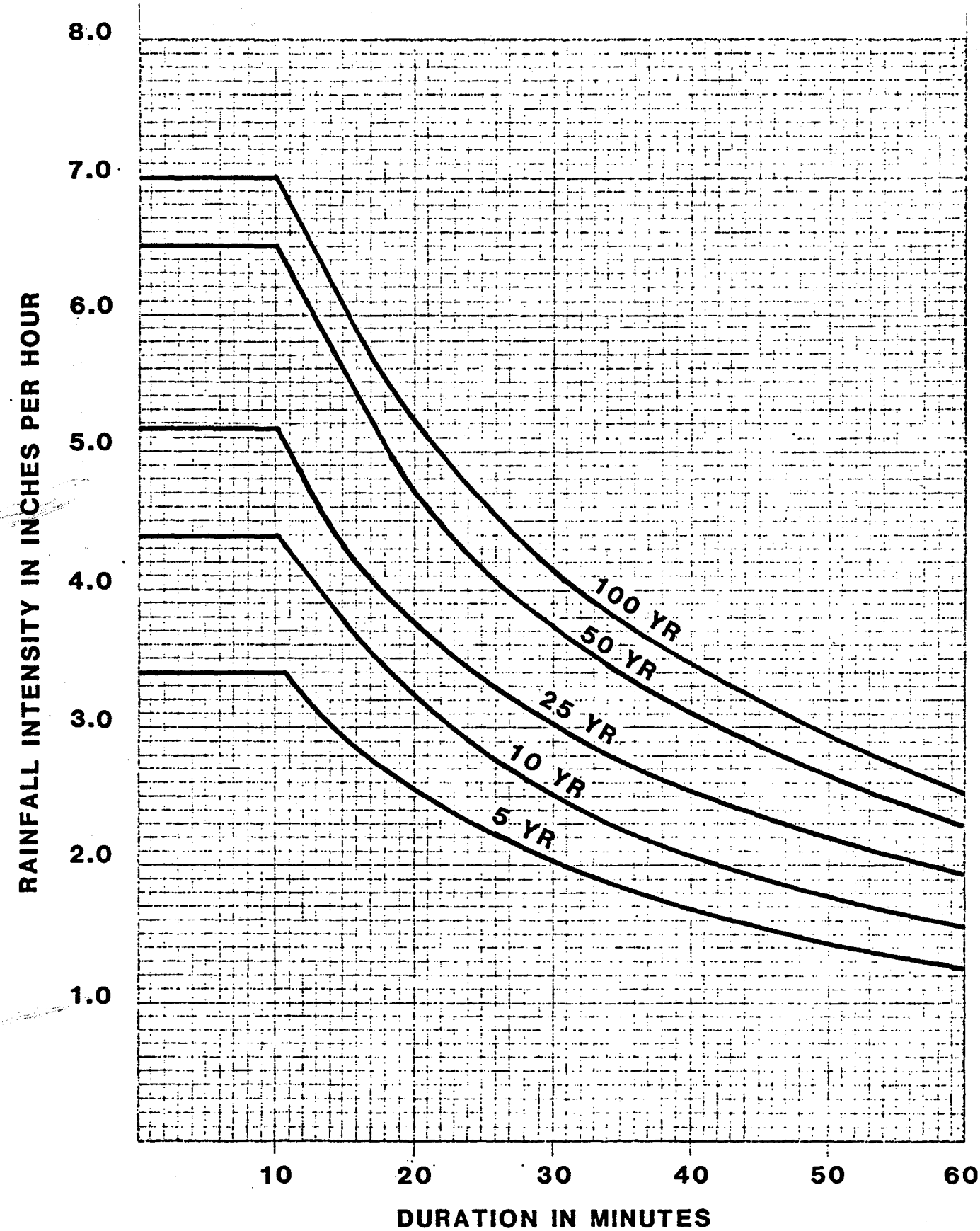
102.1 Design References

102.2 Hydrologic Design

102.3 Pavement Design

102.4 Median Drainage

102.5 Storm Sewer System



RAINFALL INTENSITY-DURATION-FREQUENCY CURVES
APACHE JUNCTION, ARIZONA

FIGURE A-1

102.1 DESIGN REFERENCES

References used for the design of the project are listed in Section III of this report.

102.2 HYDROLOGIC CRITERIA

The Rational Method (Q=CiA) is used to compute the peak rate of discharge for all on-site generated storm runoff. This discharge is used to design the catch basin inlets, storm drains, and other appurtenant drainage facilities required to drain the mainline and ramp pavement, the median, and the area between the ramps and the mainline.

102.2.1 Runoff Coefficient (c):

The runoff coefficient represents the ratio of runoff to rainfall, and is directly related to the impermeability of the ground or ground cover. For freeway drainage design, the following coefficients are used.

Surface	"C"
Pavement	0.95
Median (Composite)	0.74
Non-Paved Area	0.64

102.2.2 Rainfall Intensity (i):

Rainfall itensity is a function of the Time of Concentration (Tc) and the return frequency of the design storm. When the Tc and the storm frequency are known, the rainfall intensity can be read directly from a chart which shows the intensity (in inches per hour) for the 100-, 50-, 25-, 10-, and 5-year storm frequencies for a duration of ten minutes to over one hour. To obtain the maximum discharge, the storm duration is taken to be the Tc.

The Tc is the time it takes for a particle of water to travel from the farthest reach of the drainage area to the point of interception. Many different methods for estimating the Tc are provided in the published literature. For this project, an average velocity was

calculated based on gutter hydraulics and applied to the travel distance. A minimum Tc of ten minutes was used.

The return storm frequency used for the design is in accordance with the criteria specified in Reference 1, Section 1.2, "Design Frequency". This Section specifies that the 10-year return storm shall be used for all pavement runoff calculations except for depressed roadways or underpasses where ponded water can be removed only through a storm sewer system, in which case the 50-year return storm shall be used. This exception does not apply to any portion of the project.

The Rainfall Intensity-Duration-Frequency chart for the City of Apache Junction was used to obtain design intensities, and is presented in Figure A-1. This chart, which is obtained from the Apache Junction Development Guide (Reference 8), was checked using procedures outlined in Reference 1, and was found to provide similar values.

102.2.3 Drainage Area (A):

The drainage area is the surface area (in Acres) which contributes runoff to the total discharge at the point of interception. For this project, the area of freeway pavement contributing to any mainline catch basin is based on the ultimate roadway configuration. Under this configuration, the temporary median area will be graded and paved and a third lane will be added in each direction.

102.3 PAVEMENT DESIGN

102.3.1 Allowable Ponding Widths:

The following allowable ponding widths are applicable:

Roadway Type	Maximum Spread
4 or 6 lanes (Undivided)	Shoulder, Parking or Distress Lane width plus 1/2 adjacent traffic lane width (16 feet).
22' or 24' Ramps	Left 2 feet / Right 8 feet

102.3.2 Curb:

The non-hazardous curb shown in Detail A of Figure B-1 will be used on the mainline roadways and ramps to protect the embankment slope face from erosion.

102.3.3 Hydraulic Capacity of Inlets:

Catch basins for drainage of the mainline roadways and ramps, used in conjunction with the non-hazardous curb and gutter, will be the "Special Catch Basin" type shown in Detail AA of Figure B-2. Hydraulic capacity charts have not been developed specifically for these special grate inlets, however, the capacity values obtained for the standard grate, Type LW-1.2 (Chart 1 - Reference 2) are similar and are used in the design. The curve reflects a built-in 50% clogging factor capacity reduction.

Slotted drains are used in conjunction with mainline catch basins to improve the interception capacity and to reduce the number of catch basins required. Slotted drain capacities are based on charts provided in Reference 5. A clogging factor capacity reduction is applied to drains installed on continuous grades and in sump conditions, i.e., at sag locations. The clogging factor is 25% and 50%, respectively.

Where inlets are located on a continuous grade, a portion of the gutter flow is permitted to by-pass the inlet and be intercepted at succeeding inlets downstream. The maximum spread width criteria governs the allowable by-pass discharge.

At gore sections and sag poings in vertical curves, the inlets are sized to intercept all the flow. No flow will be permitted to overtop the curb.

All hydrologic and hydraulic computations are performed on ADOT Pavement Drainage Design Forms provided in ADOT Highway Drainage Manuals.

102.4 MEDIAN DRAINAGE

1. The storm runoff from highway medians will be removed by median inlets or culverts.

2. The maximum allowable ponding depth in the median shall not exceed the elevation of the top of the subgrade at the edge of pavement.

3. Median dikes will be required at the downstream side of all median inlets except where the inlet is located in a sag.

4. The median shall be paved when volocity is excessive and the potential for erosion is high.

5. The hydraulic capacity charts for standard ADOT median inlets will be used in the design.

102.5 STORM SEWER SYSTEM

The storm sewer system shall consist of a network of inlets, catch basins, conduits and other appurtenances which are designed to collect and convey storm runoff from the roadways and adjacent contributary drainage areas to an appropriate outlet.

102.5.1 Downdrains:

Inlets are located such that gutter flow does not exceed the maximum allowable spread and does not overtop the curb. Because of the relatively steep sideslopes of the highway embankment, flow intercepted at an inlet passes into a catch basin and then into a downdrain. Downdrains are used in lieu of spillways primarily because of aesthetic considerations.

To reduce the potential for erosion at the toe of the embankment, the downdrain is equipped with a flared end-section. When the slope of the downdrain is high, an elbow is provided about 12 feet from the end-section and the remaining downdrain is constructed on a relatively flat slope to reduce the flow velocity.

102.5.2 Clogging Factors:

The following clogging factors shall be applied to grate, curb opening and combination inlets:

a. Grates

(1) Sump Conditions

(a) Orifice Flow - actual area = 2.0 x required area

(b) Weir Flow - actual perimeter = 2.0 x required perimeter

(2) Continuous Grade Conditions - actual length of opening = 2.0 x required length or greater

b. Curb Opening Inlets

(1) Sump Conditions - actual length of opening = 1.25 x required length or greater

(2) Continuous Grade Conditions - actual length of opening = 1.25 x required length or greater

c. Combination Grate and Curb Opening - ADOT Standard C-15.10 Catch Basin, Type 1 and 2

(1) Sump Conditions

(a) Orifice Flow - actual area = 1.0 x required area of grate only

(b) Weir Flow - actual perimeter = 1.0 x required perimeter of grate only

(2) Continuous Grade Conditions - actual length of opening = 1.0 x required length of grate only

d. Slotted Drains

(1) Sump Conditions - actual length of opening = 2.0 x required length

(2) Continuous Grade Conditions - actual length of opening = 1.25 x required length

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-514			

GENERAL NOTES:

1.) All concrete shall be Class 'S' (f'c = 2500 psi)

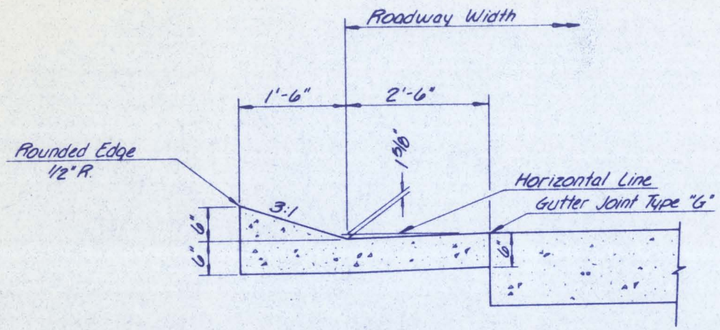
2.) All gutter flow lines shall be troweled to on accurate grade for a width of 9". The remainder of curb and gutter shall be textured longitudinally to a light broom finish.

3.) For Curb and Gutter with slotted drain, see Detail (AB)

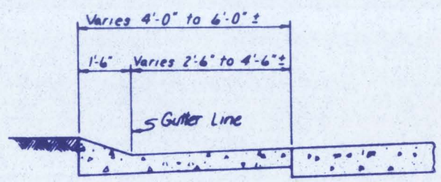
4.) 1" Deep scored joints to be placed to match adjacent joints in P.C.C.P. 1/2" Bituminous joint filler shall be placed where the curb and gutter abutts slotted drains, catch basins, curb returns, etc.

5.) For additional general notes and dimensions, see Detail (A)

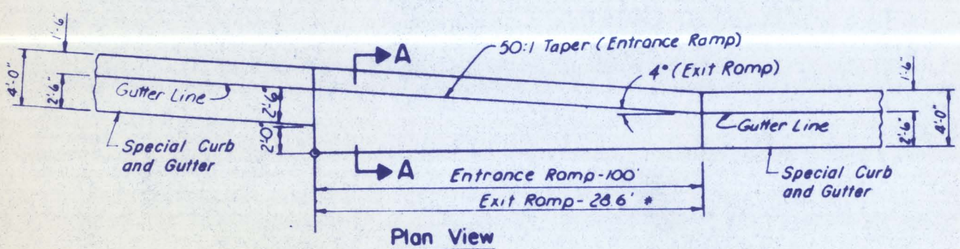
6.) See Detail (E) for Special Curb and Gutter transition to Type 'A' Curb and Gutter.



SPECIAL CURB AND GUTTER



Section A-A



Plan View

TYPE 'A' CURB & GUTTER TRANSITION - AT RAMP TAPERS

* Dimension may vary where exit occurs on curves, see plans.

DETAIL (AC)

SCHEMATIC
NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	J. SCHROEDER	8/87
DRAWN	M. McKOVICH	8/87
CHECKED	J. SPOFFORD	8/87
APPROVED	J. SCHROEDER	8/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

DETAIL AC
SPECIAL CURB AND GUTTER

ROUTE: SR 360
MILEPOST: 16.39-27.13
LOCATION: POWER RD TO US 60

SHEET ___ OF ___

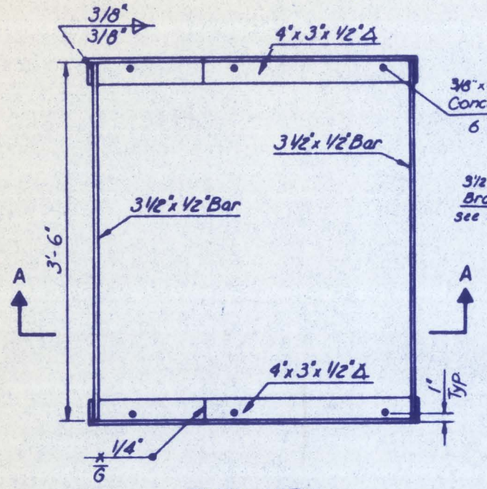
___ OF ___

SURVEY NO. | FINISHED PLANS | REVISIONS | LOCATION | DATE

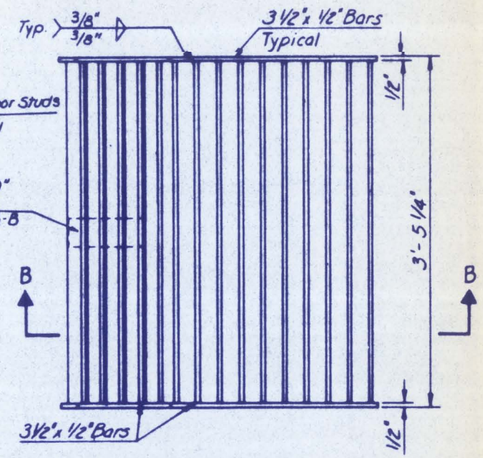
BRUNING 103549-1

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-514			

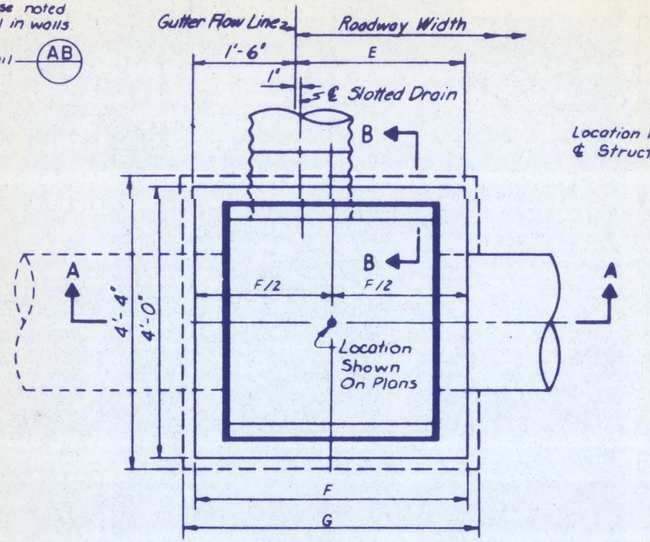
General Notes:
1) All Concrete shall be Class "B" (f'c = 2500 p.s.i.)
2) All reinforcing steel shall conform to 1003-1,2 Grade 40.
3) All reinforcing steel shall have 2" min. clear cover unless otherwise noted
4) Reinforcing steel shall be No. 4 rebar, 12" c to c' horiz & vertical in walls
5) Pipe can be placed in any wall.
6) For more information & dimensions of Slotted Drains see Detail AB
7) In the wall section "B", T = 6" when H = 8' or less or T = 8" when H is over 8'



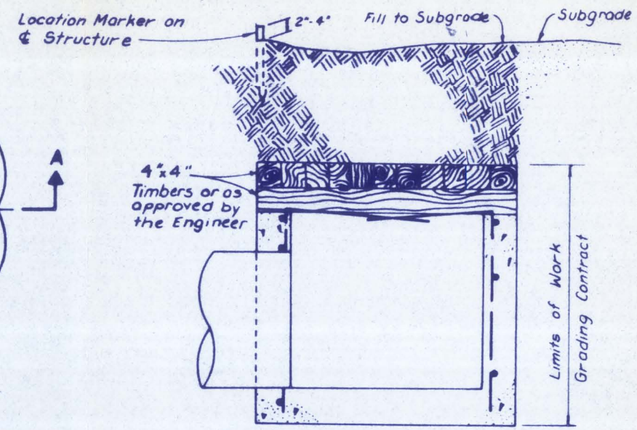
PLAN VIEW
FRAME



PLAN VIEW
GRATE

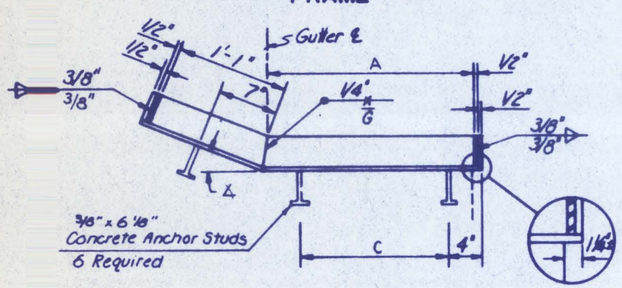


PLAN VIEW

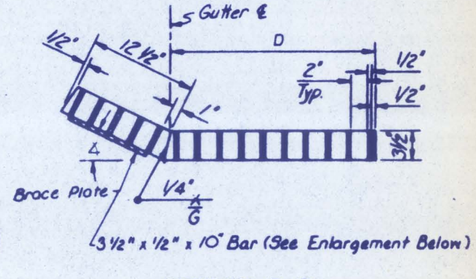


Bend Rebars and cover with two layers of 4"x4" Timbers.

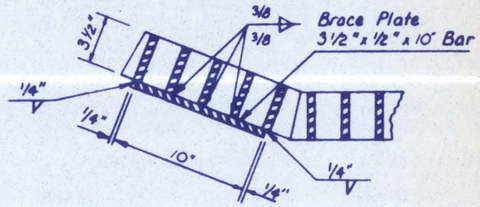
TIMBER CAP DETAIL



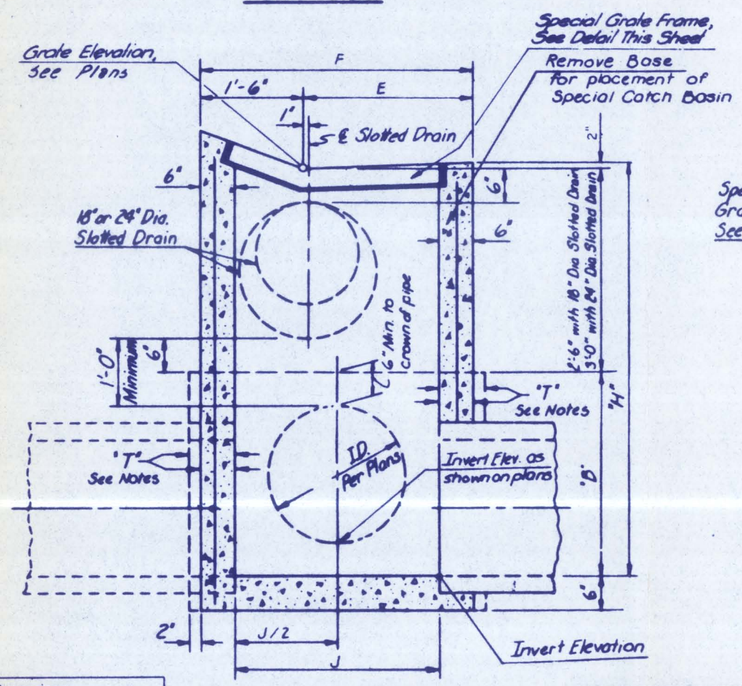
SECTION A-A



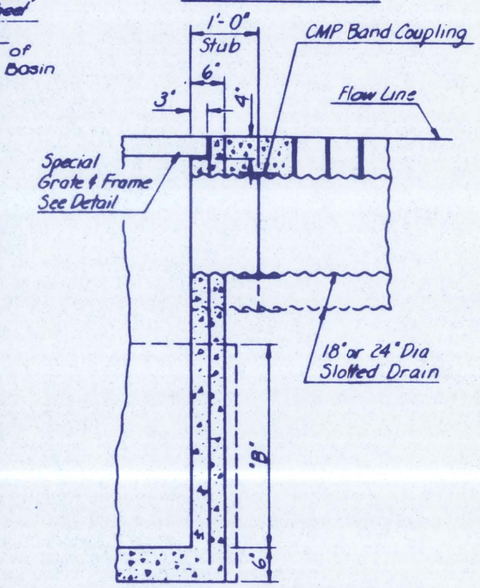
SECTION B-B



BRACE PLATE



SECTION A-A



SECTION B-B SCHEMATIC
NOT FOR CONSTRUCTION

NOTES

1) All Structural Steel shall be in accordance with A.S.T.M. Spec's A-36.
2) All Reinforcement Steel shall conform to 1003-1,2, Grade 40.
3) All Welding shall be in accordance with A.D.O.T. specifications.
4.) The completed Grate assembly (Frame & Grate) shall be given two shop coats of No. 1 paint.
5.) The installation and inspection of steel studs welded to steel acting as connection devices to the concrete shall conform to the American Welding Society's Structural Welding Code (AWS D1.1), Specifications 4.21-4.27

SPECIAL CATCH BASIN
FRAME & GRATE

Special Curb & Gutter Dimensions											
Curb Height	Gutter Width	Catch Basin Frame			Catch Basin Grate		Catch Basin				
		A	C	∆	D	∆	E	F	G	J
6"	2'-6"	2'-0"	1'-4"	22°-04'-29"	2'-0"	22°-04'-29"	2'-6"	4'-0"	4'-4"	3'-0"

DETAIL AA

SPECIAL CATCH BASIN

	NAME	DATE
DESIGN	J. SCHROEDER	8/87
DRAWN	M. McKOVICH	8/87
CHECKED	J. SPOFFORD	8/87
APPROVED	J. SCHROEDER	8/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

DETAIL AA
SPECIAL CATCH BASIN DETAILS

ROUTE: SR 360 | MILEPOST: 16.39-27.13 | LOCATION: POWER RD TO US 60

SHEET ___ OF ___

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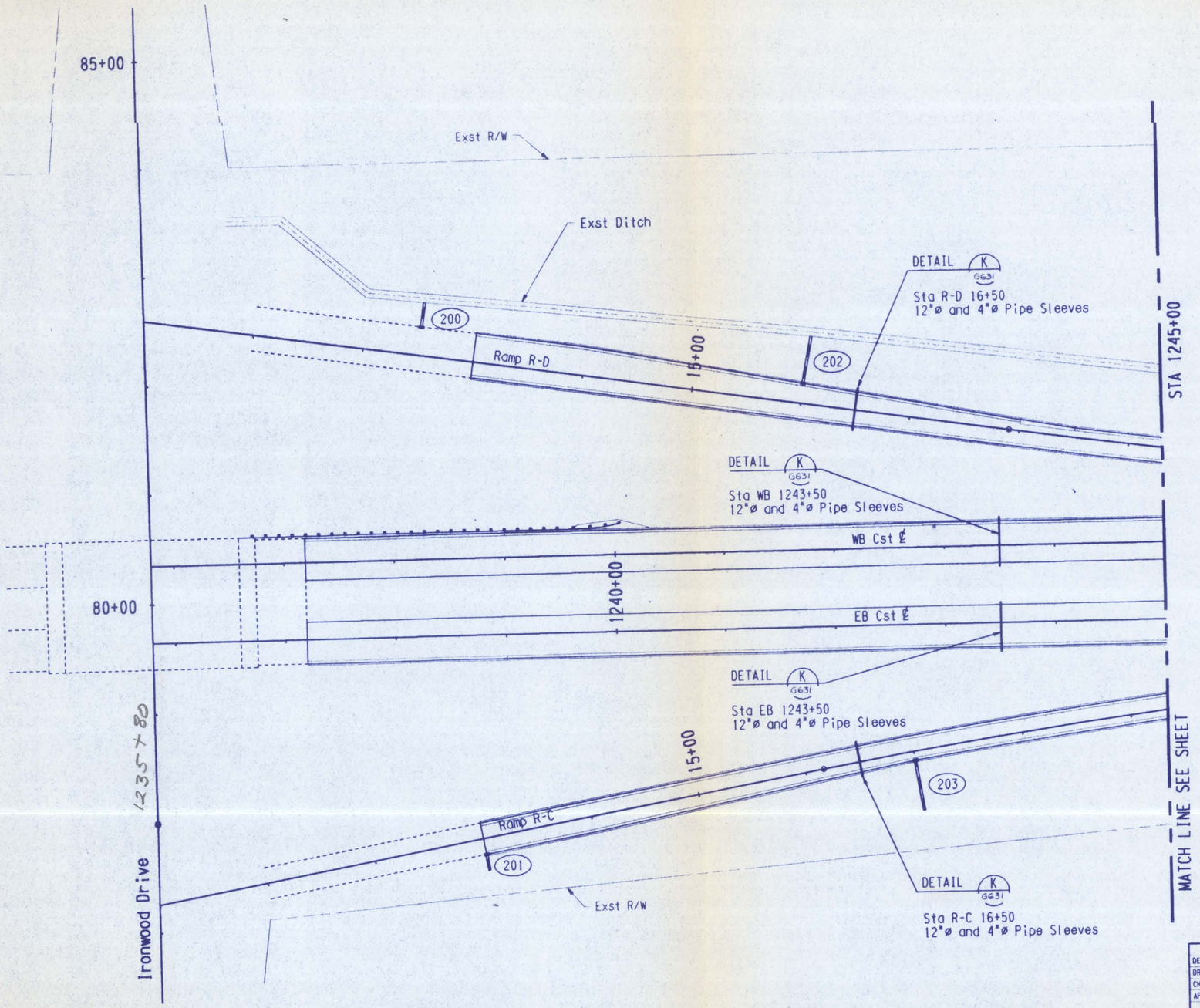
BRUNING 103549-1

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1 514			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY



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	NAME	DATE
DESIGN	P. PATERSON	8/87
DRAWN	K. YAPP	8/87
CHECKED	J. SPOFFORD	9/87
APPROVED	P. PATERSON	10/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY DRAINAGE
SUPERSTITION FREEWAY
STA 1239+00 TO STA 1245+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET 695 OF 729

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SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
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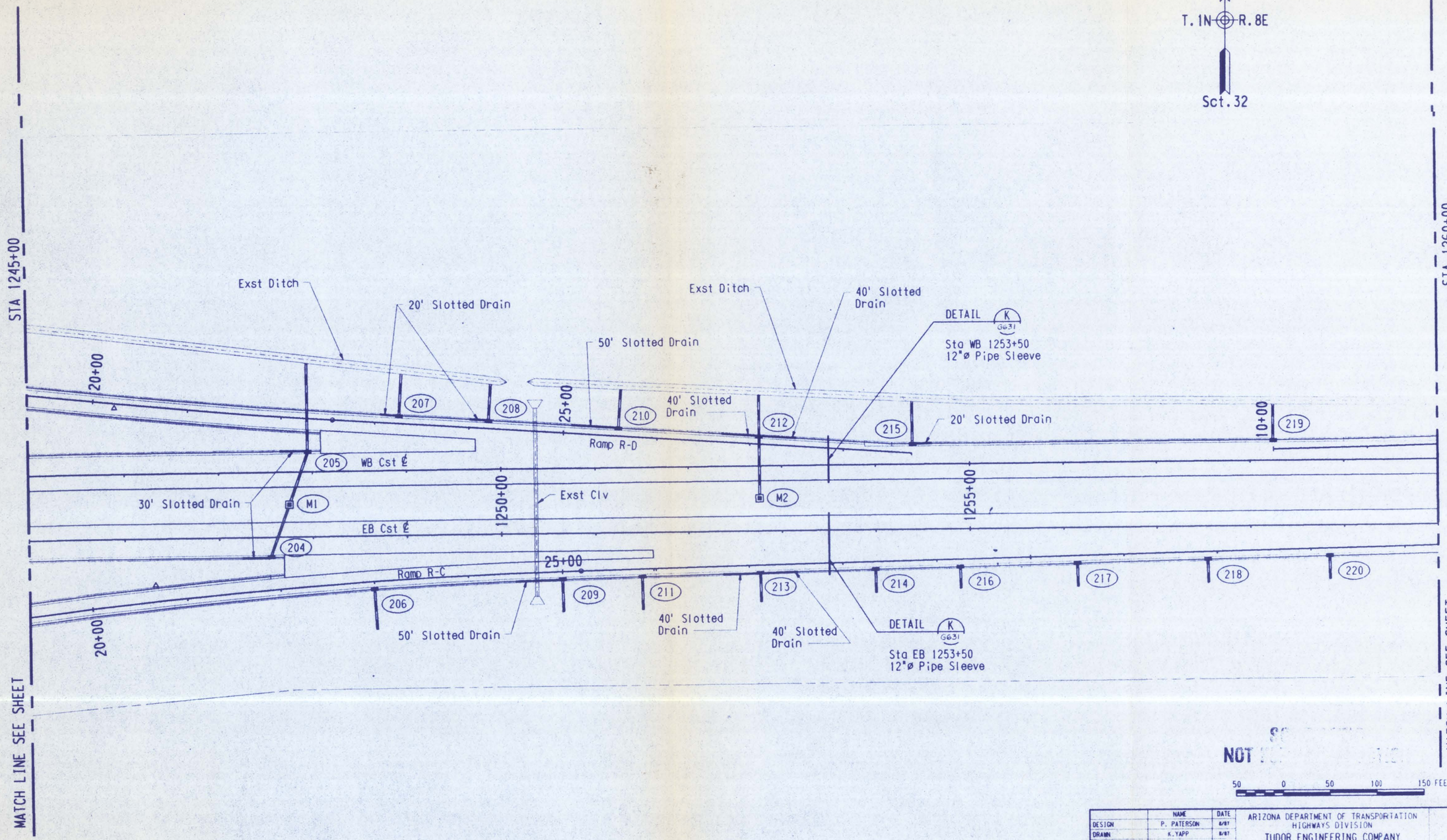

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DRAWN	K. YAPP	8/87
CHECKED	J. SPOFFORD	9/87
APPROVED	P. PATERSON	10/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY DRAINAGE
SUPERSTITION FREEWAY
STA 1245+00 TO STA 1260+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET OF 729

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SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
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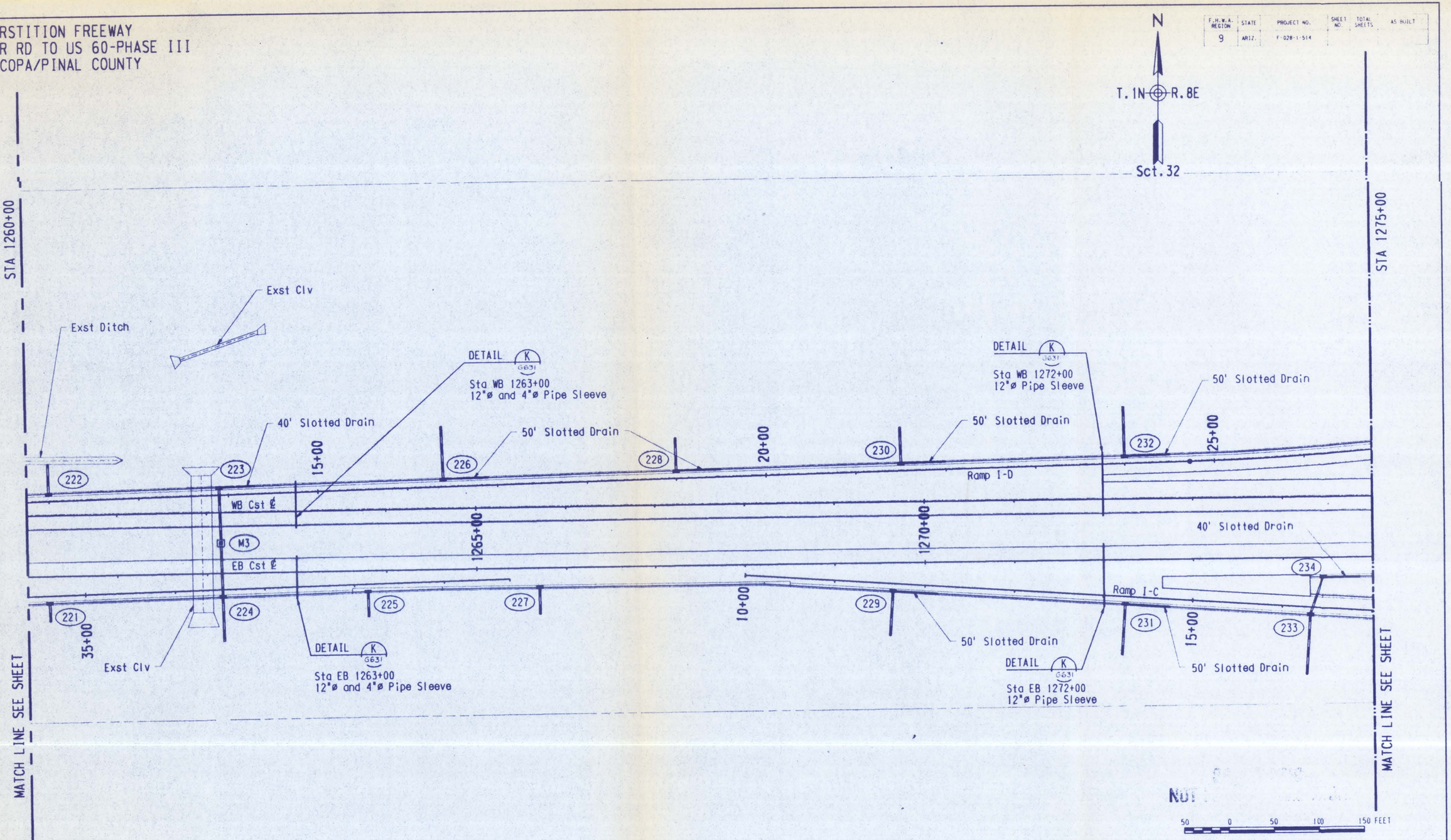

	NAME	DATE
DESIGN	P. PATERSON	8/87
DRAWN	K. YAPP	8/87
CHECKED	J. SPOFFORD	9/87
APPROVED	P. PATERSON	10/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY DRAINAGE
SUPERSTITION FREEWAY
STA 1260+00 TO STA 1275+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET 695 OF 729

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SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY

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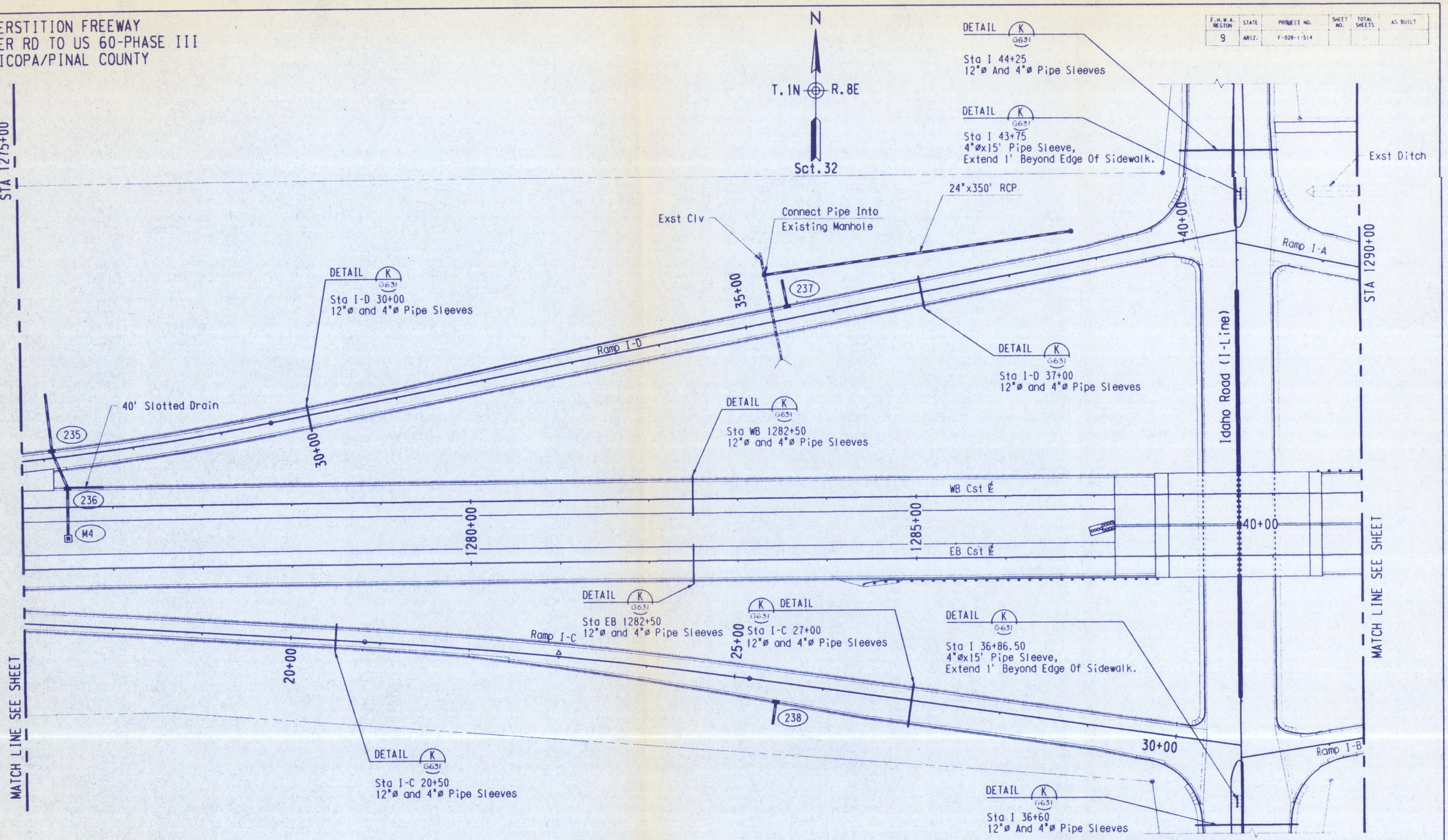

NOTE

For drainage at Idaho Road, see "Roadway Plan and Profile, Idaho Road".

NOT FOR CONSTRUCTION

50 0 50 100 150 FEET

	NAME	DATE
DESIGN	P. PATERSON	8/87
DRAWN	K. YAPP	8/87
CHECKED	J. SPOFFORD	9/87
APPROVED	P. PATERSON	10/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY DRAINAGE
SUPERSTITION FREEWAY
STA 1275+00 TO STA 1290+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET 64 OF 729

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F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
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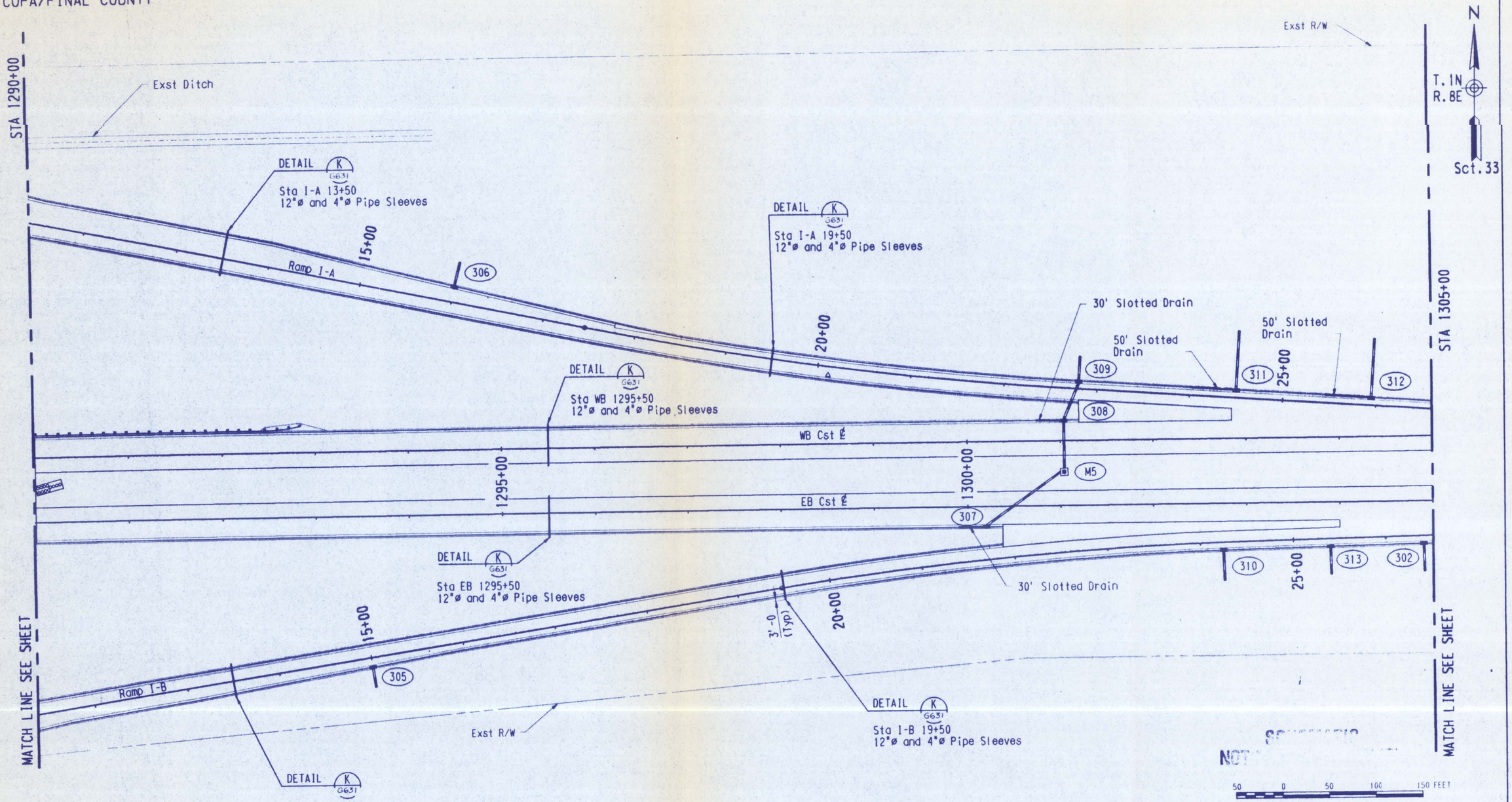
SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY



	NAME	DATE
DESIGN	P. PATERSON	8/87
DRAWN	K. YAPP	8/87
CHECKED	J. SPOFFORD	9/87
APPROVED	P. PATERSON	10/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY DRAINAGE
SUPERSTITION FREEWAY
STA 1290+00 TO STA 1305+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET 697 OF 729

___ OF ___

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F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
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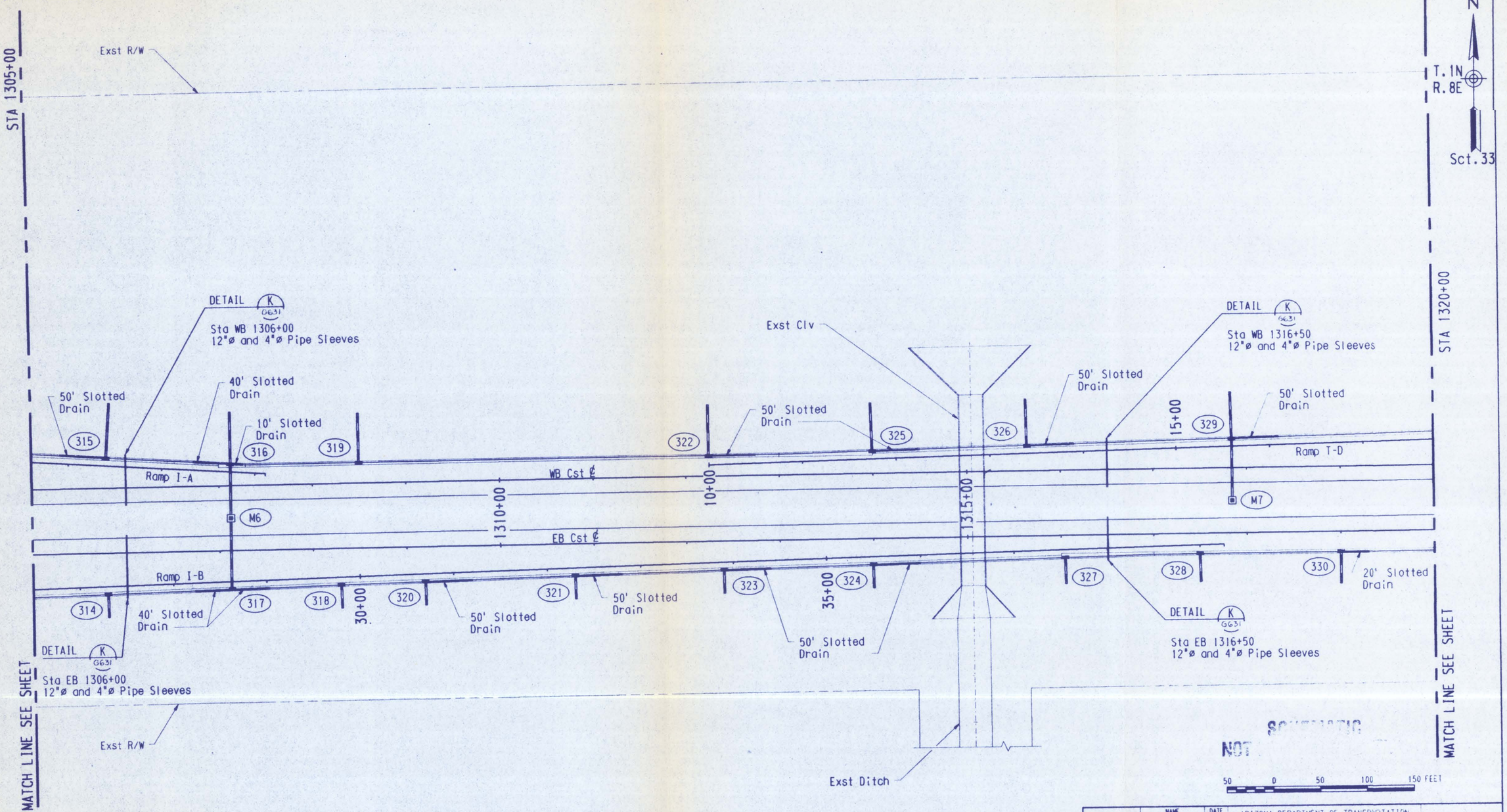
SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY



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DESIGN	P. PATERSON	8/87
DRAWN	K. YAPP	8/87
CHECKED	J. SPOFFORD	9/87
APPROVED	P. PATERSON	10/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY DRAINAGE
SUPERSTITION FREEWAY
STA 1305+00 TO STA 1320+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

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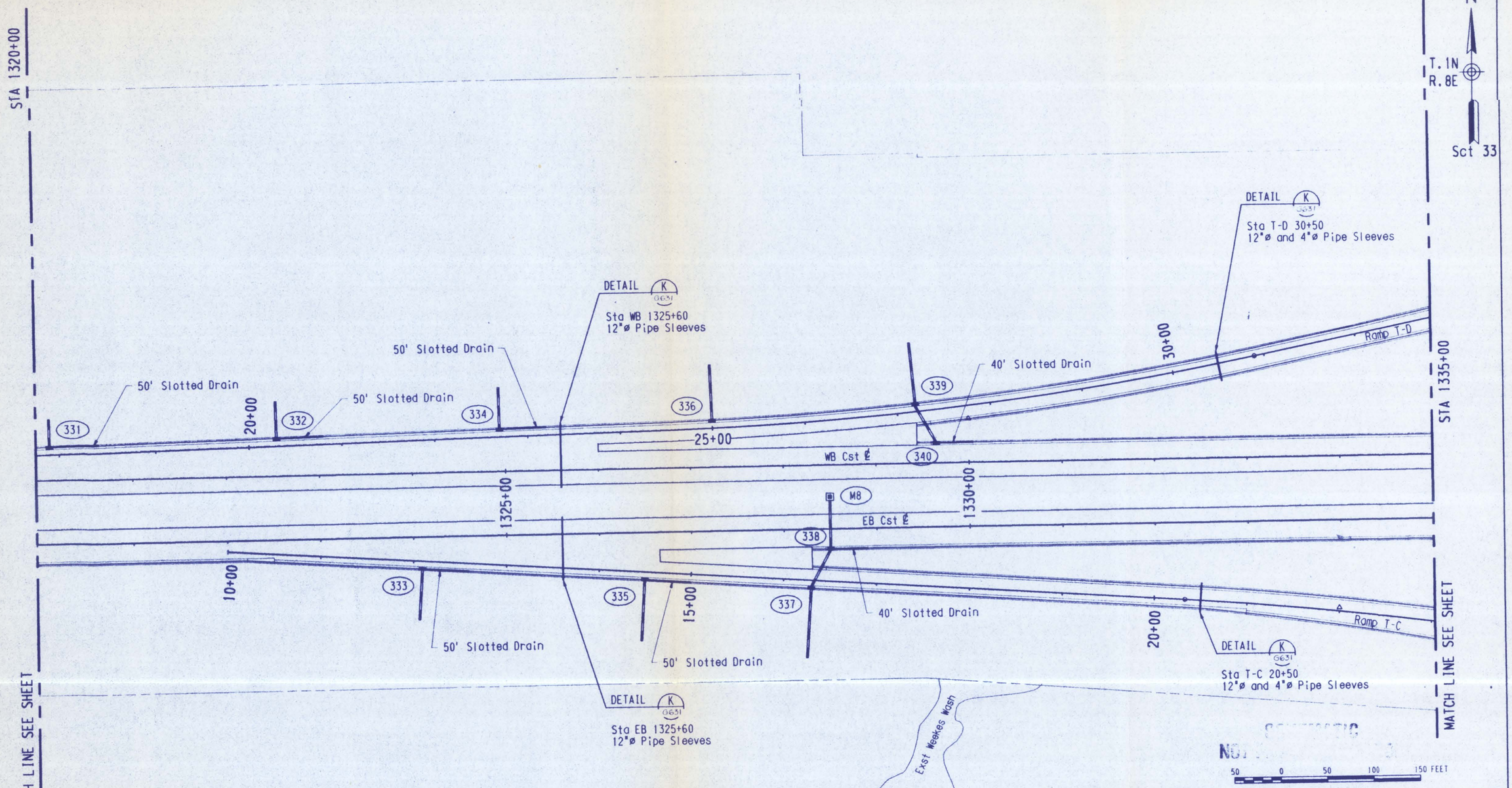
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-514			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY



	NAME	DATE
DESIGN	P. PATERSON	8/87
DRAWN	K. YAPP	8/87
CHECKED	J. SPOFFORD	9/87
APPROVED	P. PATERSON	10/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY DRAINAGE
SUPERSTITION FREEWAY
STA 1320+00 TO STA 1335+00

ROUTE	MILEPOST	LOCATION
SR 360	16.38-27.13	POWER RD TO US 60

SHEET 699 OF 729

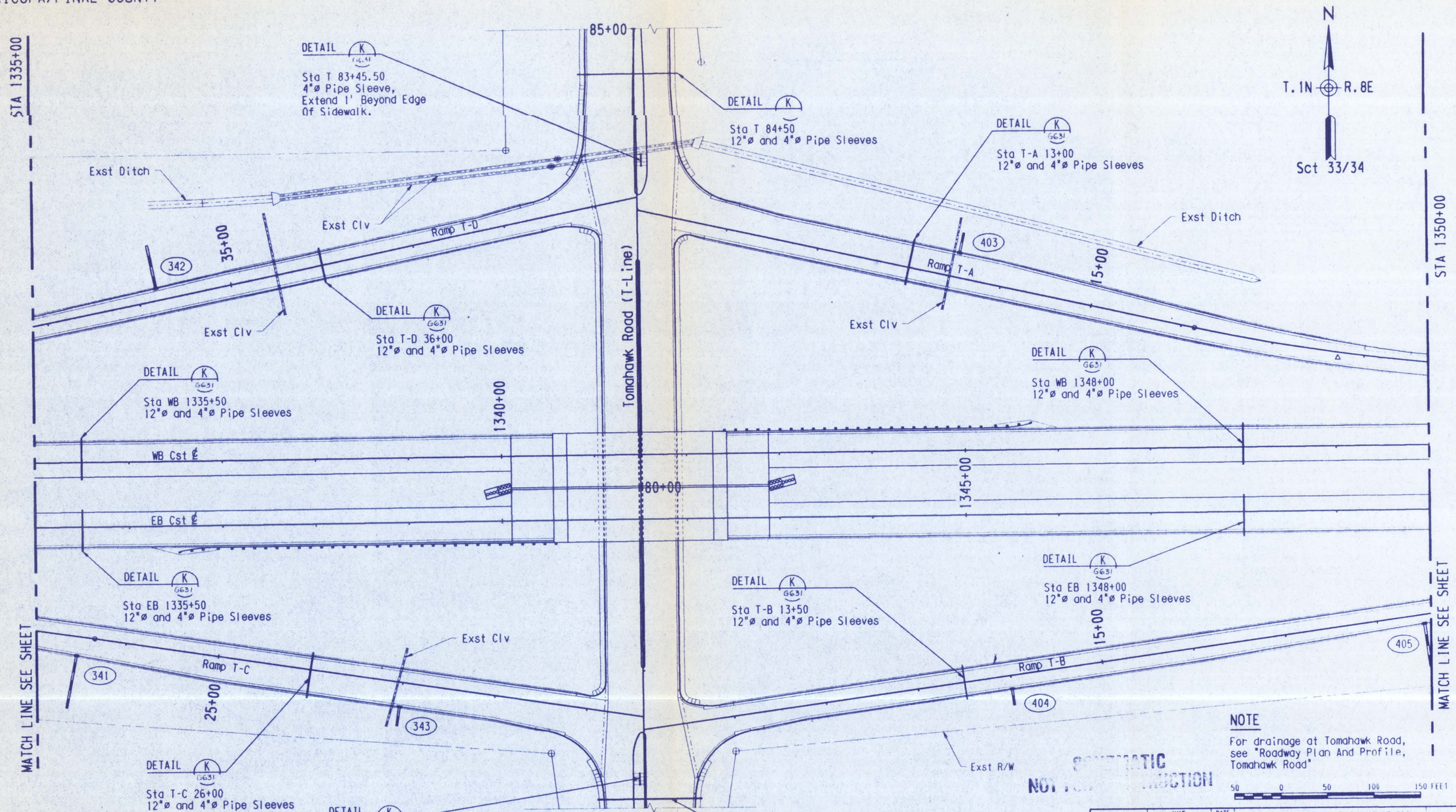
___ OF ___

PLOTTING DATE 15-OCT-1987 (11:07 AND UPDATED 10-19-87
QS:(315,100)115\0631.R00 CADD CONTROL DATE 10-19-87
(315,100)115\0631.R00

SURVEY NO.	FINISHED	REVISIONS	LOCATION	DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-514			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY



NOTE

For drainage at Tomahawk Road, see "Roadway Plan And Profile, Tomahawk Road"

50 0 50 100 150 FEET

NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	P. PATERSON	8/87
DRAWN	K. YAPP	8/87
CHECKED	J. SPOFFORD	9/87
APPROVED	P. PATERSON	10/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY DRAINAGE
SUPERSTITION FREEWAY
STA 1335+00 TO STA 1350+00

ROUTE: SR 360
MILEPOST: 16.39-27.13
LOCATION: POWER RD TO US 60
SHEET 29 OF 29

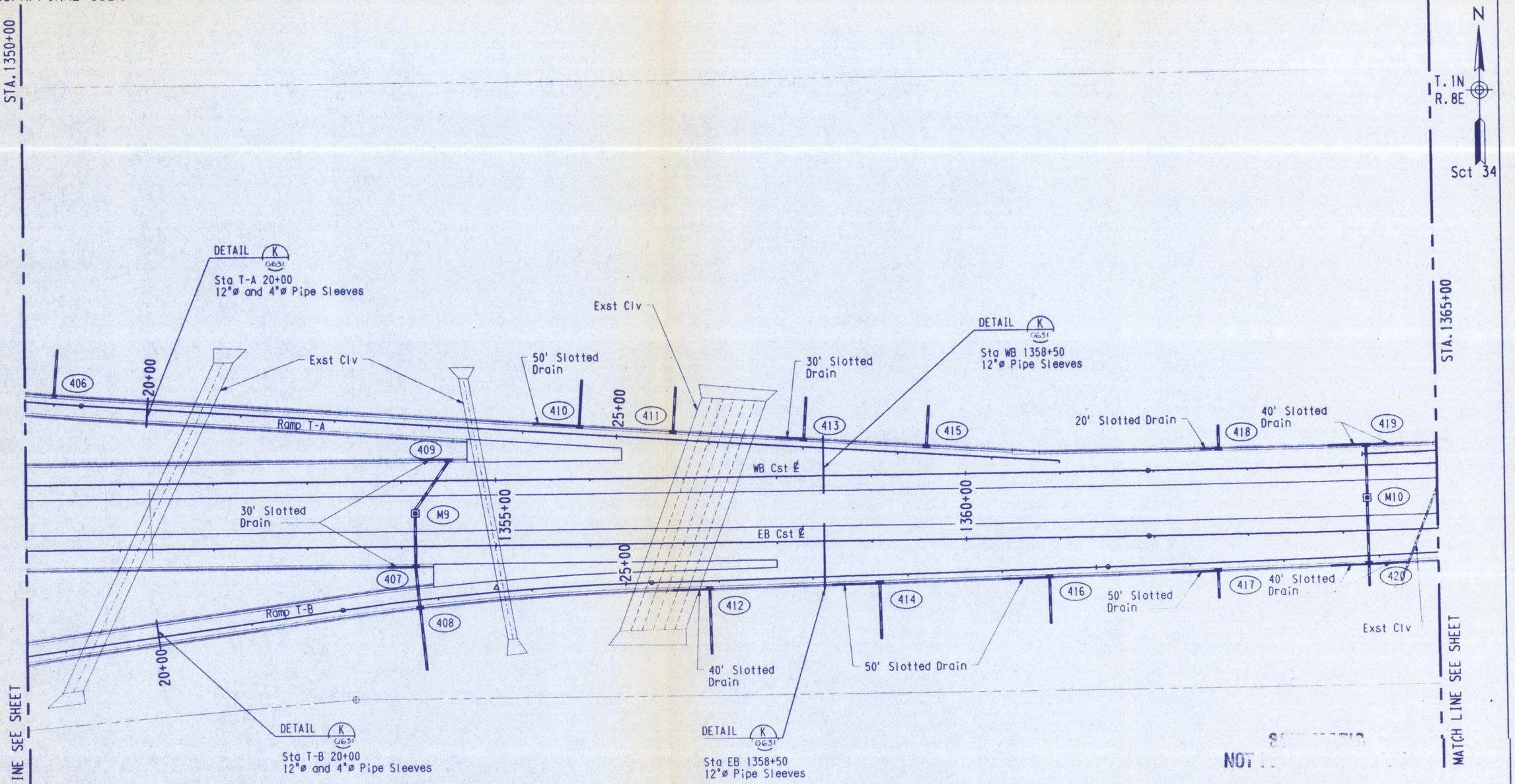
___ OF ___

PLOTTING DATE 20-OCT-1987 05:25 DS1:(375,100)11540618.ROD
CADD CONTROL DATE 10-20-87 (375,100)11540618.ROD
GROUND UPDATED 10-20-87

SURVEY NO.	FINIS	INS	REVISIONS	LOCATION	DATE

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-514			



	NAME	DATE
DESIGN	P. PATERSON	6/87
DRAWN	K. YAPP	6/87
CHECKED	J. SPOFFORD	5/87
APPROVED	P. PATERSON	10/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY DRAINAGE
SUPERSTITION FREEWAY
STA 1350+00 TO STA 1365+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET C701 OF C729

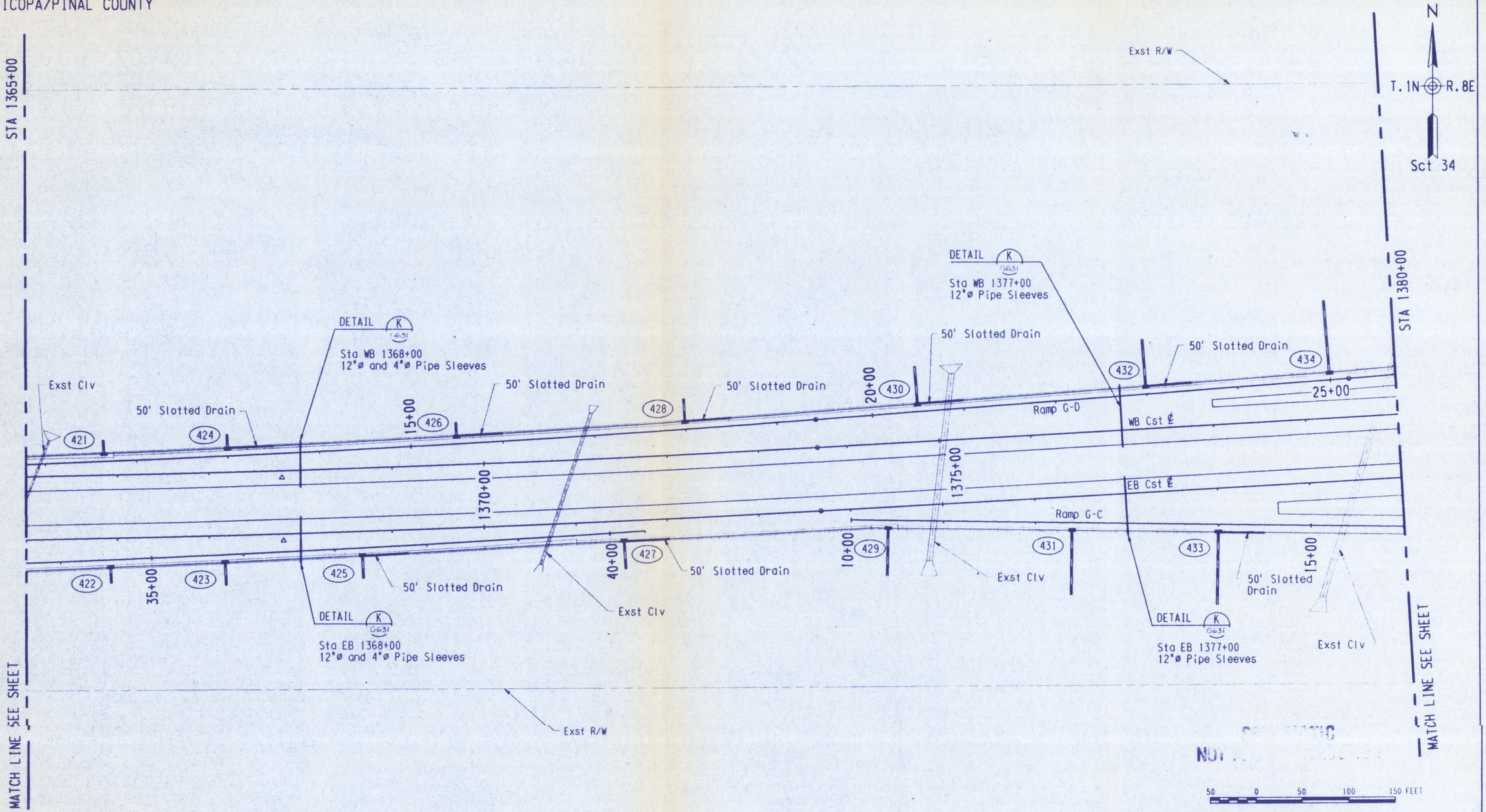
OF

PLOTTING DATE 20-OCT-1987 07:26 CADD CONTROL DATE 10-20-87
QST:[315,100]1154C619.ROD [315,100]1154C619.ROD
ROUND UPDATED 10-20-87

SURVEY NO.	FIN/SUPT. IN ABS	REVISIONS	LOCATION	DATE

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-514			



	NAME	DATE
DESIGN	P. PATERSON	8/87
DRAWN	K. YAPP	8/87
CHECKED	J. SPOFFORD	9/87
APPROVED	P. PATERSON	10/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY DRAINAGE
SUPERSTITION FREEWAY
STA 1365+00 TO STA 1380+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

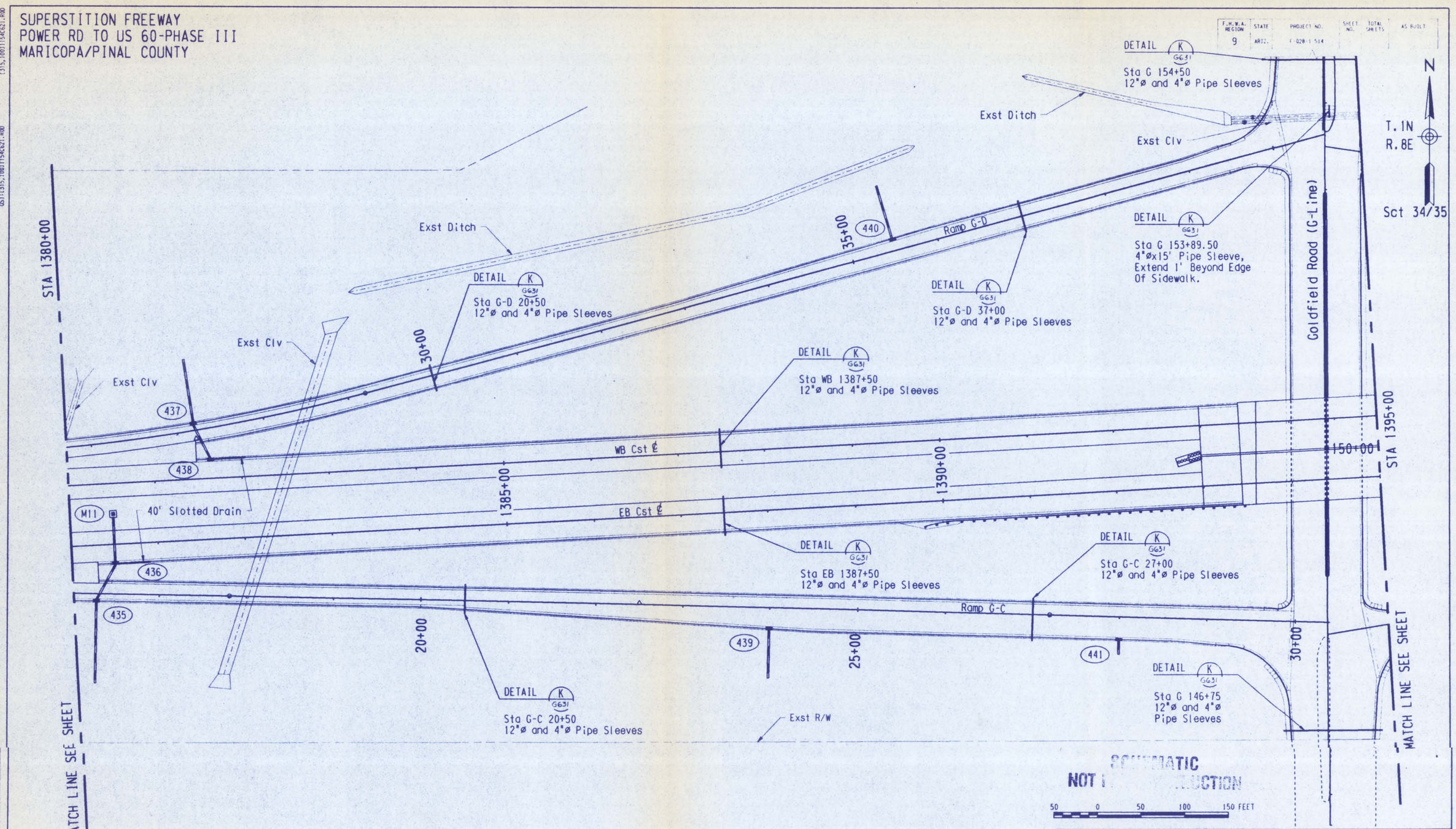
SHEET 102 OF 729

PLOTTING DATE 20-OCT-1987 08:12 CADD CONTROL DATE 10-20-87
DS1:1315,1003115406200.RDD
EDIT AND UPDATED 10-20-87

SURVEY NO. | FINISHED PLANS | REVISIONS | LOCATION | DATE

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-514			



SCHEMATIC
NOT FOR CONSTRUCTION

NOTE

For drainage at Goldfield Road, see "Roadway Plan And Profile, Goldfield Road"

	NAME	DATE
DESIGN	P. PATERSON	8/87
DRAWN	R. YAPP	8/87
CHECKED	J. SPOFFORD	9/87
APPROVED	P. PATERSON	10/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

DRAINAGE PLAN
SUPERSTITION FREEWAY
STA 1380+00 TO STA 1395+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

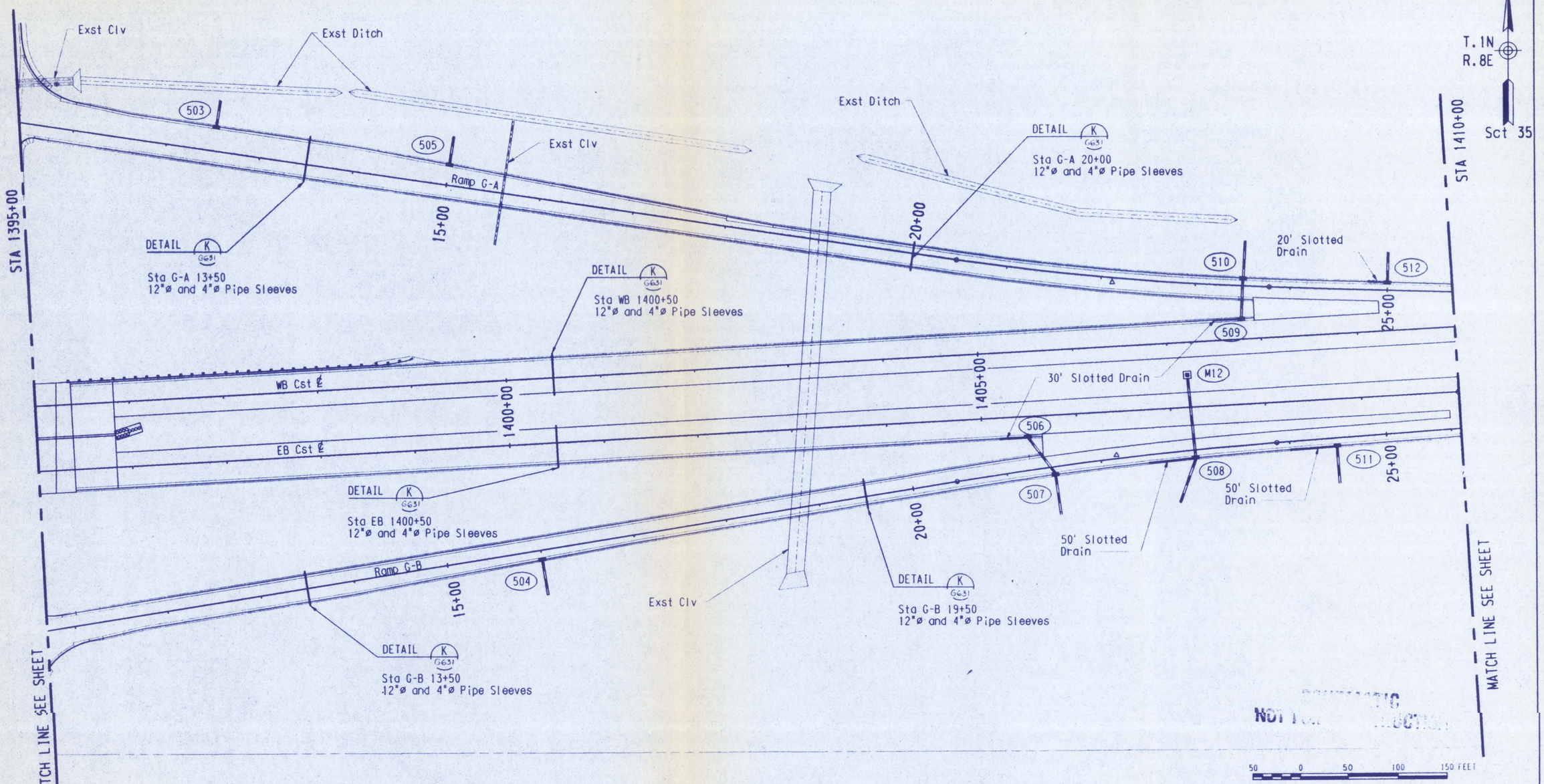
SHEET 0703 OF 0729

PLOTTING DATE 20-OCT-1987 09:22 CADD CONTROL DATE 10-20-87
GS1:(315,100)11540621.ROD
BACKGROUND UPDATED 10-20-87
(315,100)11540621.ROD

SURVEY NO.	FINI	MMS	REVISIONS	LOCATION	DATE

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-514			



NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	P. PATERSON	8/87
DRAWN	K. YAPP	8/87
CHECKED	J. SPOFFORD	9/87
APPROVED	P. PATERSON	10/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY DRAINAGE
SUPERSTITION FREEWAY
STA 1395+00 TO STA 1410+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET C704 OF C729

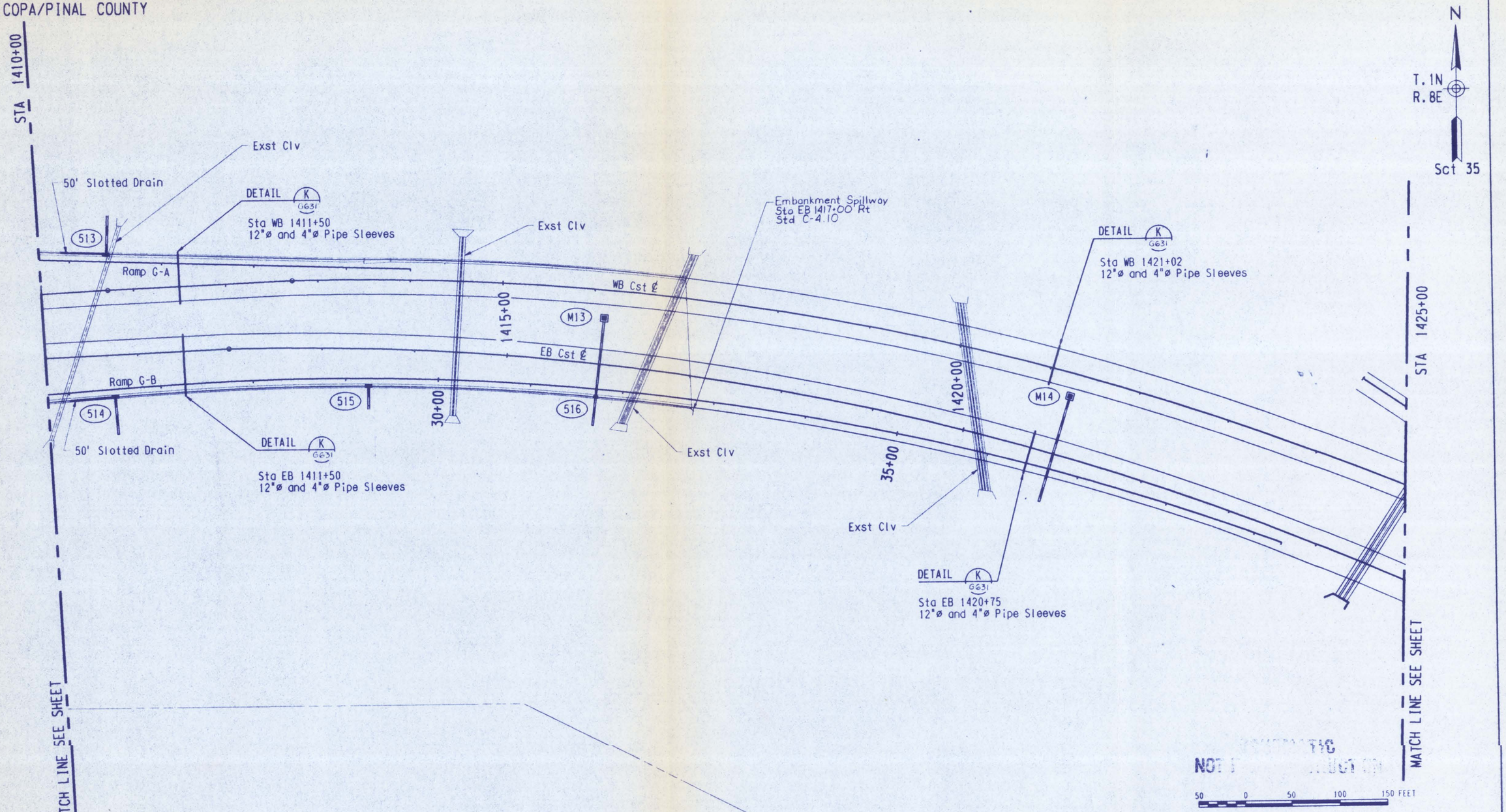
OF

PLOTTING DATE 20-OCT-1987 10:33 05:11:15,(00)11:4C622.MOD
CADD CONTROL DATE 10-20-87 13:15,(00)11:4C622.MOD
ROUND UPDATED 10-20-87

SURVEY NO.	FINISHING	REVISIONS	LOCATION	DATE

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-514			



NOT [illegible] FOR CONSTRUCTION

	NAME	DATE
DESIGN	P. PATERSON	6/87
DRAWN	K. YAPP	6/87
CHECKED	J. SPOFFORD	9/87
APPROVED	P. PATERSON	10/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY
ROADWAY DRAINAGE
SUPERSTITION FREEWAY
STA 1410+00 TO STA 1425+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET [illegible] OF C729

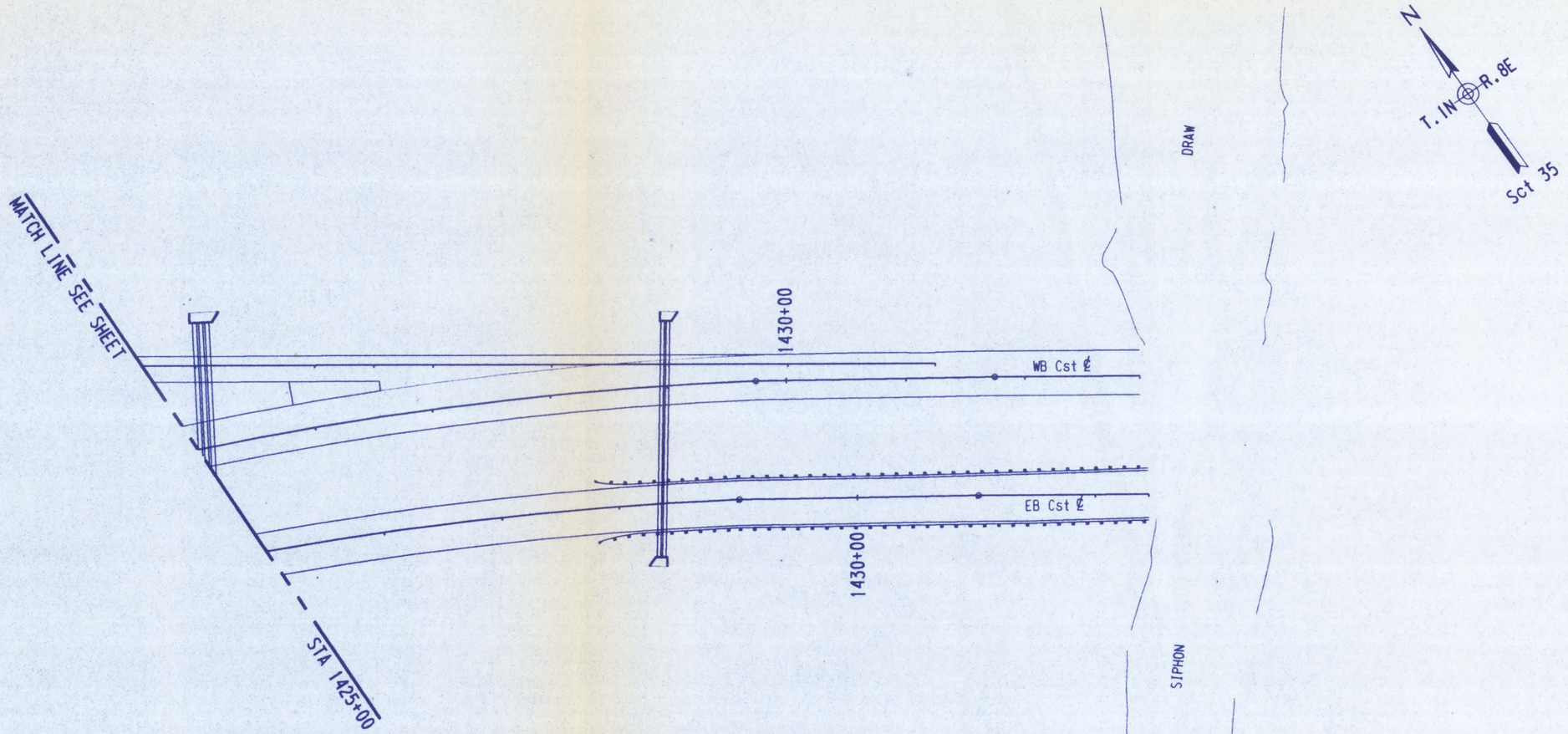
___ OF ___

PLOTTING DATE 20-OCT-1987 11:44 CADD CONTROL DATE 10-20-87
DS1:(315,100)1154G623.R00 (315,100)1154G623.R00
CADD UPDATED 10-20-87

SURVEY NO.	FINISHED	REVISIONS	LOCATION	DATE

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-514			



SCHEMATIC
NOT FOR CONSTRUCTION

50 0 50 100 150 FEET

	NAME	DATE
DESIGN	P. PATERSON	8/87
DRAWN	K. YAPP	8/87
CHECKED	J. SPOFFORD	9/87
APPROVED	P. PATERSON	10/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY DRAINAGE
SUPERSTITION FREEWAY
STA 1419+00 TO STA 1433+00

ROUTE: SR 360
MILEPOST: 16.39-27.13
LOCATION: POWER RD TO US 60

SHEET 706 OF 729

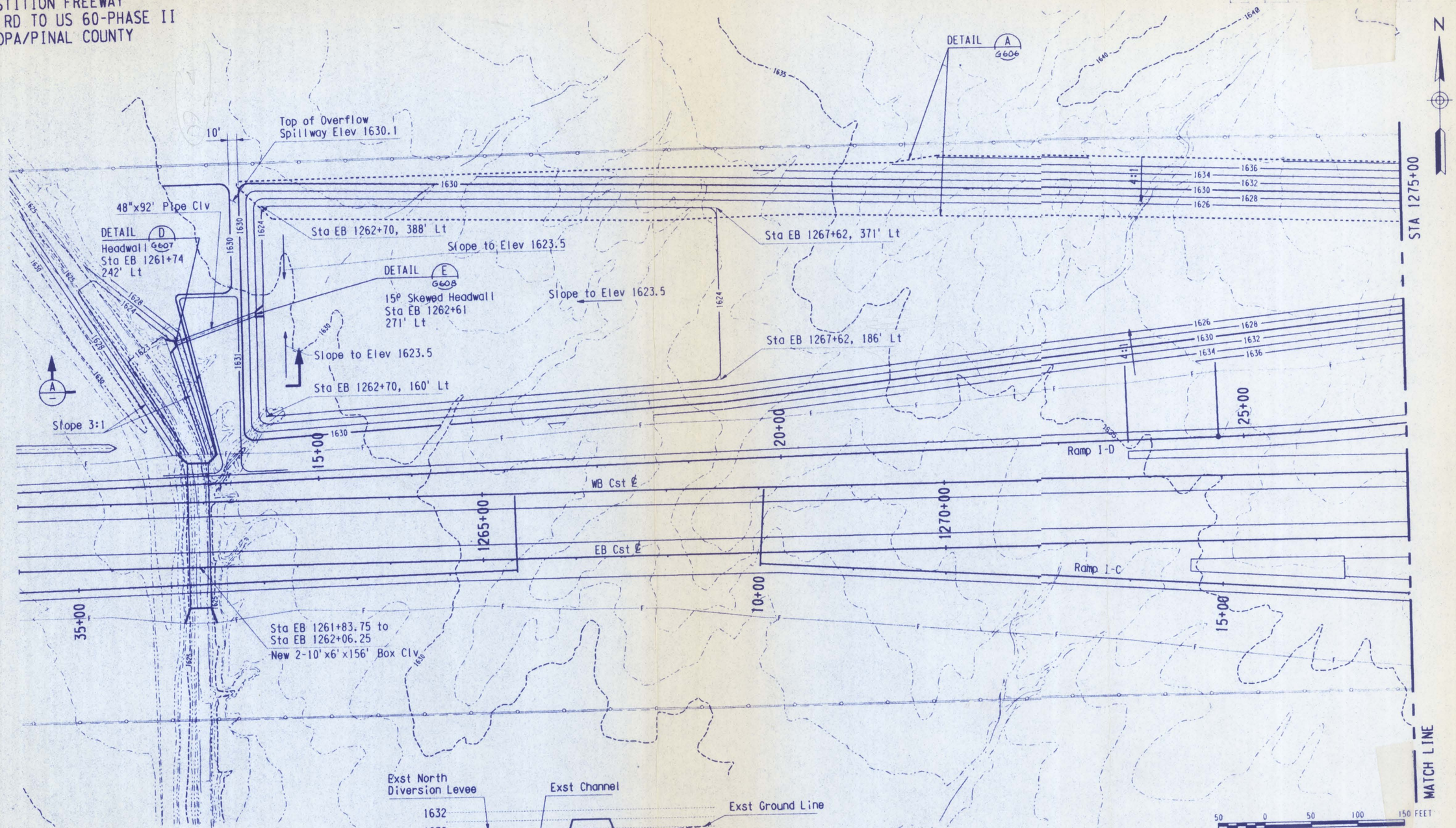
___ OF ___

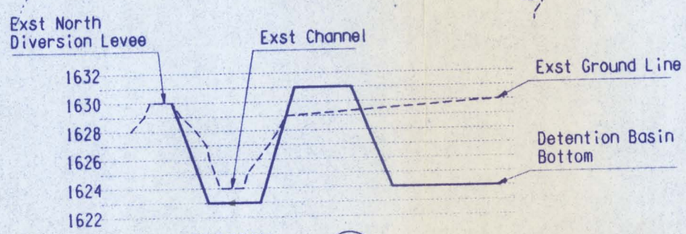
PLOTTING DATE 20-OCT-1987 13:24
DGN:(315,(00)11540524.RDD)
CADD CONTROL DATE 10-20-87
(315,(00)11540524.RDD)
DOUND UPDATED 10-20-87

SURVEY NO.	FINISH	NS	REVISIONS	LOCATION	DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY





SECTION A

SCHEMATIC
NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	P. PATERSON	8/87
DRAWN	K. YAPP	8/87
CHECKED	B. BRAATEN	8/87
APPROVED	P. PATERSON	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

DETENTION BASIN PLAN
SUPERSTITION FREEWAY
STA 1260+00 TO STA 1275+00

ROUTE: SR 360
MILEPOST: 16.39-27.13
LOCATION: POWER RD TO US 60

SHEET C656 OF C672

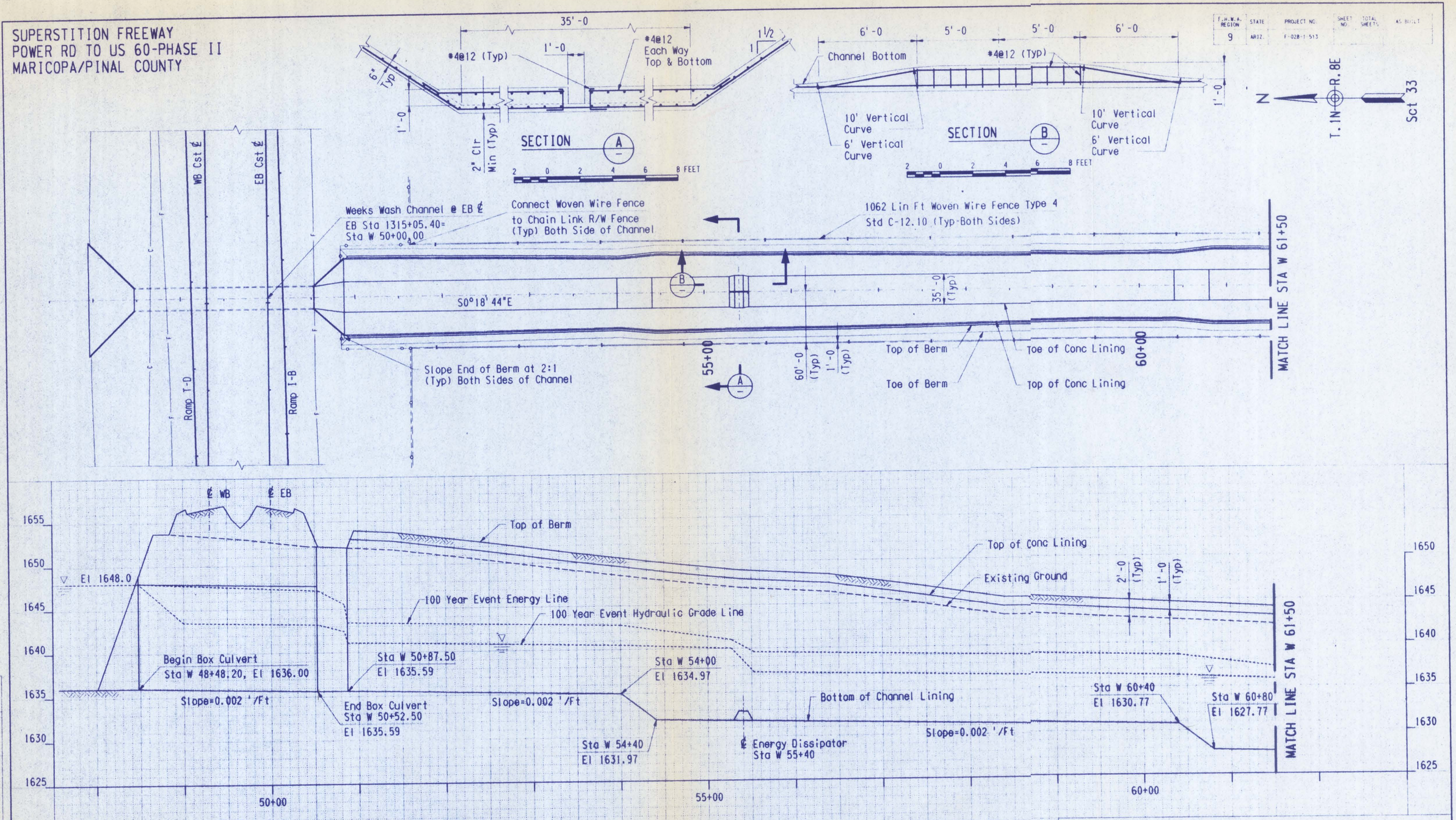
___ OF ___

BAC UPDATED 9-23-87
PLOTTING DATE 23-SEP-1987 06:55 CONTROL DATE 9-23-87
DS:1:1315,1003115\4C601.ROD CA: 1315,1003115\4C601.ROD

SURVEY NO.	FINISHED #	REVISIONS	LOCATION	DATE

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			



	NAME	DATE
DESIGN	B. BRAATEN	9/87
DRAWN	D. SILVEIRA	10/87
CHECKED	P. PATERSON	11/87
APPROVED	J. SCHROEDER	11/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

WEEKES WASH CHANNEL
STA W 50+00 TO STA W 61+50
SHEET 1

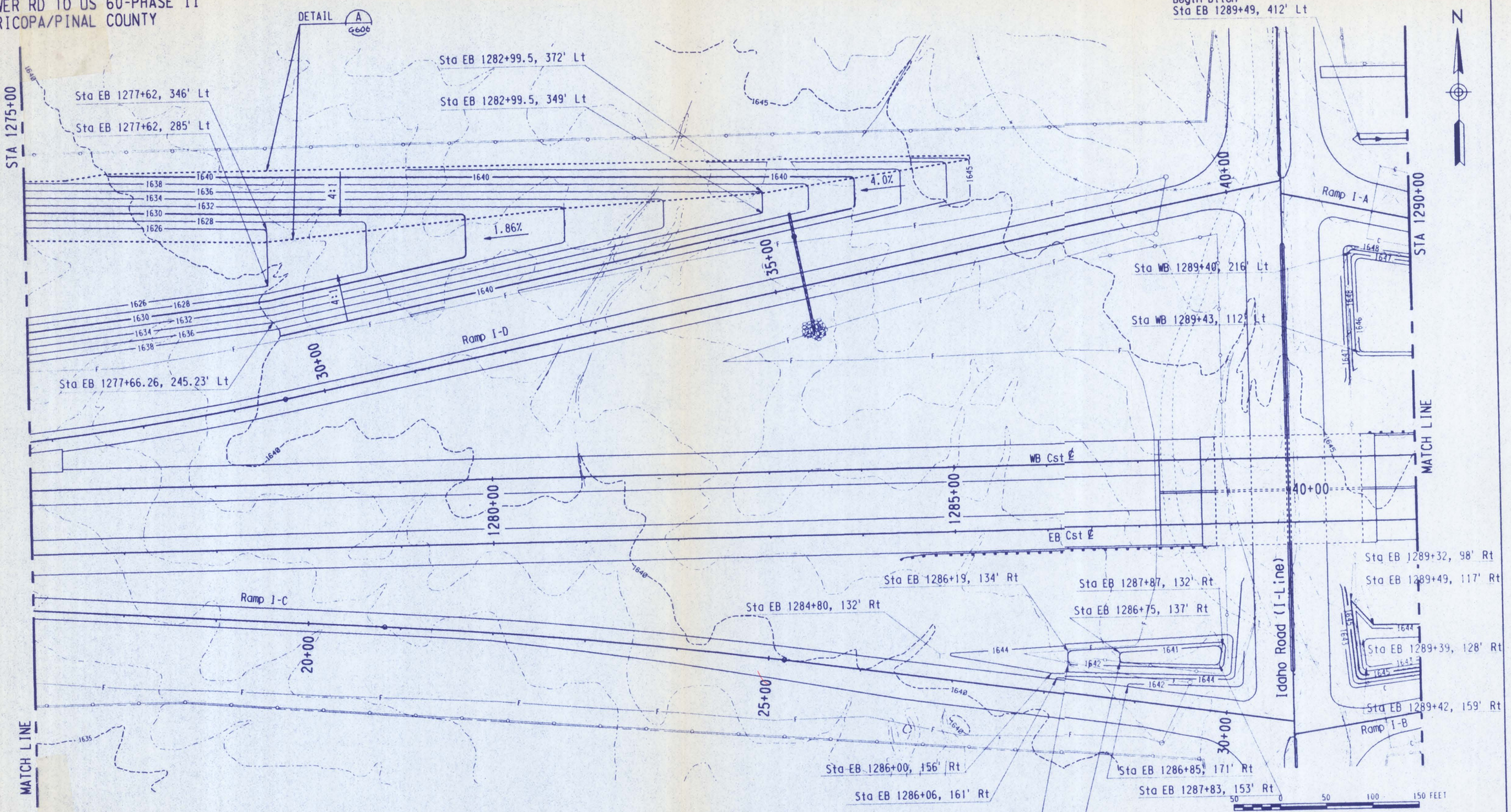
ROUTE	MILEPOST	LOCATION	SHEET	OF
SR 360	16.39-27.13	POWER RD TO US 60		OF

PLOTTING DATE 29-OCT-1987 08:58 CADD CONTROL DATE 15-29-87
DS11:1315.1003\1154C355.R00 [315.1003\1154C355.R00]
BY: ND UPDATED 9-10-87

SURVEY NO.	FINISHED	REVISIONS	LOCATION	DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY



SCHEMATIC
NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	P. PATERSON	8/87
DRAWN	K. YAPP	8/87
CHECKED	B. BRAATEN	8/87
APPROVED	P. PATERSON	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

DETENTION BASIN PLAN
SUPERSTITION FREEWAY
STA 1275+00 TO STA 1290+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

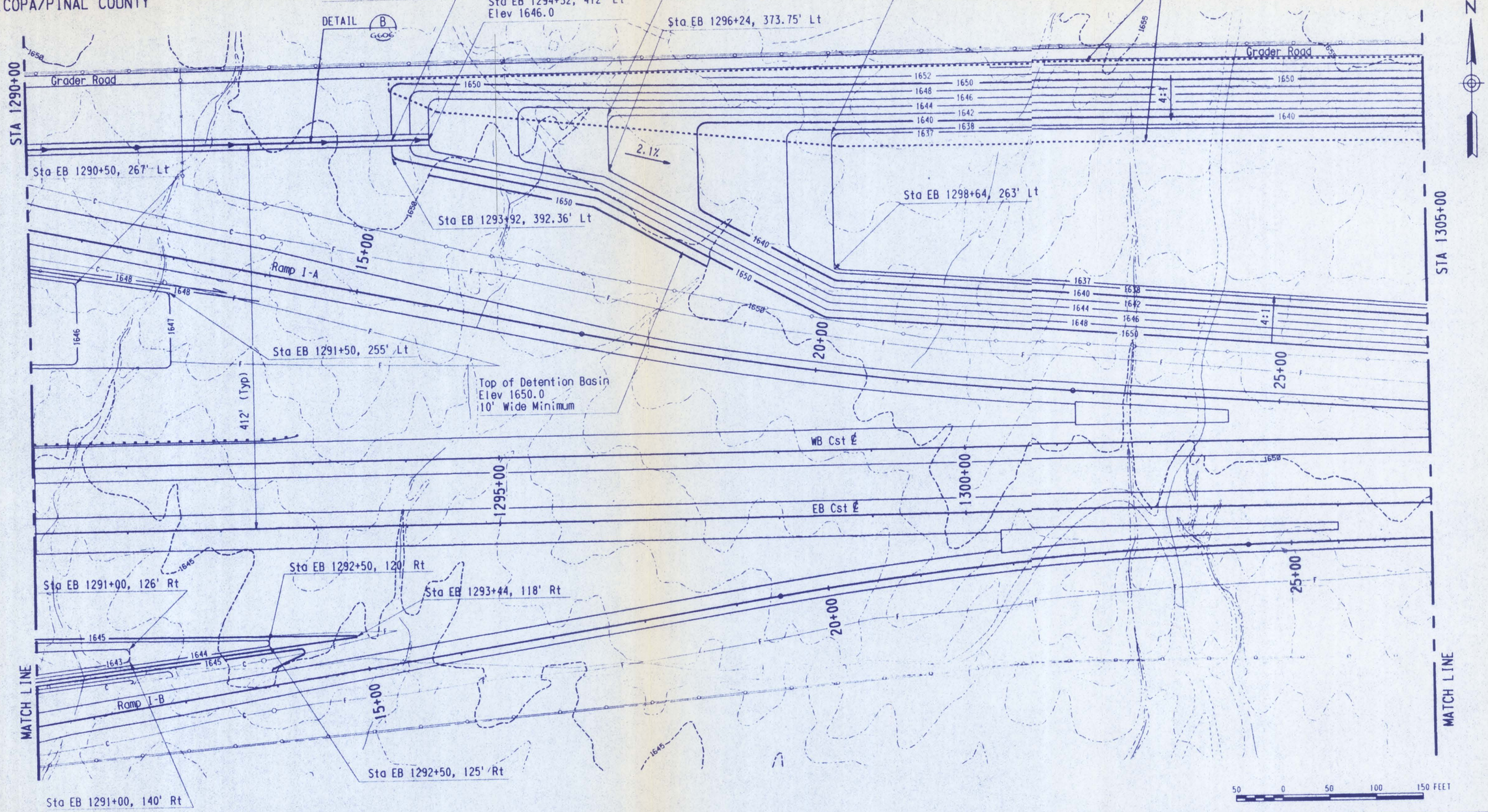
SHEET C657 OF C672

OF

BACKGRND UPDATED 9-23-87
PLOTTING DATE 23-SEP-1987 09:24 CADD DATE 9-23-87
051:315,1001115&G602.RDD

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F 028-1 513			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY



SCHEMATIC
NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	P. PATERSON	8/87
DRAWN	K. YAPP	8/87
CHECKED	B. BRAATEN	8/87
APPROVED	P. PATERSON	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

DETENTION BASIN PLAN
SUPERSTITION FREEWAY
STA 1290+00 TO STA 1305+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET C658 OF C672

___ OF ___

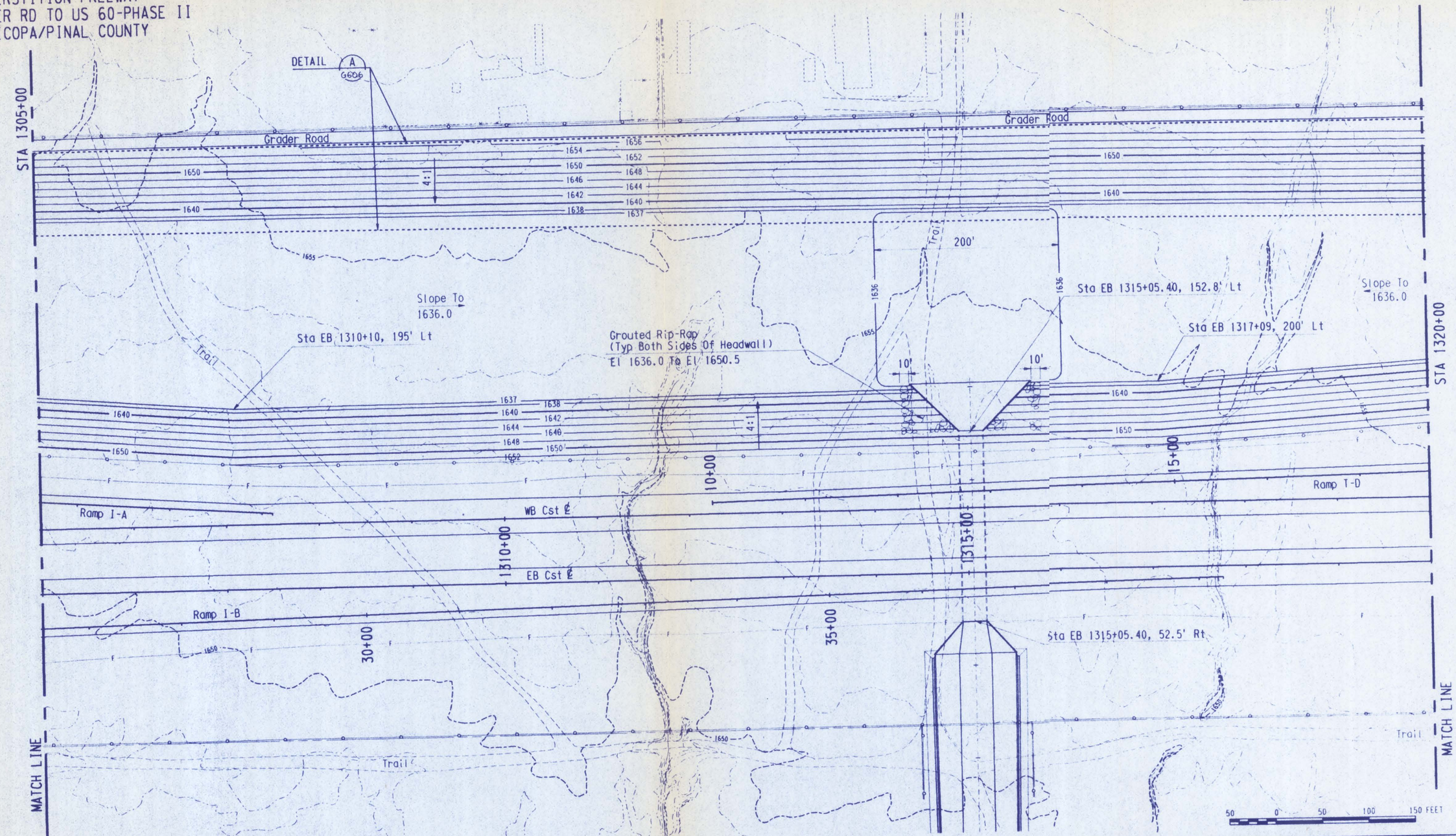
BACKGROUND UPDATED 6-12-87
CADD CONTROL DATE 9-22-87
(315,100)(154C603.ROD)

PLOTTING DATE 22-SEP-1987 19:16
(315,100)(154C603.ROD)

SURVEY NO.	FINISHED PLANS	REVISIONS	LOCATION	DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY



SCHEMATIC
NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	P.PATERSON	8/87
DRAWN	K.YAPP	8/87
CHECKED	B.BRAATEN	8/87
APPROVED	P. PATERSON	8/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY
DETENTION BASIN PLAN
SUPERSTITION FREEWAY
STA 1305+00 TO STA 1320+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET C659 OF C672

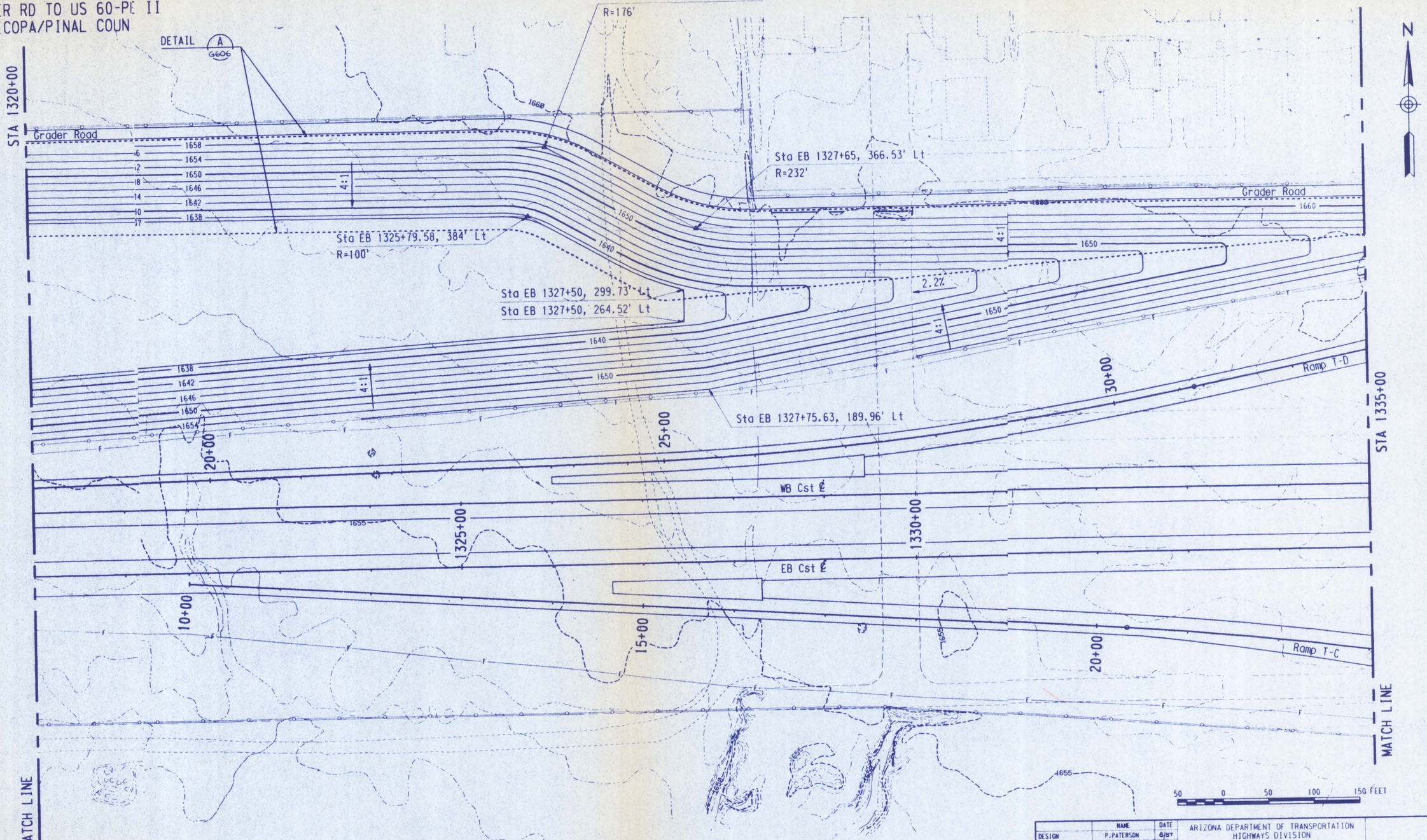
___ OF ___

PLOTTING DATE 23-SEP-1987 11:52 CADD UPDATED 9-23-87
DGN:1315,1001115\4C604.RDD CADD CONTROL DATE 9-23-87
(315,1001115\4C604.RDD

SURVEY NO.	FINISHED ?	REVISIONS	LOCATION	DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			

SUPERSTITION FREEWAY
POWER RD TO US 60-PE II
MARICOPA/PINAL COUN



SCHEMATIC
NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	P.PATERSON	8/87
DRAWN	K.YAPP	8/87
CHECKED	B.BRAATEN	8/87
APPROVED	P PATERSON	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

DETENTION BASIN PLAN
SUPERSTITION FREEWAY
STA 1320+00 TO STA 1335+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET C660 OF C672

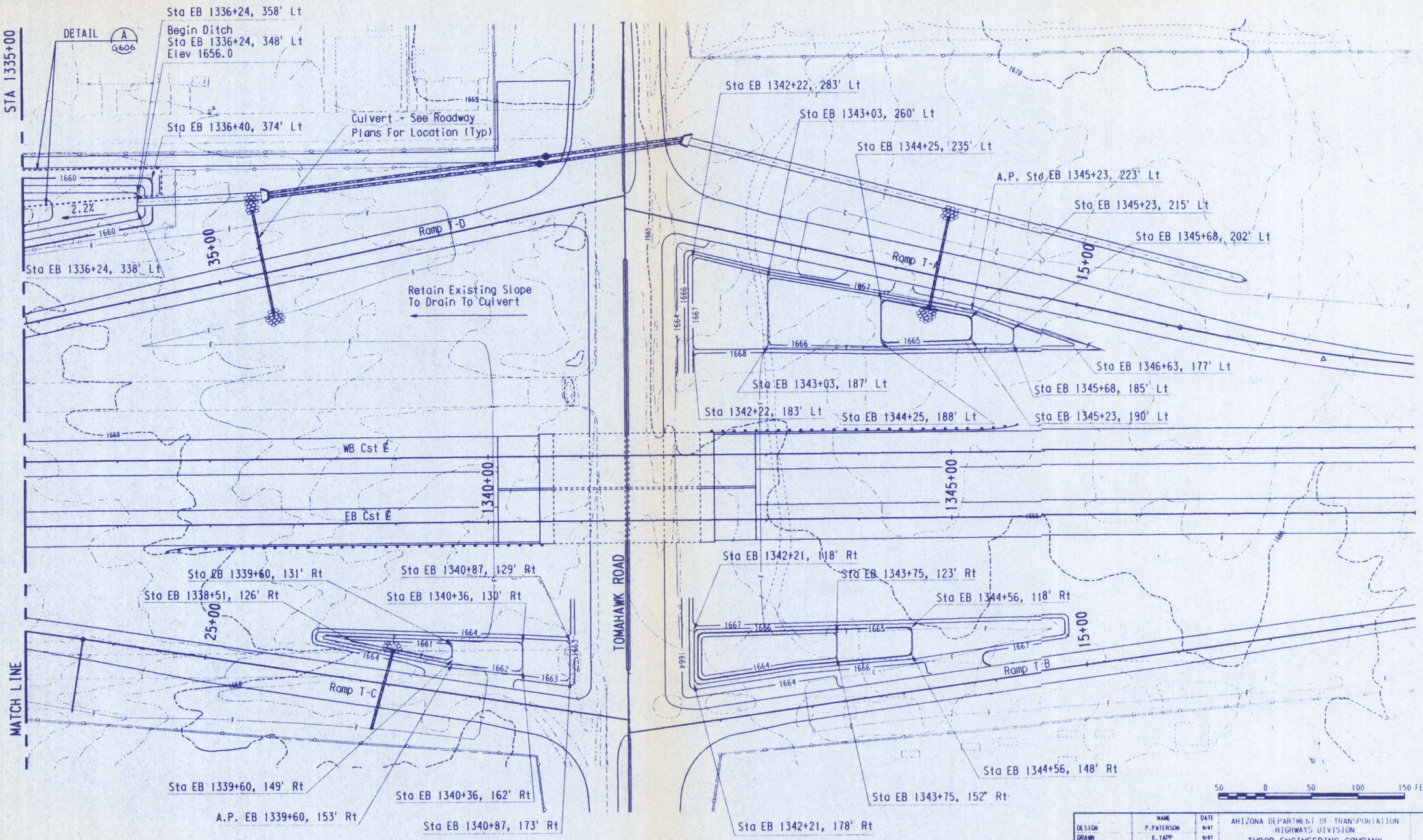
___ OF ___

BACKGROUND UPDATED 9-23-87
CADD CONTROL DATE 9-23-87
(315,1003115WC605.RDD)
PLOTTING DATE 23-SEP-1987 14:19
OSI:(315,1003115WC605.RDD)

SURVEY NO.	FINISHED PLANS	REVISIONS	LOCATION	DATE

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			



SCHEMATIC
NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	P.PATERSON	8/87
DRAWN	K.YAPP	8/87
CHECKED	B.BRAATEN	8/87
APPROVED	P.PATERSON	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

DETENTION BASIN PLAN
SUPERSTITION FREEWAY
STA 1335+00 TO STA 1350+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET C661 OF C672

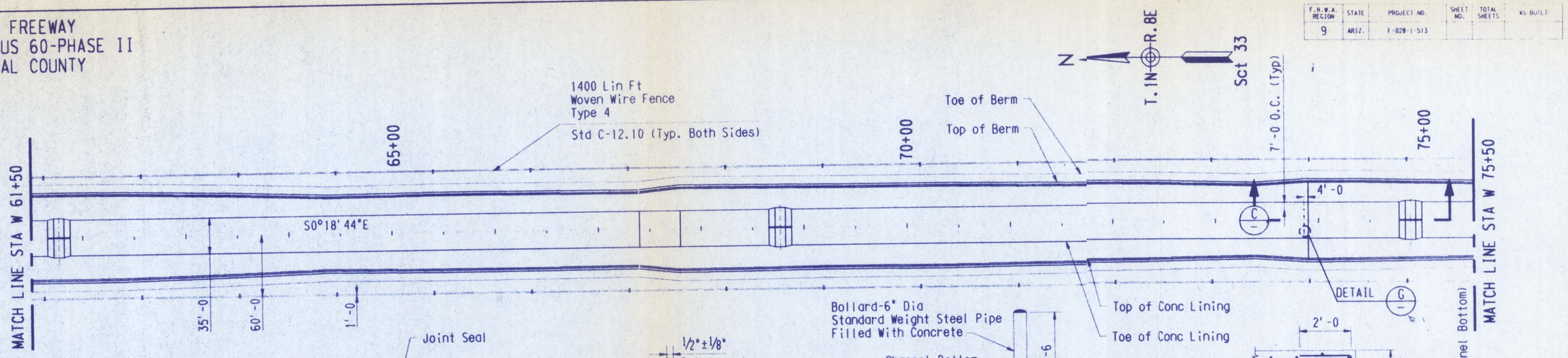
___ OF ___

PLOTTING DATE 23-SEP-1987 15:27 CADD CONTROL DATE 9-23-87
DS1:(315,100)1540606.ROD (315,100)1540606.ROD
BACKGROUND UPDATED 9-23-87

SURVEY NO.	FINISH	REVISIONS	LOCATION	DATE

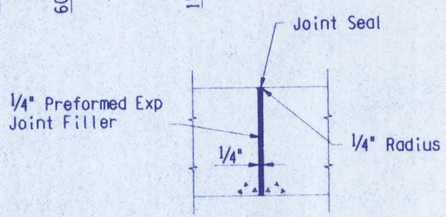
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY

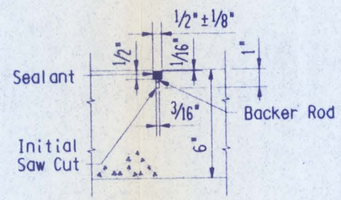


NOTES

1. Maximum spacing of weakened plane joints shall be 20'-0.
2. Backer Rod-(Expanded Cellular Rubber) shall conform to the requirements of ASTM D 1056 Grade # SBE 41.
3. Maximum spacing of expansion joints shall be 60'-0.



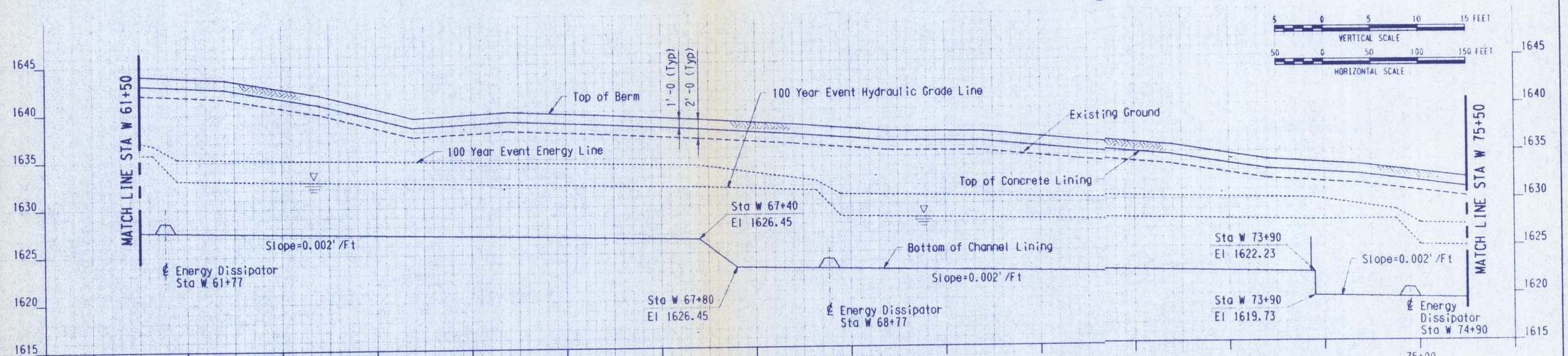
EXPANSION JOINT DETAIL



WEAKENED PLANE JOINT DETAIL

DETAIL C

SECTION C



SCHEMATIC
NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	B. BRAATEN	8/87
DRAWN	D. SILVEIRA	8/87
CHECKED	P. PATERSON	8/87
APPROVED	J. SCHROEDER	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY
WEEKES WASH CHANNEL
STA W 61+50 TO STA W 75+50
SHEET 2

ROUTE: SR 360
MILEPOST: 16.39-27.13
LOCATION: POWER RD TO US 60

SHEET C663 OF C672

OF

PLOTTING DATE 21-SEP-1987 20:20 CADD CONTROL DATE 9-21-87
DS:(315,100)(15)C356.RKD (315,100)(15)C356.RKD

LAND UPDATED 9-14-87

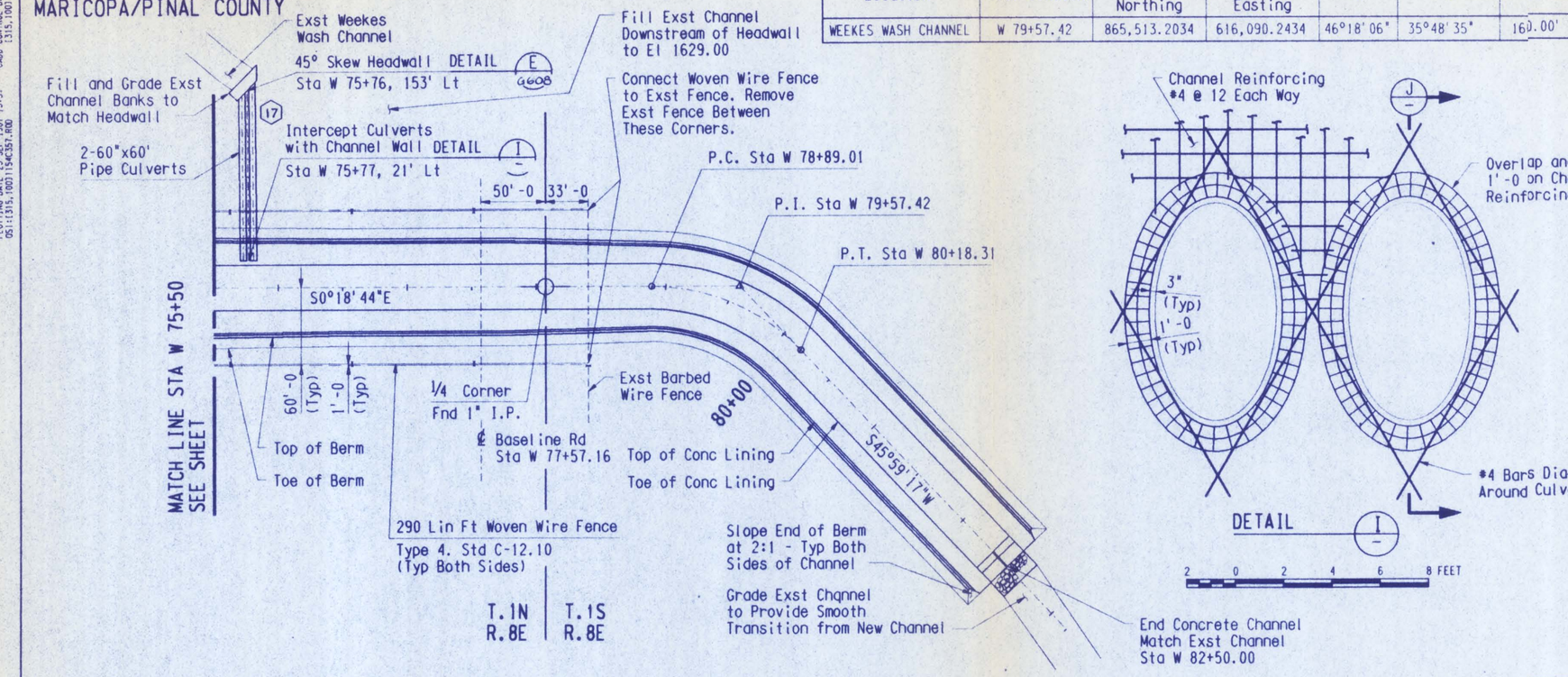
SURVEY NO.	FINISHED	REVISIONS	LOCATION	DATE

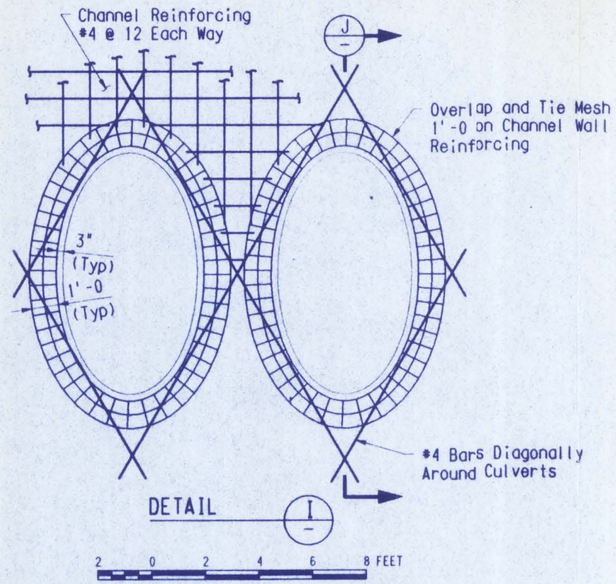
SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY

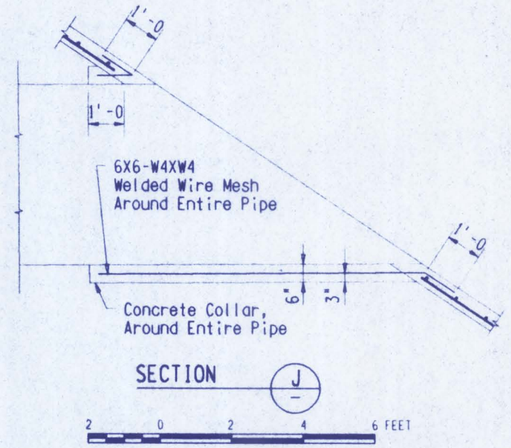
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			

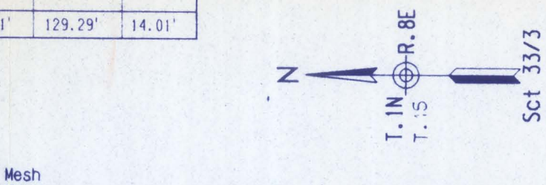
CURVE DATA

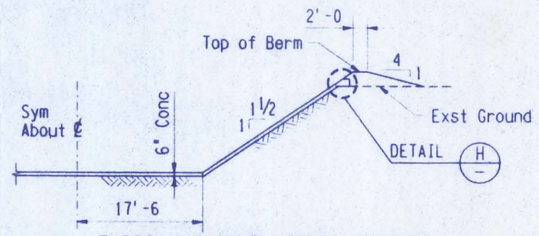
Location	P.I. Station	P.I. Coordinates Northing	P.I. Coordinates Easting	Δ	D	R	T	L	E
WEEKES WASH CHANNEL	W 79+57.42	865,513.2034	616,090.2434	46°18'06"	35°48'35"	160.00'	68.41'	129.29'	14.01'



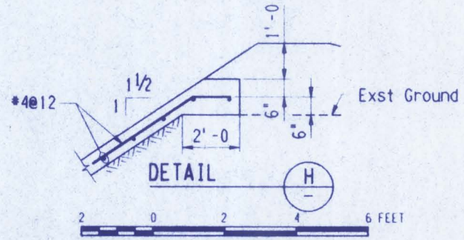


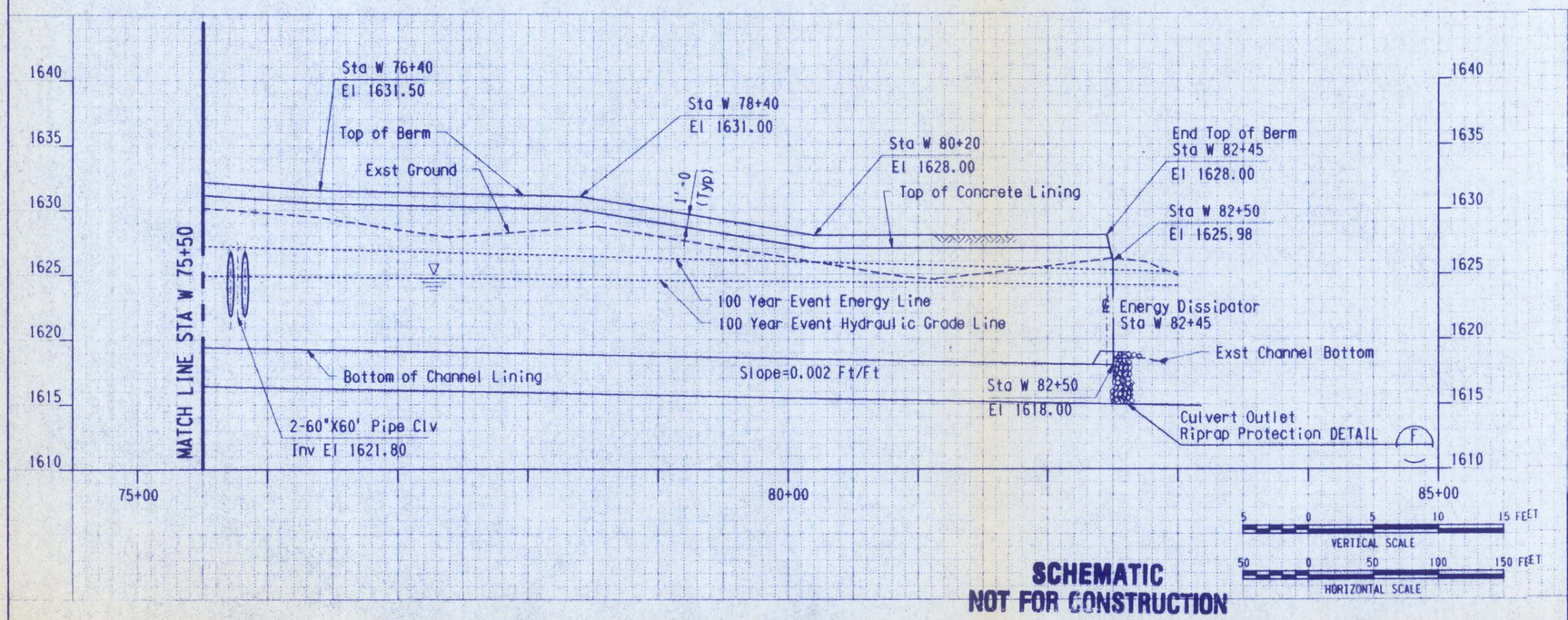






TYPICAL CHANNEL CROSS SECTION





SCHEMATIC
NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	B. BRAATEN	
DRAWN	D. SILVEIRA	
CHECKED	P. PATERSON	
APPROVED	J. SCHROEDER	

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY
WEEKES WASH CHANNEL
STA W 75+50 TO STA W 82+50
SHEET 3

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET C664 OF C672

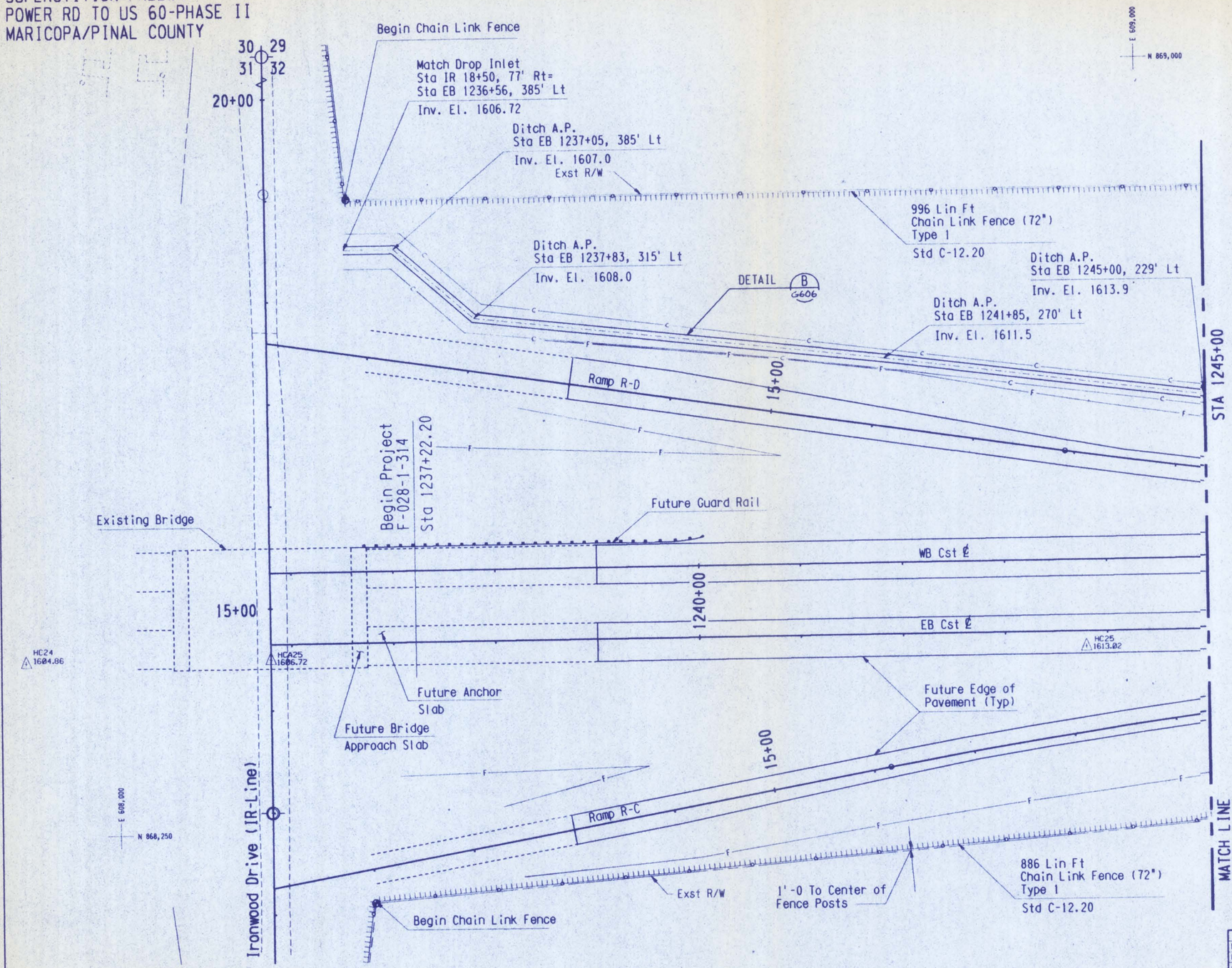
OF

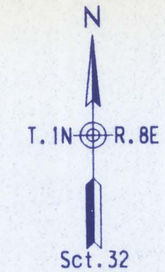
PLOTTING DATE 23-SEP-1987 15:37 CADD CONTROL DATE 9-22-87 GS:[315,100]15K357.ROD
BOUND UPDATED 6-19-87

SURVEY NO.	FINISHED	REVISIONS	LOCATION	DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY





SCHEMATIC
NOT FOR CONSTRUCTION

50 0 50 100 150 FEET

	NAME	DATE
DESIGN	J. SCHROEDER	8/87
DRAWN	K. YAPP	8/87
CHECKED	J. SPOFFORD	8/87
APPROVED	J. SCHROEDER	8/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY PLAN
SUPERSTITION FREEWAY
STA 1237+22.20 TO STA 1245+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET 608 OF 672

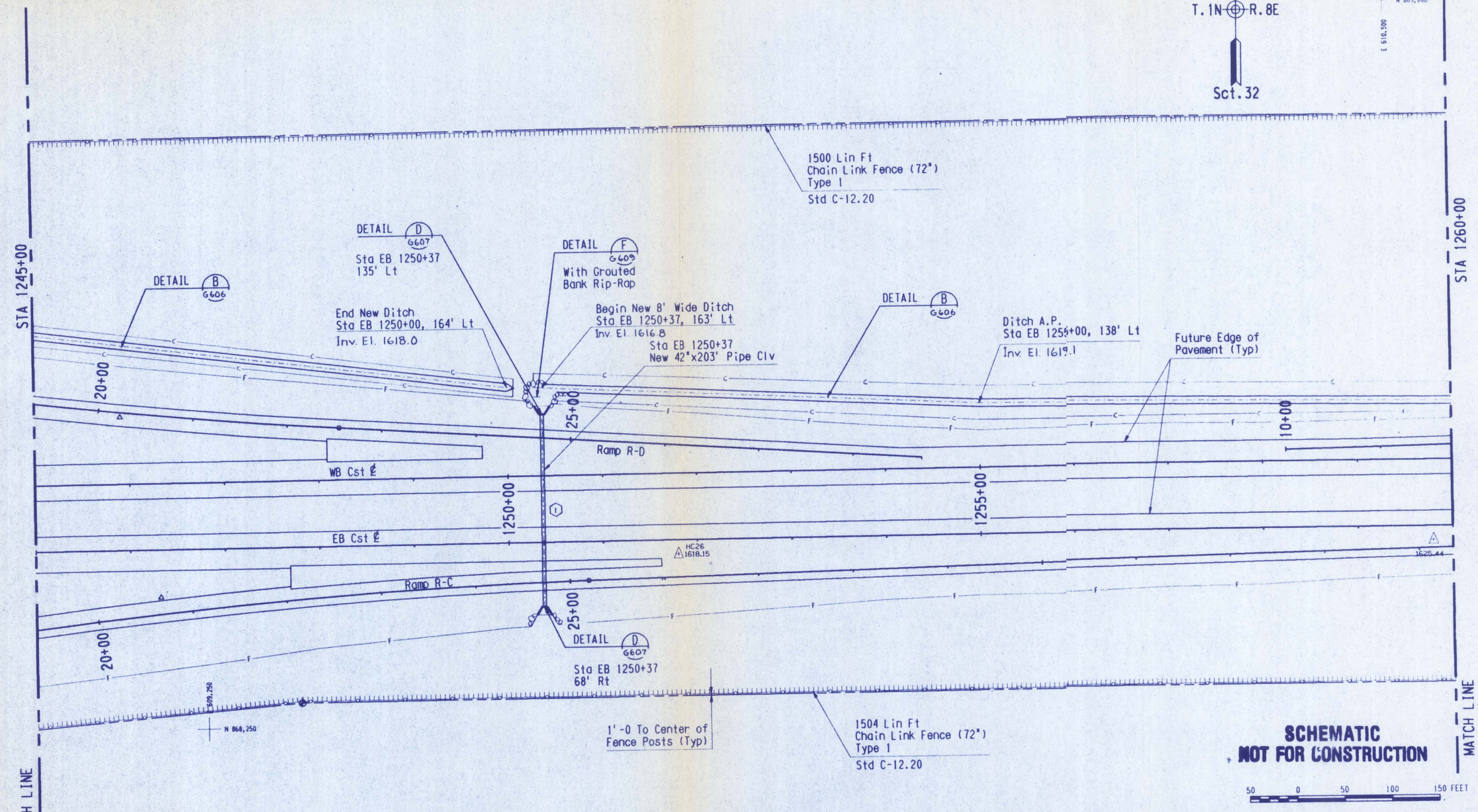
OF

BACKGROUND UPDATED 9-11-87
CONTROL DATE 9-16-87
CS1:(315,100)11540101.ROD
PLOTTING DATE 16-SEP-1987 14:05
CS1:(315,100)11540101.ROD

SURVEY NO.	FINISHED P	REVISIONS	LOCATION	DATE

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1 513			



SCHEMATIC
NOT FOR CONSTRUCTION

50 0 50 100 150 FEET

	NAME	DATE
DESIGN	J. SCHROEDER	8/87
DRAWN	K. YAPP	8/87
CHECKED	J. SPOFFORD	8/87
APPROVED	J. SCHROEDER	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY PLAN
SUPERSTITION FREEWAY
STA 1245+00 TO STA 1260+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET C612 OF C672

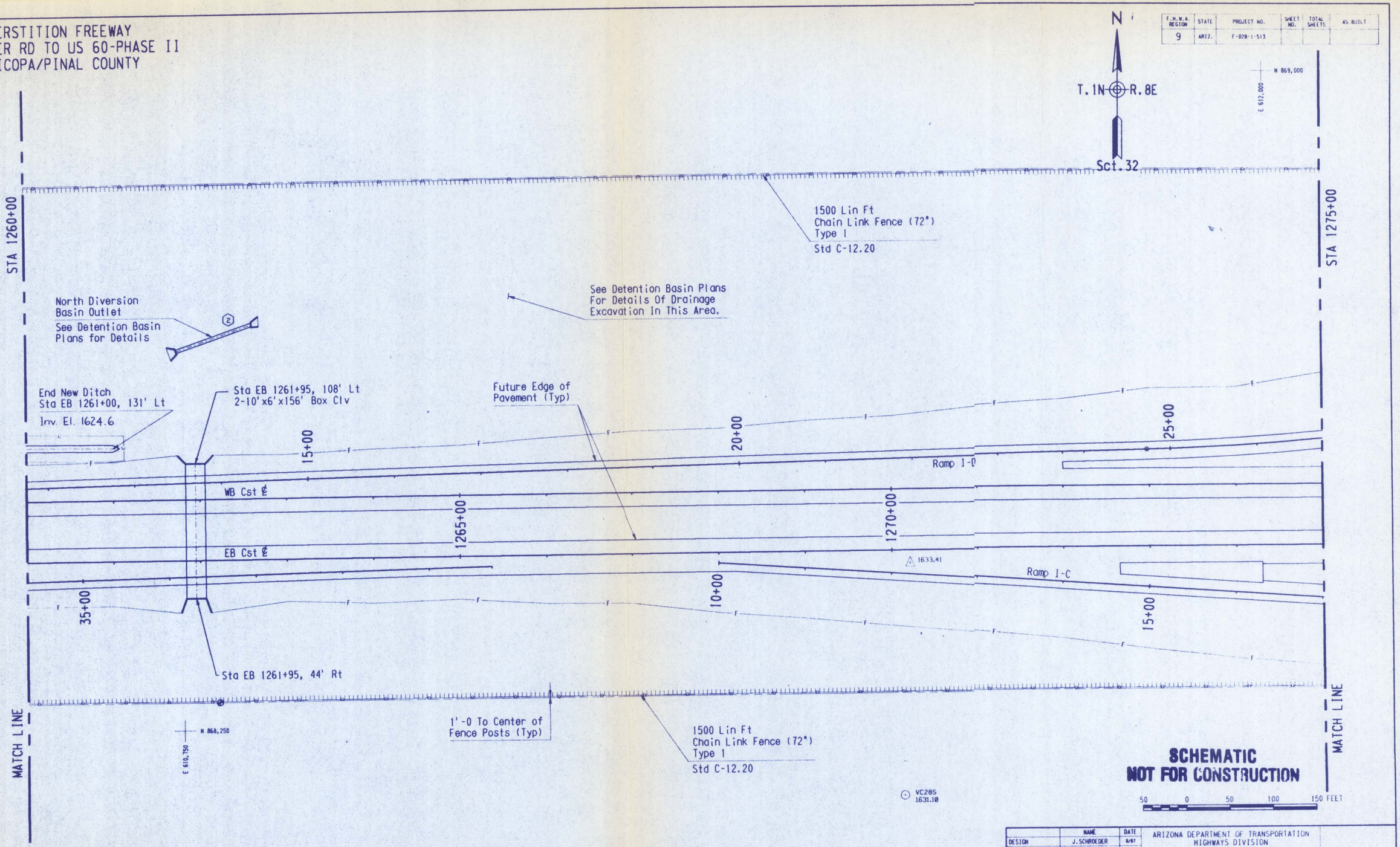
___ OF ___

PLOTTING DATE 15-SEP-1987 12:53 CADD CONTROL DATE 9-15-87
GS:1315,1003115\C102.RDD [315,1003115\C102.RDD
LAND UPDATED 9-11-87

SURVEY NO. | FINISHED | REVISIONS | LOCATION | DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY



SCHEMATIC
NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	J.SCHROEDER	8/87
DRAWN	K.YAPP	8/87
CHECKED	J.SPOFFORD	8/87
APPROVED	J.SCHROEDER	8/87

ROUTE: SR 360
MILEPOST: 16.39-27.13

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY PLAN
SUPERSTITION FREEWAY
STA 1260+00 TO STA 1275+00

LOCATION: POWER RD TO US 60

SHEET C614 OF C672

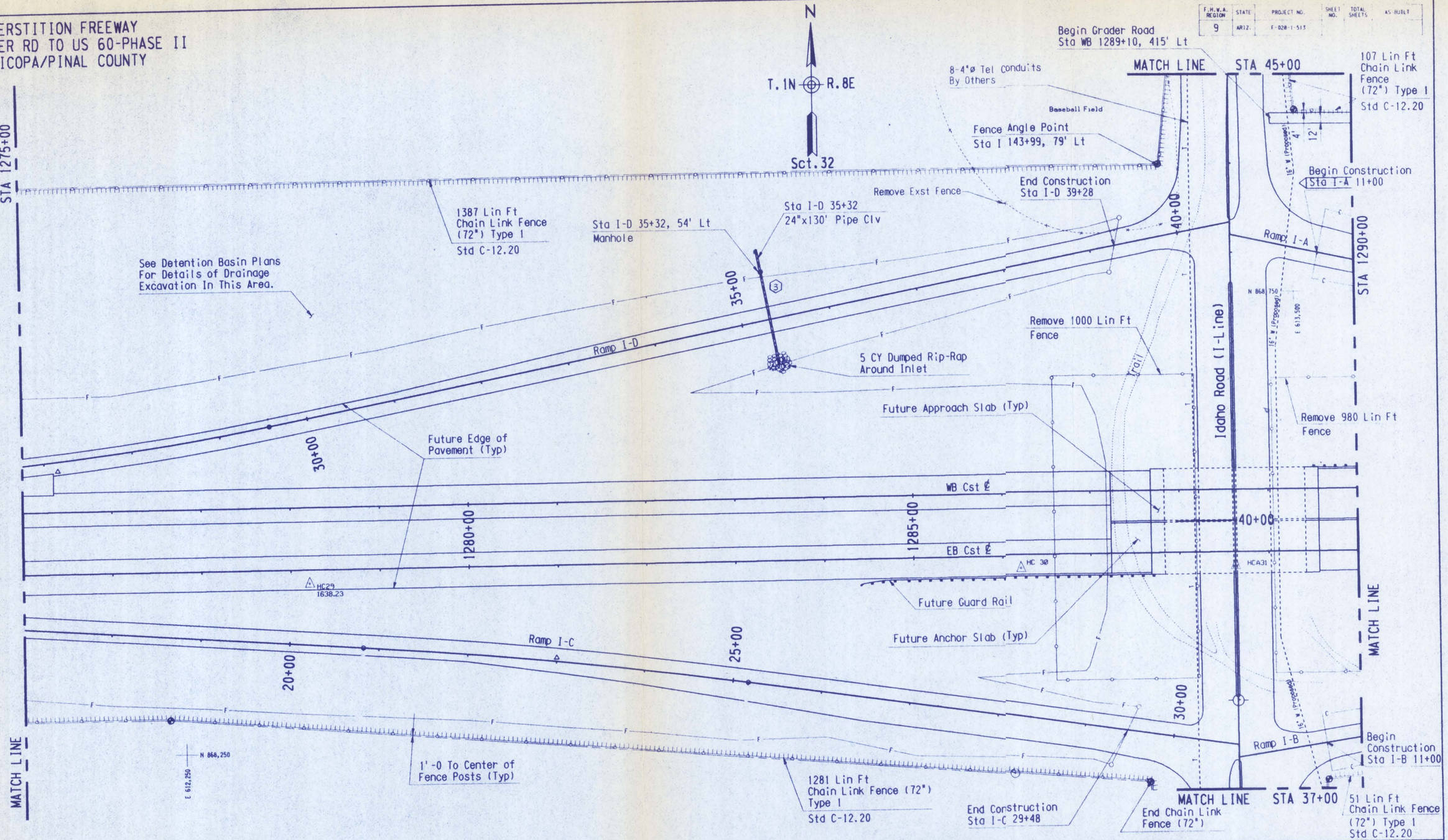
OF

PLOTTING DATE 15-SEP-1987 17:13 CADD CONTROL DATE 9-15-87 GROUND UPDATED 9-15-87
DS1=1315,1003115=C103.RDD 1315,1003115=C103.RDD

SURVEY NO.	FINISH PLANS	REVISIONS	LOCATION	DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY



SCHEMATIC
NOT FOR CONSTRUCTION

50 0 50 100 150 FEET

	NAME	DATE
DESIGN	J. SCHROEDER	8/87
DRAWN	K. TAPP	8/87
CHECKED	J. SPOFFORD	8/87
APPROVED	J. SCHROEDER	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY PLAN
SUPERSTITION FREEWAY
STA 1275+00 TO STA 1290+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET 6 OF 672

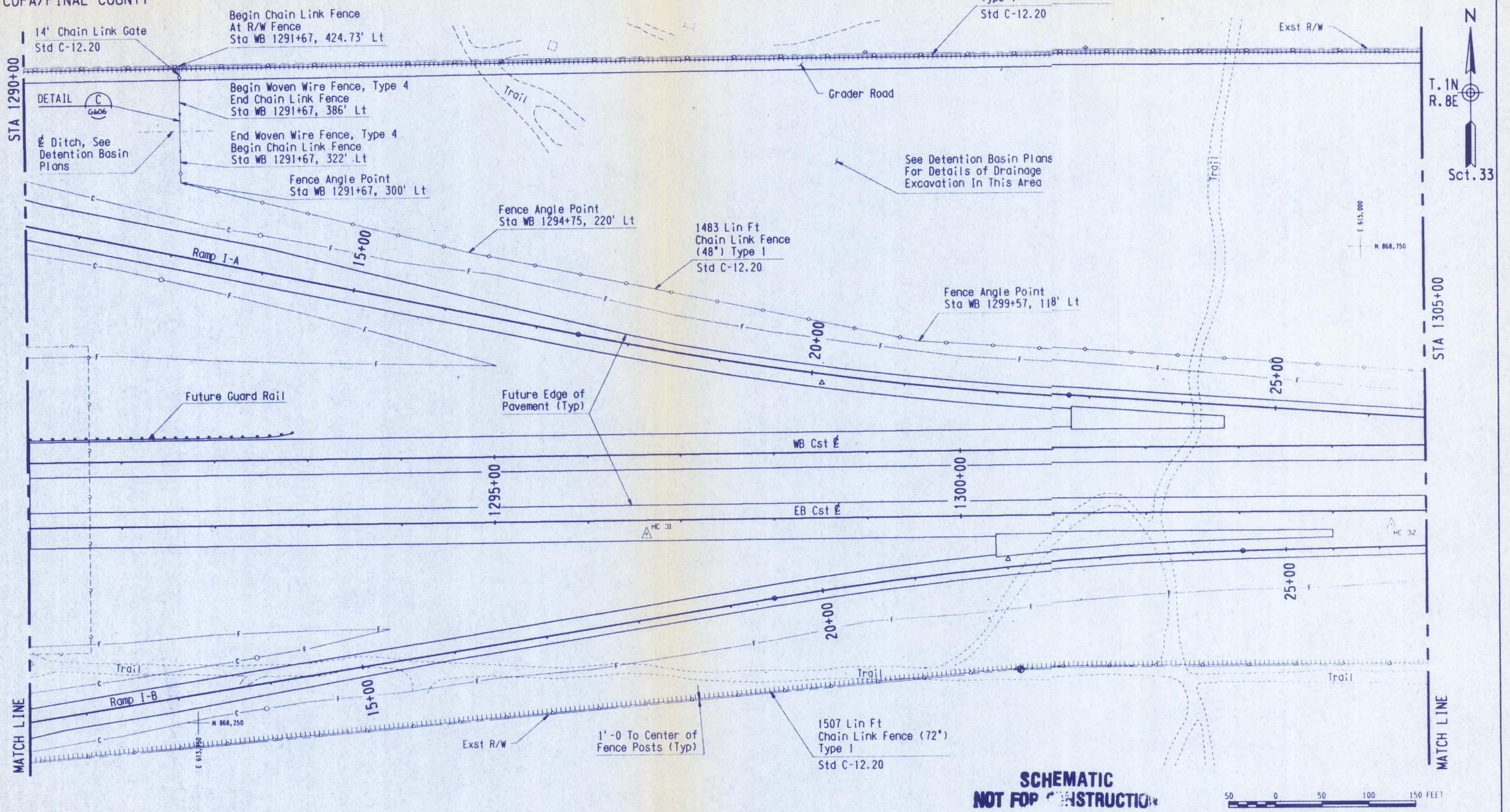
OF

PLOTTING DATE 23-SEP-1987 07:58 CADD CONTROL DATE 9-23-87
DS:1:315,100:1:15:4C104.RDD
UND UPDATED 9-23-87
DS:1:315,100:1:15:4C104.RDD

SURVEY NO. | FINISHED | REVISIONS | LOCATION | DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY



SCHEMATIC
NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	J. SCHROEDER	8/87
DRAWN	K. TAPP	8/87
CHECKED	J. SPOFFORD	8/87
APPROVED	J. SCHROEDER	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY PLAN
SUPERSTITION FREEWAY
STA 1290+00 TO STA 1305+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET 622 OF 672

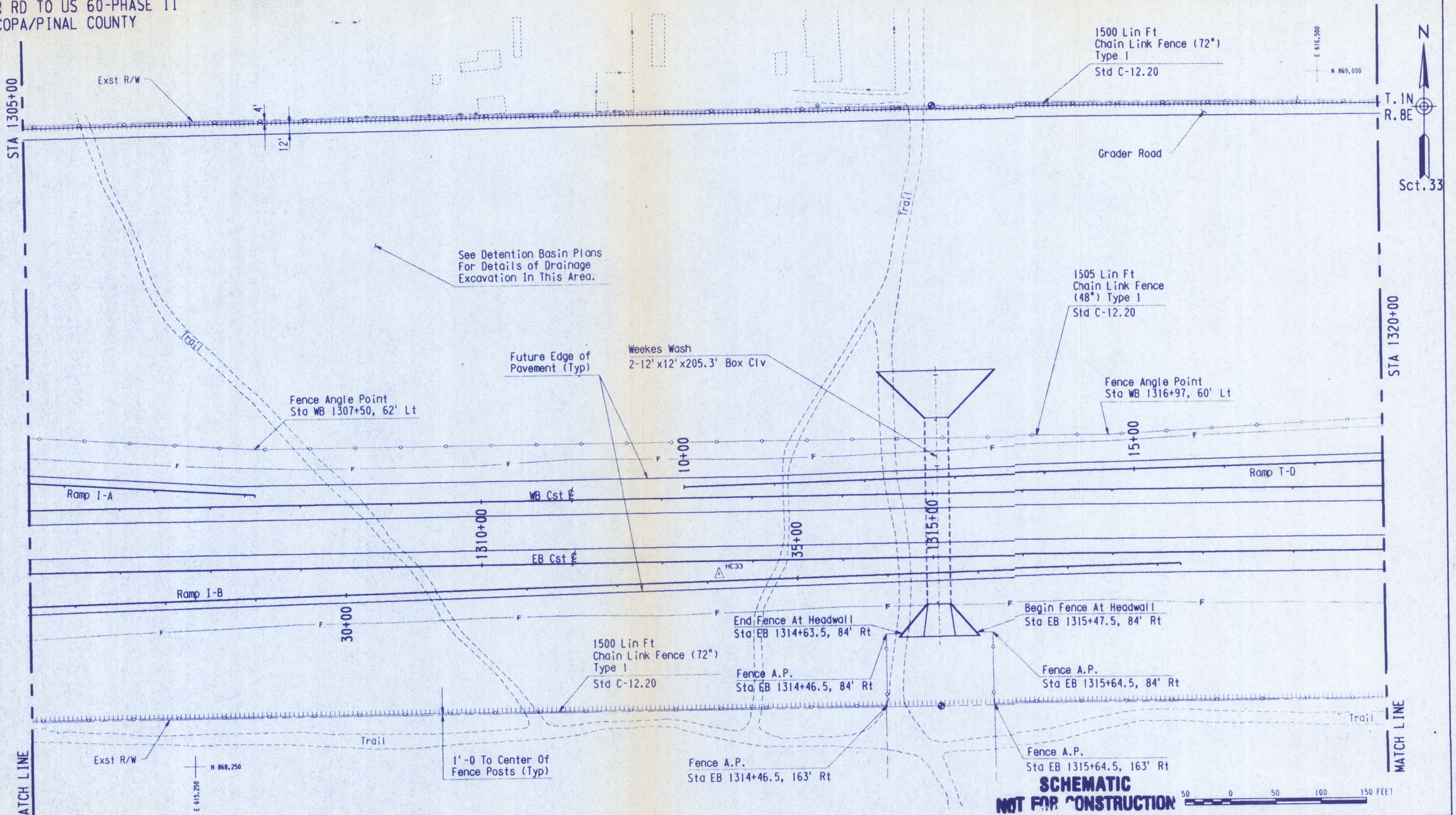
___ OF ___

PLOTTING DATE 15-SEP-1987 13:26 CADD CONTROL DATE 9-15-87
QSI:(315,100)115ACIDS.RDD (315,100)115ACIDS.RDD
BACKGROUND UPDATED 9-11-87

SURVEY NO.	FINISH	REVISIONS	LOCATION	DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY



SCHEMATIC
NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	J. SCHROEDER	8/87
DRAWN	K. YAPP	8/87
CHECKED	J. SPOFFORD	8/87
APPROVED	J. SCHROEDER	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY PLAN
SUPERSTITION FREEWAY
STA 1305+00 TO STA 1320+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET C626 OF C672

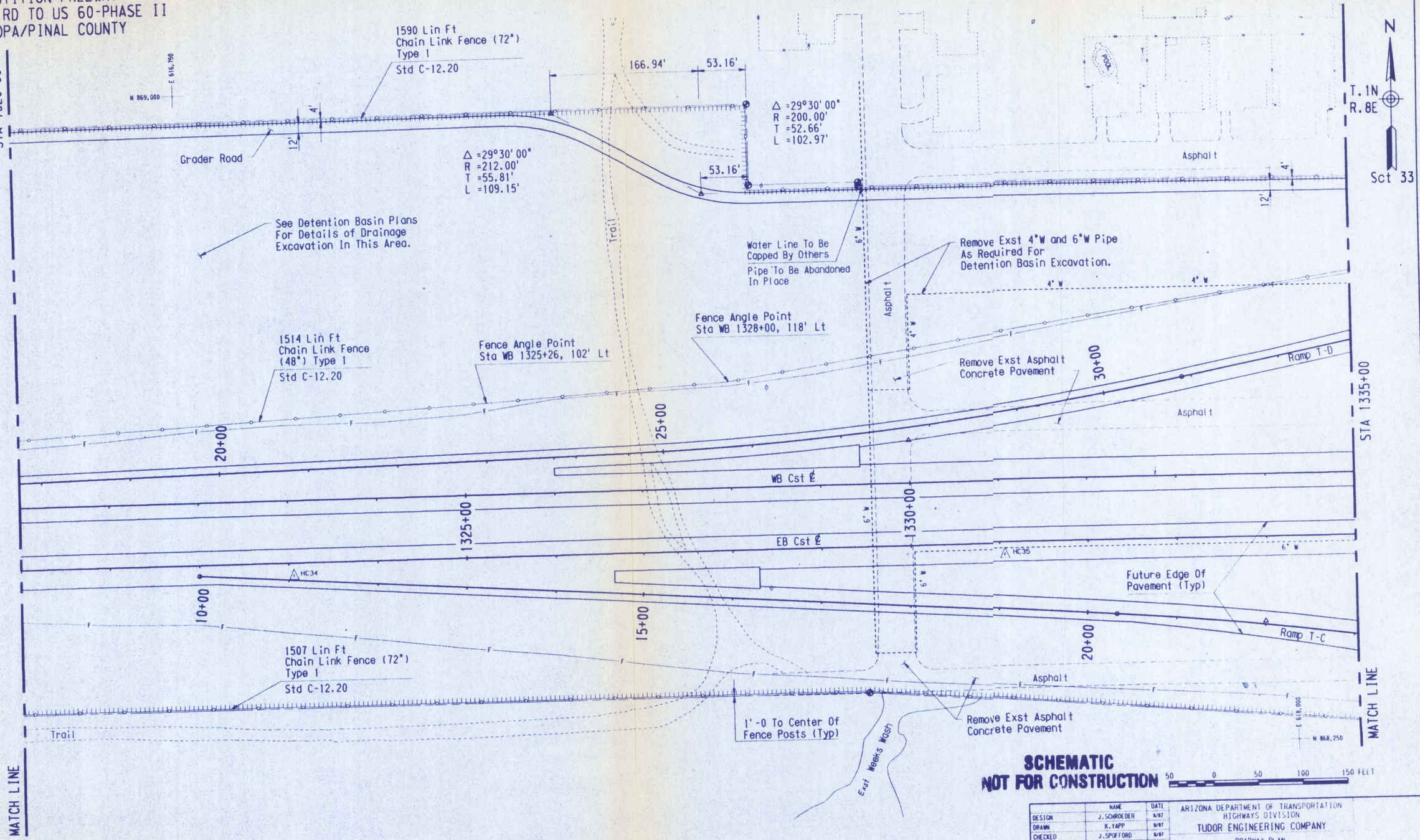
___ OF ___

PLOTTING DATE 17-SEP-1987 10:37 CADD CONTROL DATE 9-17-87
DS:(315,100)1154C106.RDD (315,100)1154C106.RDD
BOND UPDATED 9-15-87

SURVEY NO.	FINISHED BY	REVISIONS	LOCATION	DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY



SCHEMATIC
NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	J. SCHROEDER	8/87
DRAWN	K. YAPP	8/87
CHECKED	J. SPOFFORD	8/87
APPROVED	J. SCHROEDER	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY PLAN
SUPERSTITION FREEWAY
STA 1320+00 TO STA 1335+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET C628 OF C672

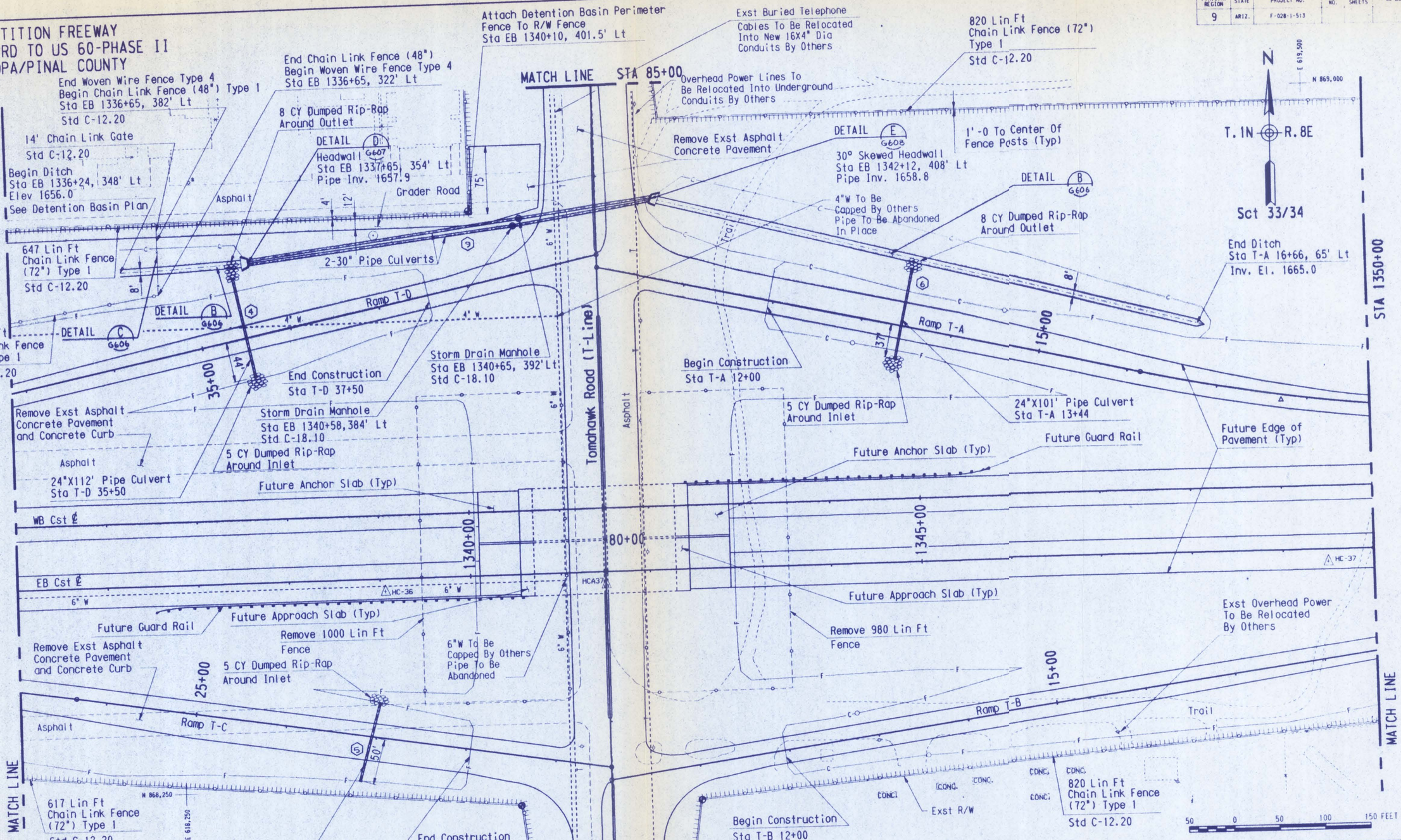
___ OF ___

PLOTTING DATE 15-SEP-1987 12:42
DGN(315,100)115KC107.RDD
CADD CONTROL DATE 9-15-87
(315,100)115KC107.ROC
B. ND UPDATED 9-11-87

SURVEY NO.	FINISHED	REVISIONS	LOCATION	DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY



SCHEMATIC
NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	J. SCHROEDER	8/87
DRAWN	K. YAPP	8/87
CHECKED	J. SPOFFORD	8/87
APPROVED	J. SCHROEDER	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY PLAN
SUPERSTITION FREEWAY
STA 1335+00 TO STA 1350+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET C632 OF C672

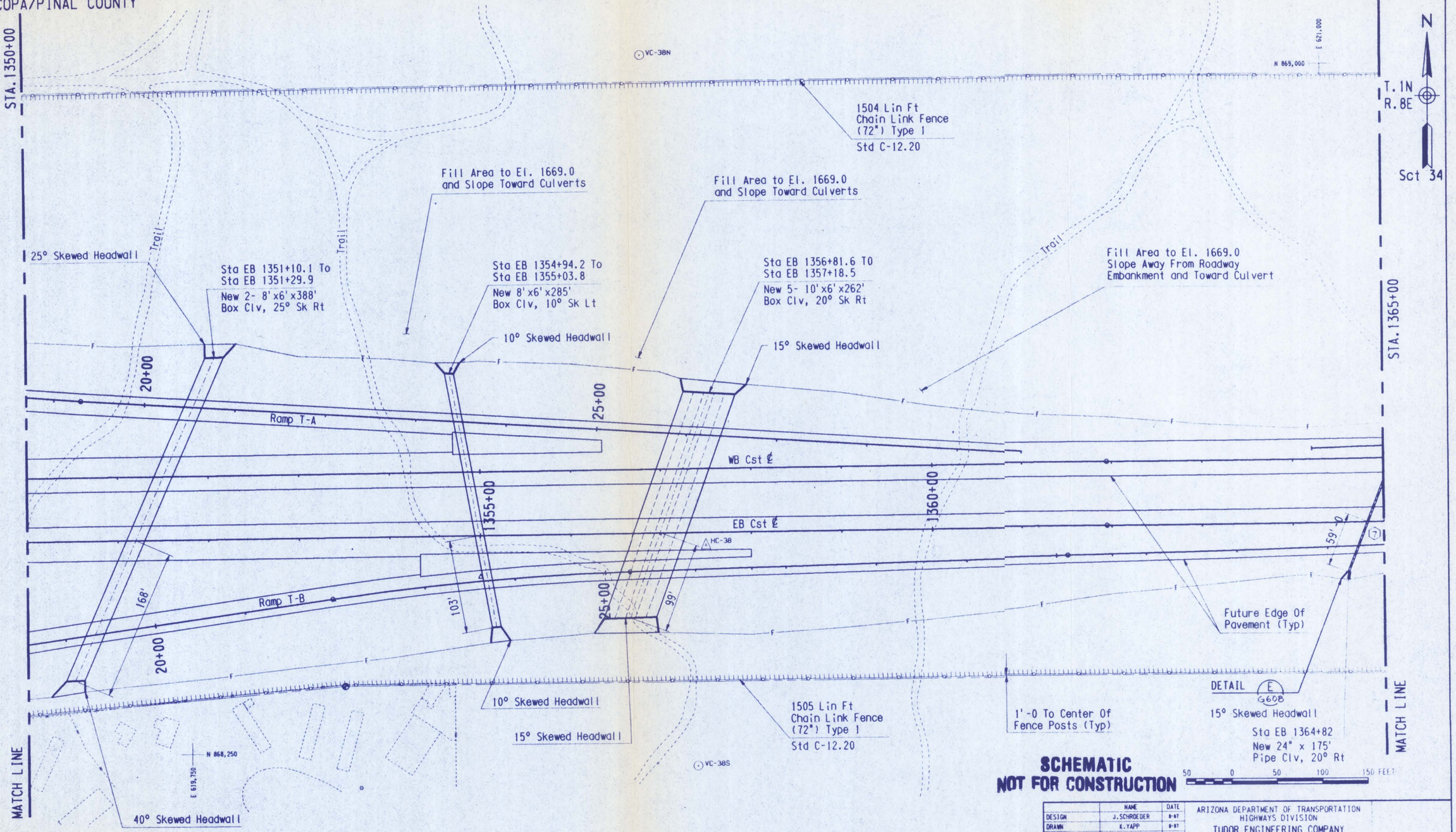
___ OF ___

PLOTTING DATE 17-SEP-1987 11:02 CADD:1315,100\1154C108.RDD
CONTROL DATE 9-17-87 CADD:1315,100\1154C108.RDD
BATCH UPDATED 9-14-87

SURVEY NO. | FINISHED # | REVISIONS | LOCATION | DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028 1-513			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY



SCHEMATIC
NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	J. SCHROEDER	8-87
DRAWN	K. YAPP	8-87
CHECKED	J. SPOFFORD	8-87
APPROVED	J. SCHROEDER	9-87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY PLAN
SUPERSTITION FREEWAY
STA 1350+00 TO STA 1365+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET C637 OF C672

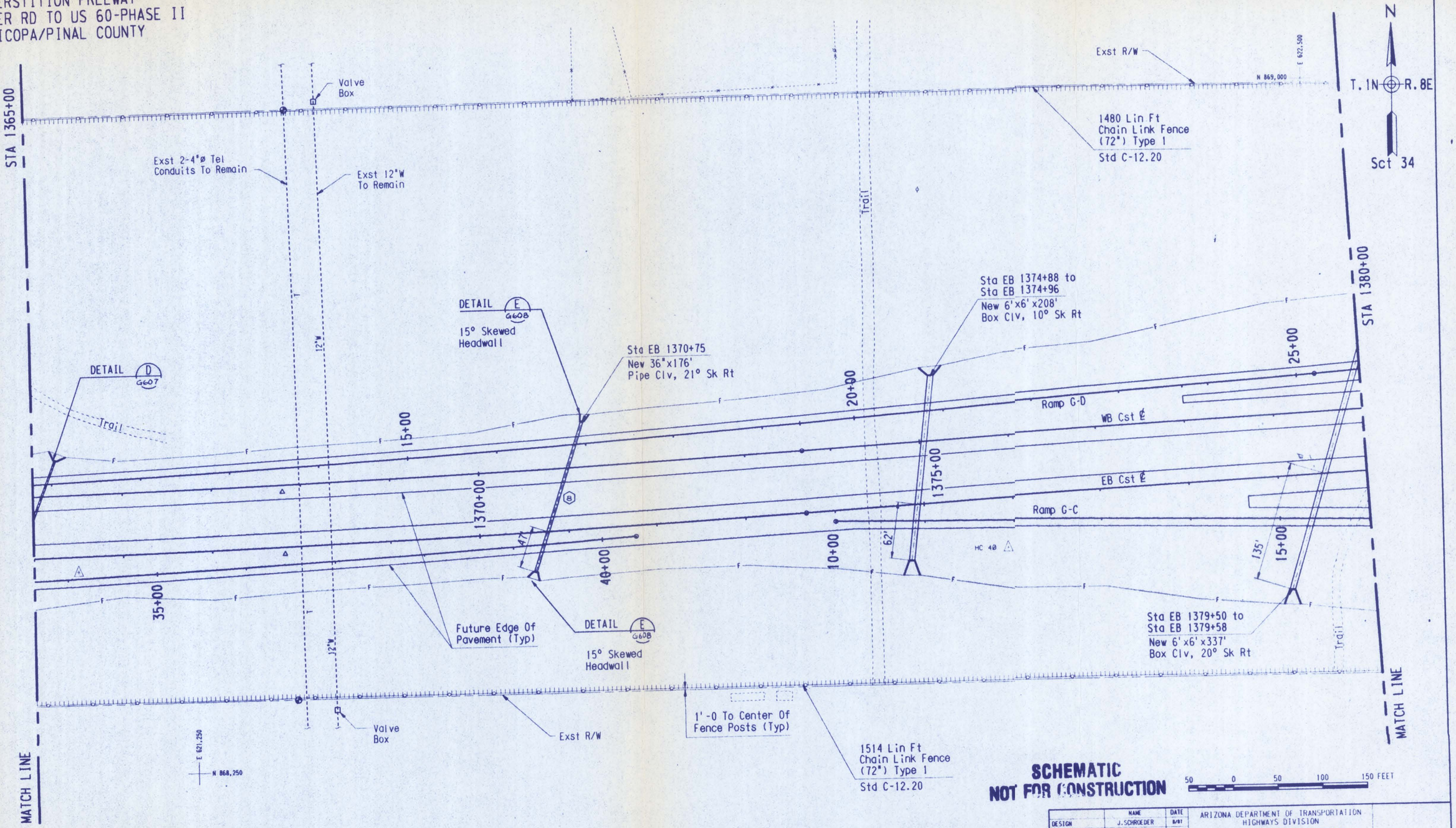
___ OF ___

BACKGROUND UPDATED 9-15-87
CADD CONTROL DATE 9-16-87 (315,100)11541109.RDD
PLOTTING DATE 16-SEP-1987 13:26 DS1:(315,100)11541109.RDD

SURVEY NO.	FINISHED	REVISIONS	LOCATION	DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY



SCHEMATIC
NOT FOR CONSTRUCTION

50 0 50 100 150 FEET

	NAME	DATE
DESIGN	J. SCHROEDER	8/87
DRAWN	K. YAPP	8/87
CHECKED	J. SPOFFORD	8/87
APPROVED	J. SCHROEDER	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY PLAN
SUPERSTITION FREEWAY
STA 1365+00 TO STA 1380+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

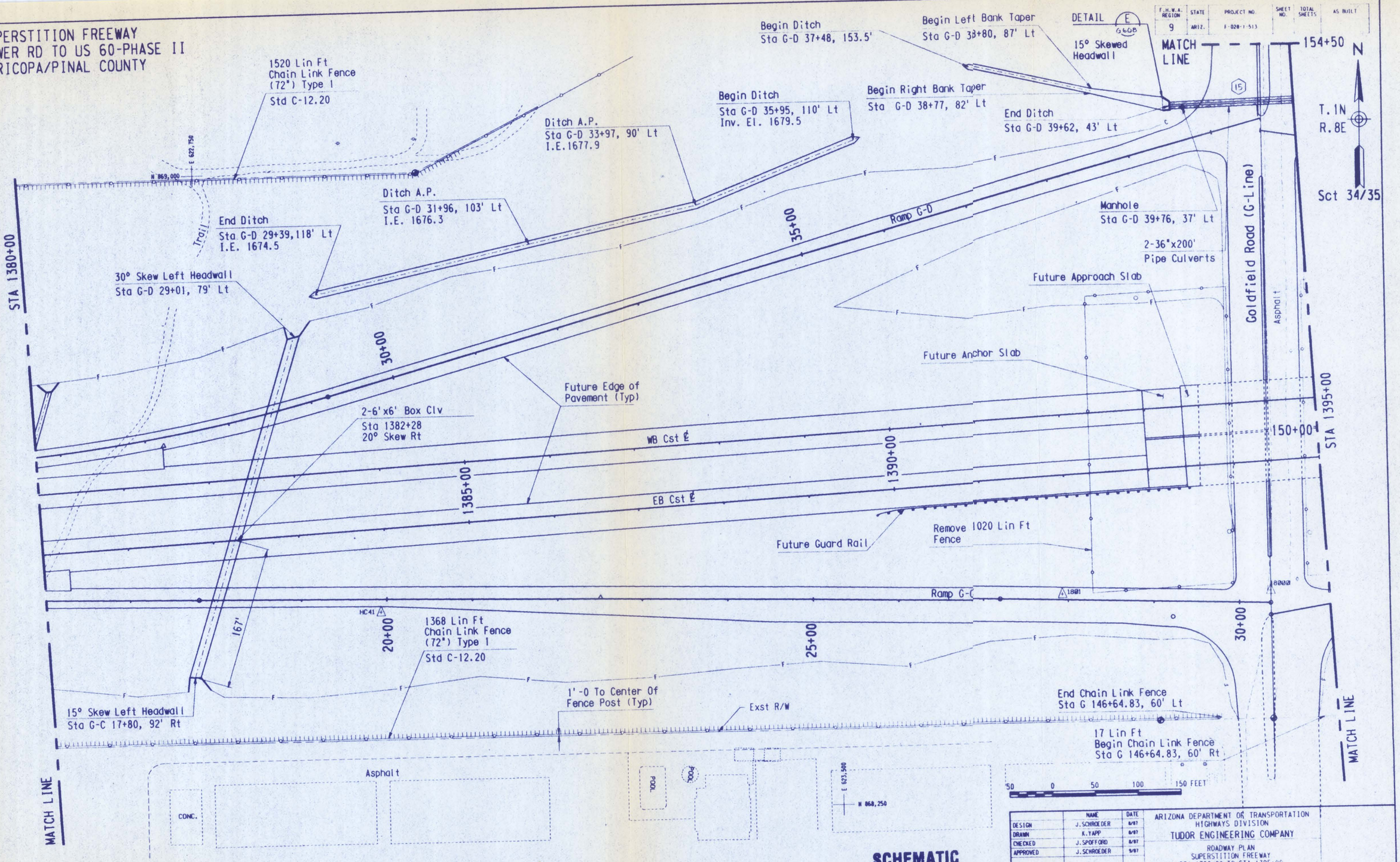
SHEET C639 OF C672

___ OF ___

PLOTTING DATE 23-SEP-1987 15:54 QS:(1315,100)1154C110.MOD
CADD CONTROL DATE 9-23-87 (315,100)1154C110.MOD
BAR UPDATED 9-23-87

SURVEY NO.	FINISHED PR	REVISIONS	LOCATION	DATE

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY



SCHEMATIC
NOT FOR CONSTRUCTION

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-020-1-513			

	NAME	DATE
DESIGN	J. SCHROEDER	8/87
DRAWN	K. YAPP	8/87
CHECKED	J. SPOFFORD	8/87
APPROVED	J. SCHROEDER	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY PLAN
SUPERSTITION FREEWAY
STA 1380+00 TO STA 1395+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET 641 OF 672

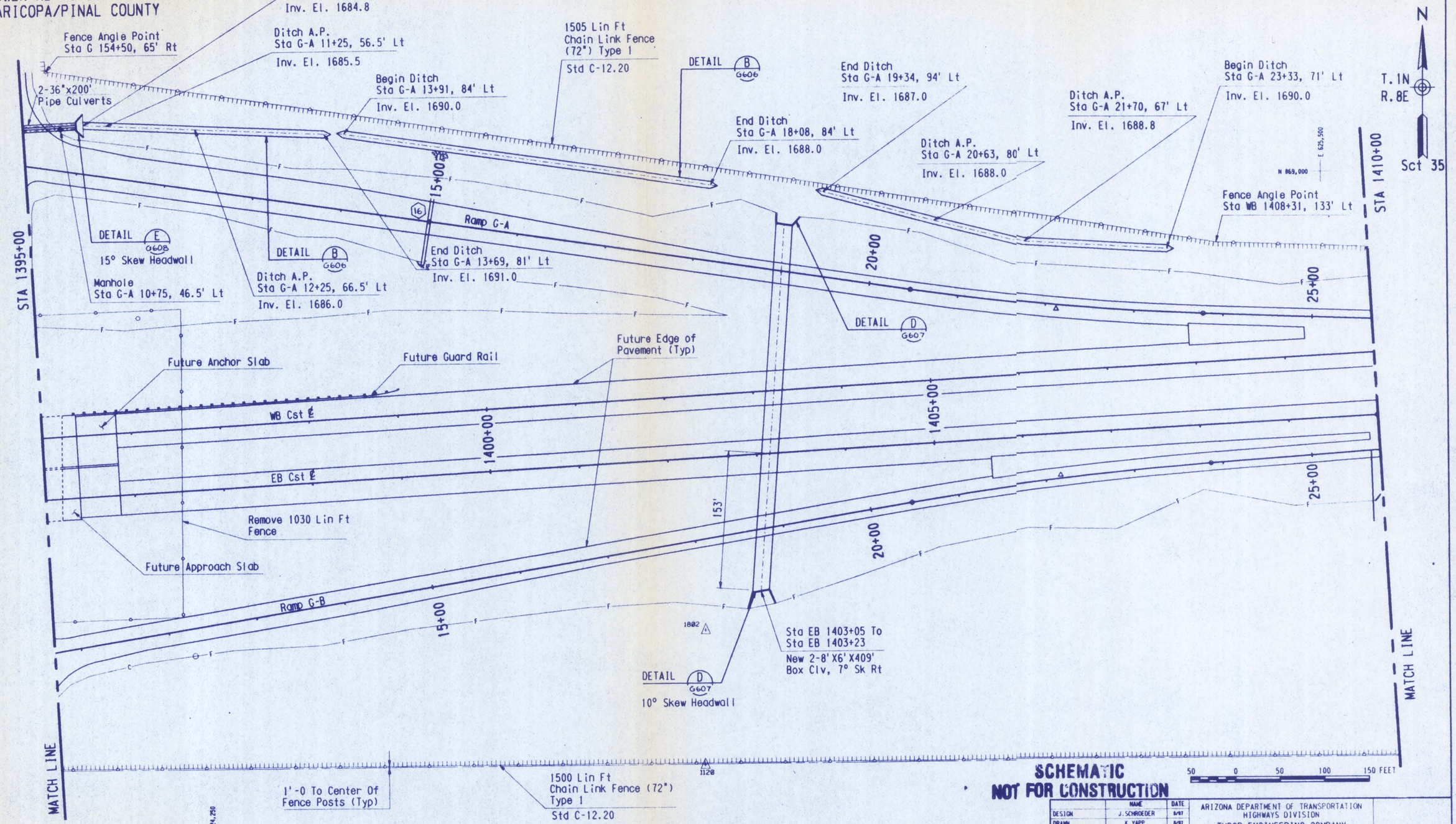
___ OF ___

PLOTTING DATE 23-SEP-1987 16:07 DS:(315,100)11540111.ROD
CADD CONTROL DATE 9-23-87 (315,100)11540111.ROD
DGND UPDATED 9-22-87

SURVEY NO.	FINISHED	REVISIONS	LOCATION	DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY



SCHEMATIC
NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	J. SCHROEDER	6/87
DRAWN	K. YAPP	6/87
CHECKED	J. SPOFFORD	6/87
APPROVED	J. SCHROEDER	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY PLAN
SUPERSTITION FREEWAY
STA 1395+00 TO STA 1410+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET 641 OF 672

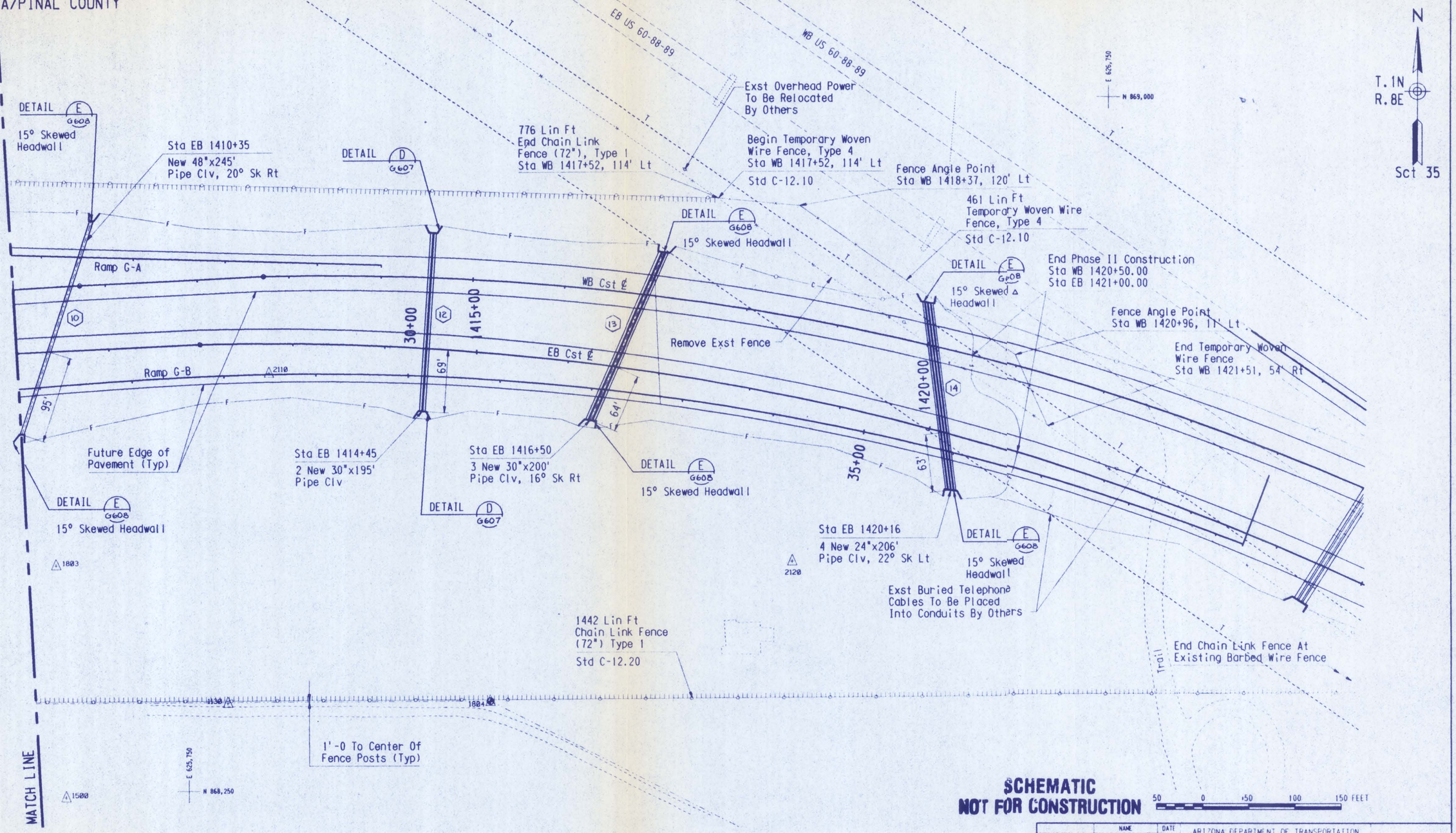
OF

PLOTTING DATE 23-SEP-1987 16:03 CADD CONTROL DATE 9-23-87
DGN:(1315,100)15KC112.RDD Bmark:GROUND UPDATED 9-22-87

SURVEY NO. | FINISHED? | REVISIONS | LOCATION | DATE

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			



SCHEMATIC
NOT FOR CONSTRUCTION

50 0 50 100 150 FEET

	NAME	DATE
DESIGN	J. SCHROEDER	8/87
DRAWN	K. YAPP	8/87
CHECKED	J. SPOFFORD	8/87
APPROVED	J. SCHROEDER	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY PLAN
SUPERSTITION FREEWAY
STA 1410+00 TO STA 1425+00

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

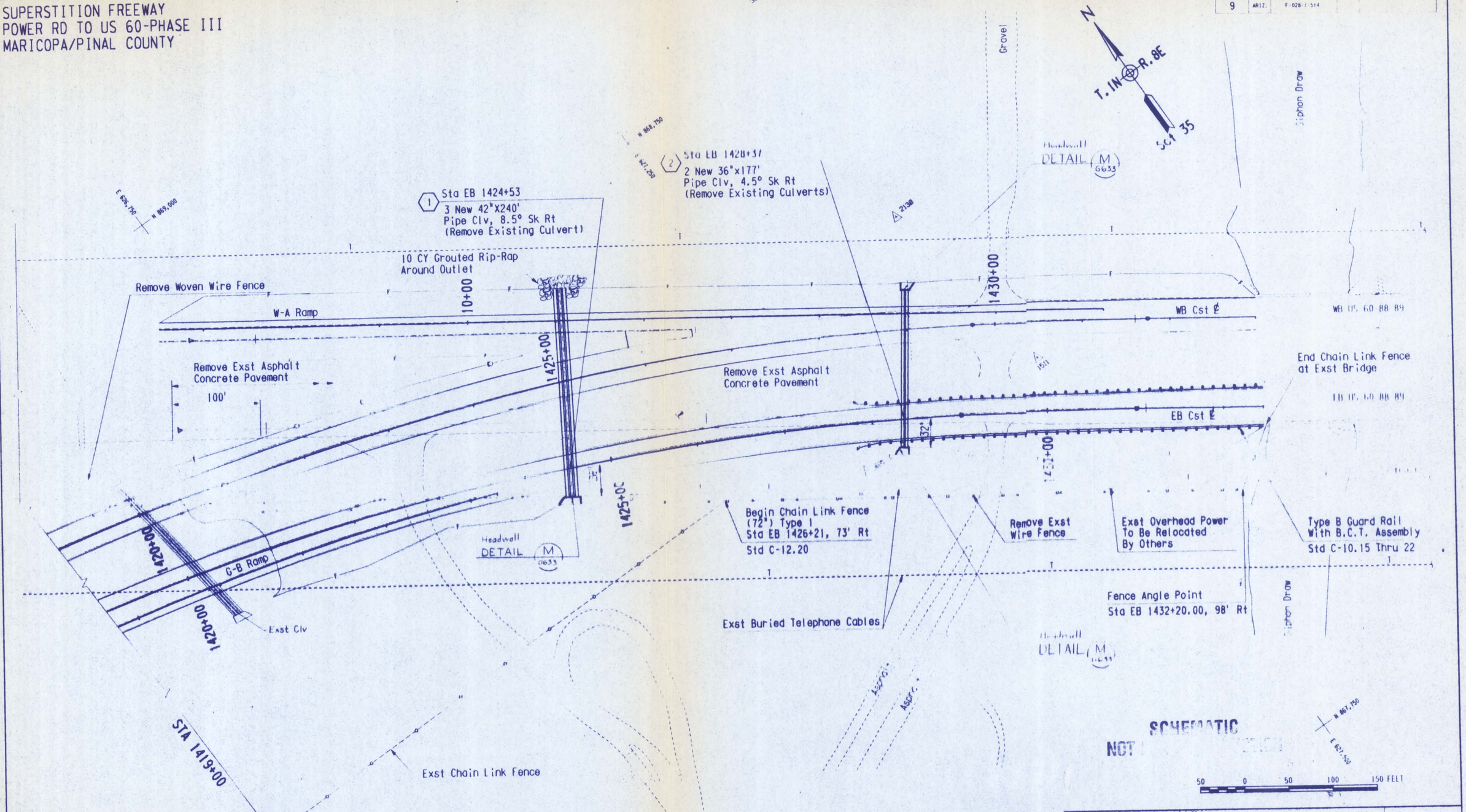
SHEET 652 OF 672

PLOTTING DATE 22-SEP-1987 13:46 DS11(315,100)115&113.RDD
CADD CONTROL DATE 9-22-87 (315,100)115&113.RDD
BAK=AROUND UPDATED 9-22-87

SURVEY NO.	FINISHED	REVISIONS	LOCATION	DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-514			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY



	NAME	DATE
DESIGN	J. SCHROEDER	9/87
DRAWN	K. YAPP	9/87
CHECKED	J. SPOFFORD	10/87
APPROVED	J. SCHROEDER	10/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY PLAN
SUPERSTITION FREEWAY
STA 1419+00 TO STA 1433+00

ROUTE: SR 360
MILEPOST: 16.39-27.13
LOCATION: POWER RD TO US 60
SHEET C675 OF C729

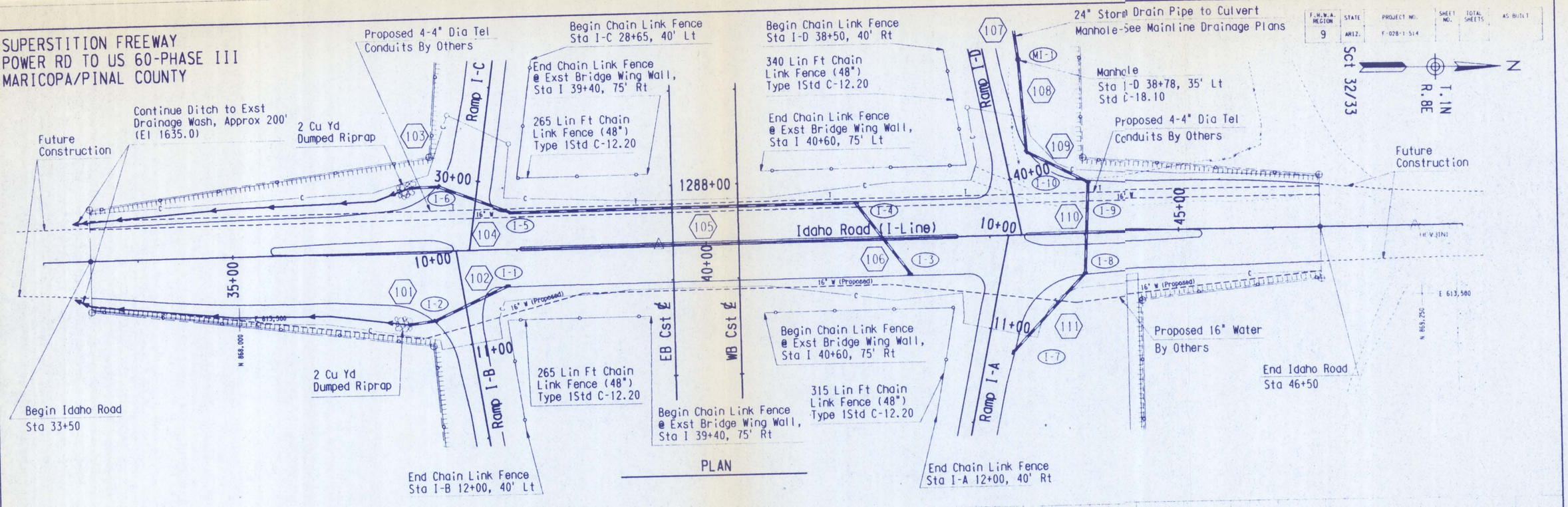
___ OF ___

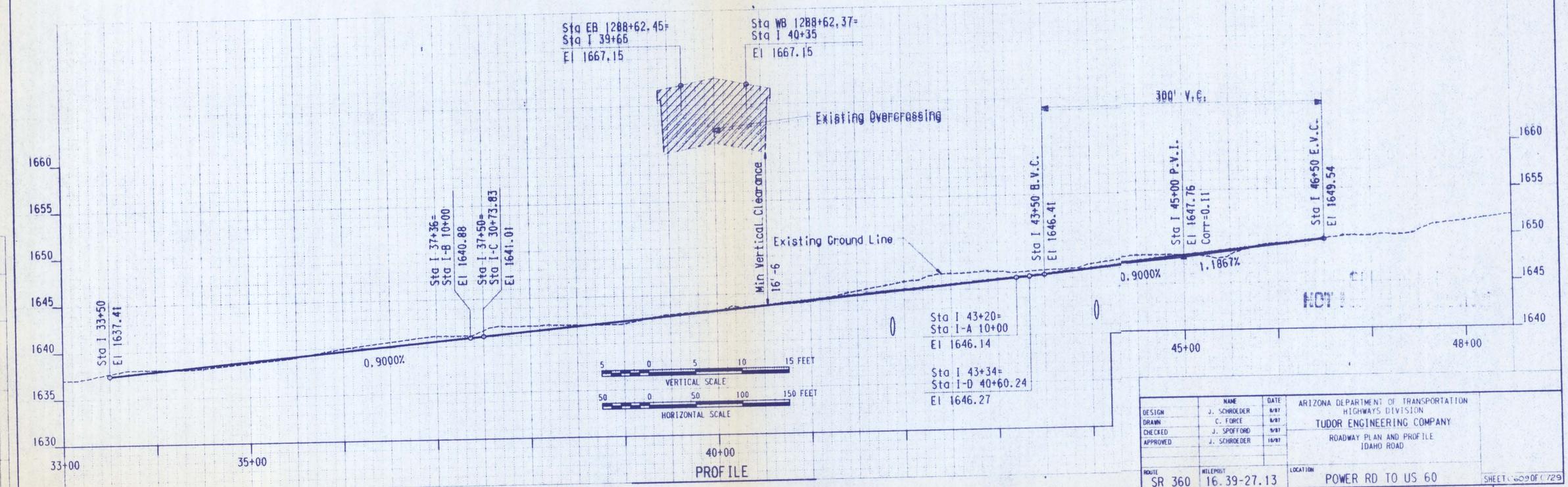
BACKGROUND UPDATED 10-27-87
CADD CONTROL DATE 10-27-87
[315,100]1154C714.RDD
PLOTTING DATE OCT-1987 12:41
05:15:55 on 54C714.RDD

SURVEY NO. | FINISHED | REVISIONS | DATE | DESIGN NO. | DATE

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-514			





	NAME	DATE
DESIGN	J. SCHROEDER	8/87
DRAWN	C. FORCE	8/87
CHECKED	J. SPOFFORD	9/87
APPROVED	J. SCHROEDER	10/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY
ROADWAY PLAN AND PROFILE
IDAHO ROAD

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET 609 OF 729

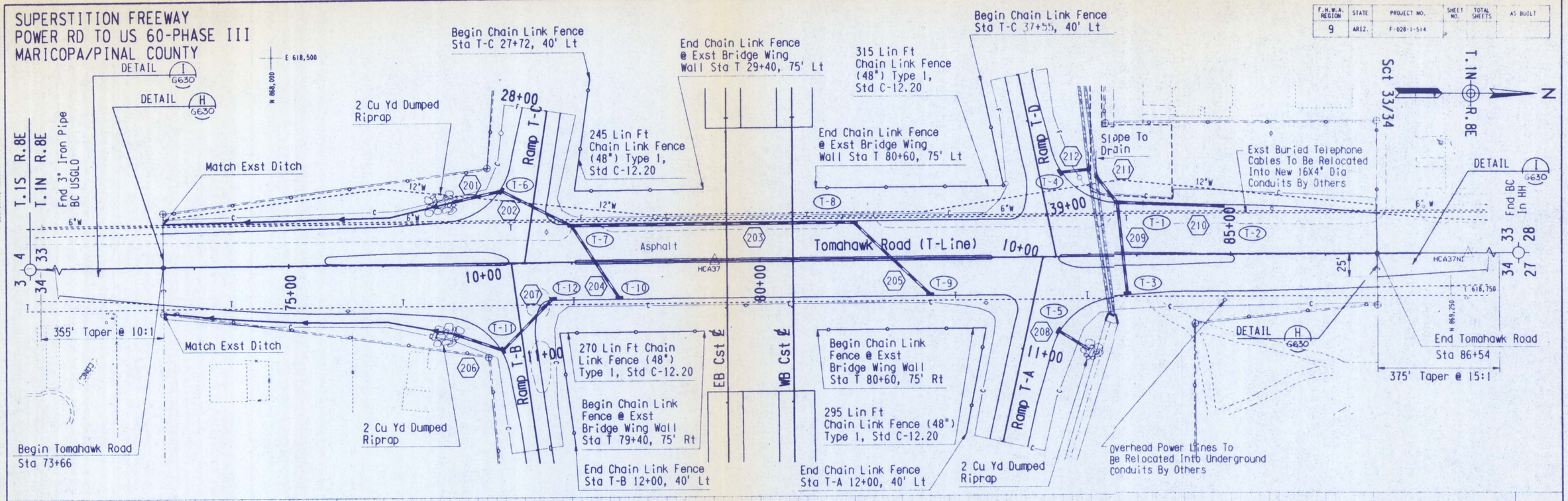
OF

BACKGROUND UP by KLY ON 8-24-87
PLOTTING DATE 16-OCT-1987 19:02 CAD CONTROL DATE 10-16-87
CS:1:315,1001115AC180.RGO (3:5,1001115AC180.RGO)

SURVEY NO. | FINISHED PLANS | REVISIONS | LOCATION | DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-514			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY



NOT [illegible]

	NAME	DATE
DESIGN	J. SCHROEDER	8/87
DRAWN	K. TAPP	8/87
CHECKED	J. SPOFFORD	10/87
APPROVED	J. SCHROEDER	10/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY PLAN AND PROFILE
TOMAHAWK ROAD

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET C614 OF C729

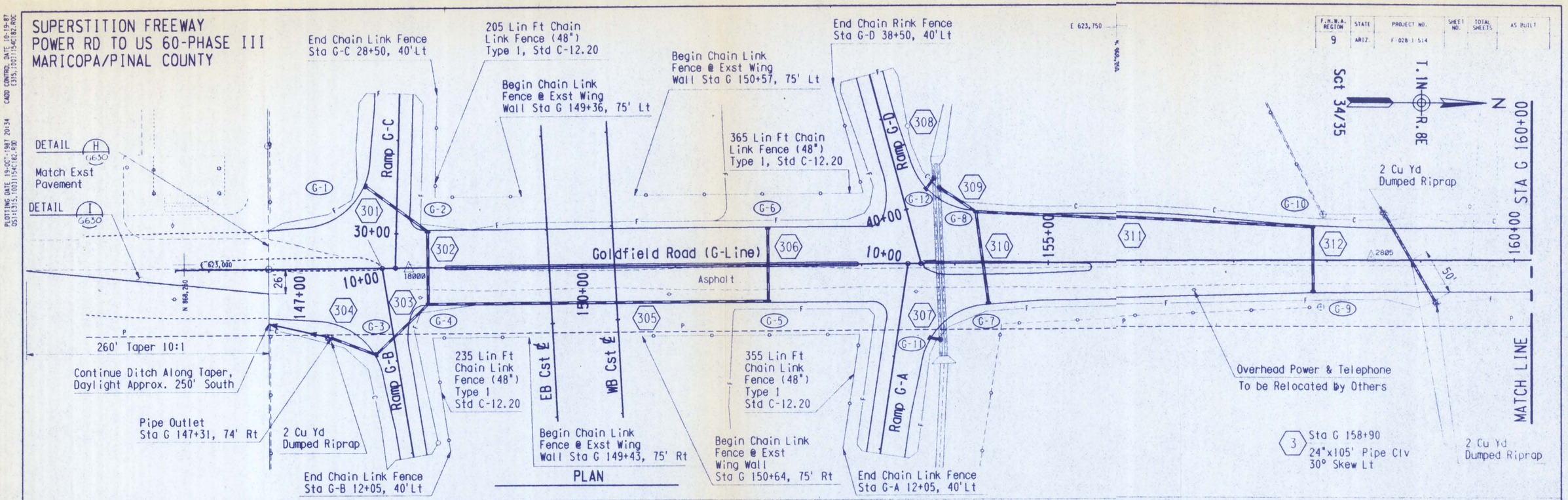
OF

PLOTTING DATE 12-OCT-1987 17:14 QS:(315,1003)154C181.ROD
CADD CONTROL DATE 10-12-87 (315,1003)154C181.ROD

SURVEY NO. | FINISHED | REVISIONS | LOCATION | DATE

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028 1 514			



NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	J. SCHROEDER	8/87
DRAWN	C. FORCE	8/87
CHECKED	J. SPOFFORD	9/87
APPROVED	J. SCHROEDER	10/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY
ROADWAY PLAN AND PROFILE
GOLDFIELD ROAD

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET 619 OF 729

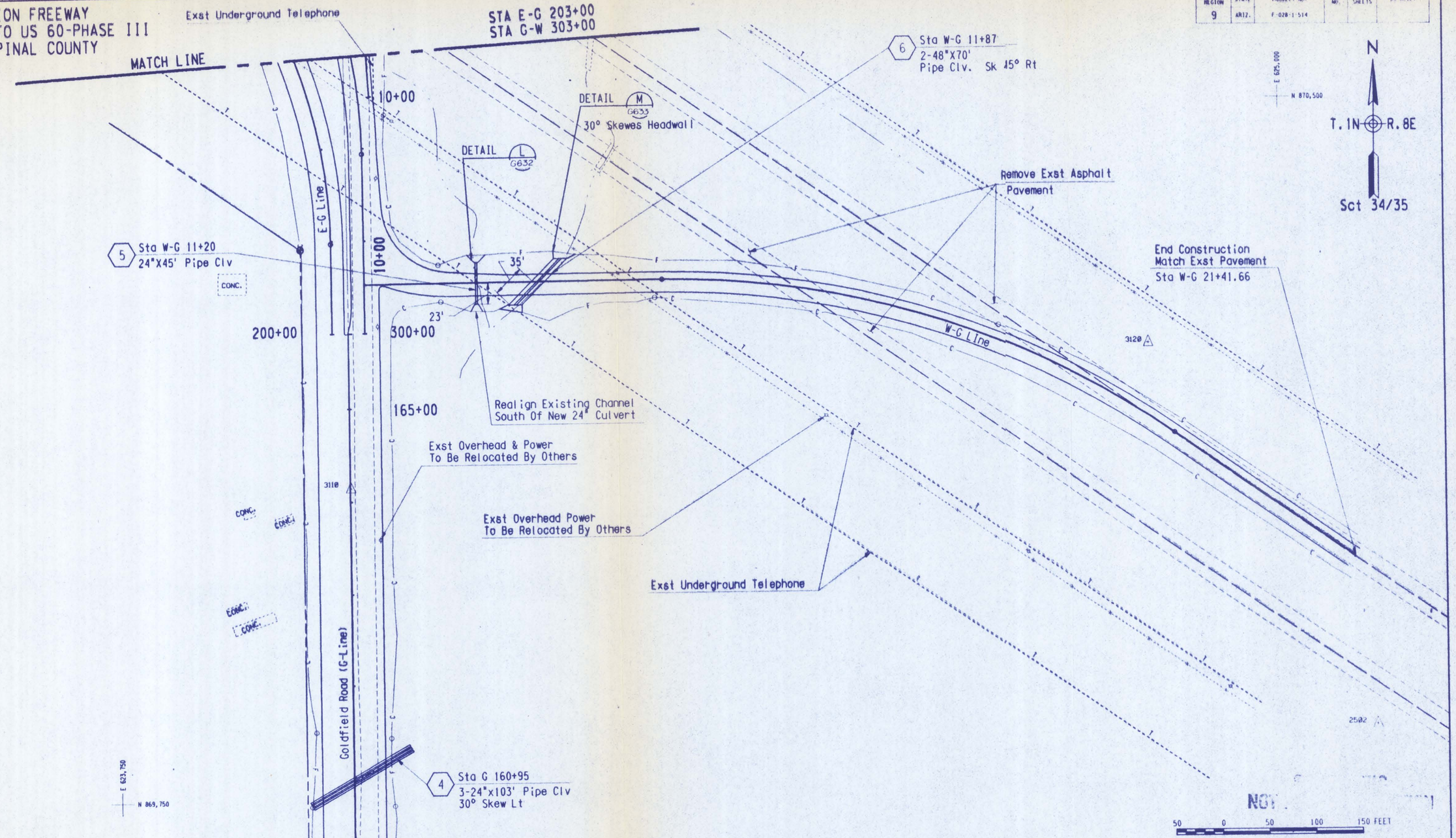
PLOTTING DATE 19-OCT-1987 20:34 CADD CONTROL DATE 10-19-87
DS1:E315.1001115\C182.ROD (315.1001115\C182.ROD

SURVEY NO. | FINTS | REVISIONS | LOCATION | DATE

OF

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-514			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY



	NAME	DATE
DESIGN	J. SCHROEDER	9/87
DRAWN	K. YAPP	9/87
CHECKED	J. SPOFFORD	10/87
APPROVED	J. SCHROEDER	10/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

ROADWAY PLAN
GOLDFIELD RD TO US 60
SHEET 1

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET 2623 OF 2729

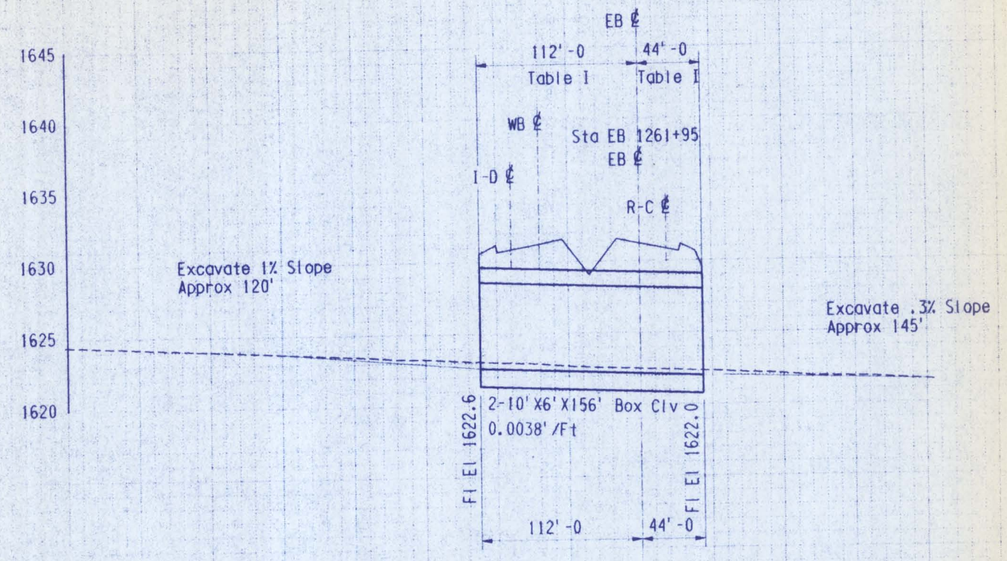
OF

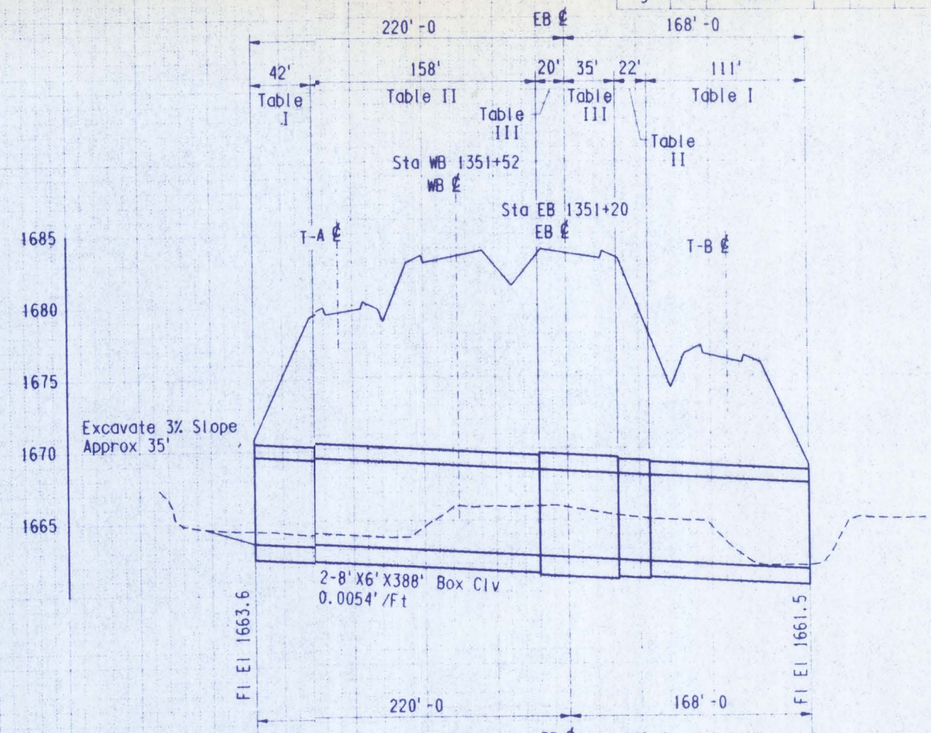
PLOTTING DATE 19-OCT-1987 14:06
DS1:1315,100)115ACT15.RDD
CADD CONTROL DATE 10-9-87
(315,100)115ACT15.RDD
GROUND UPDATED 7-24-87

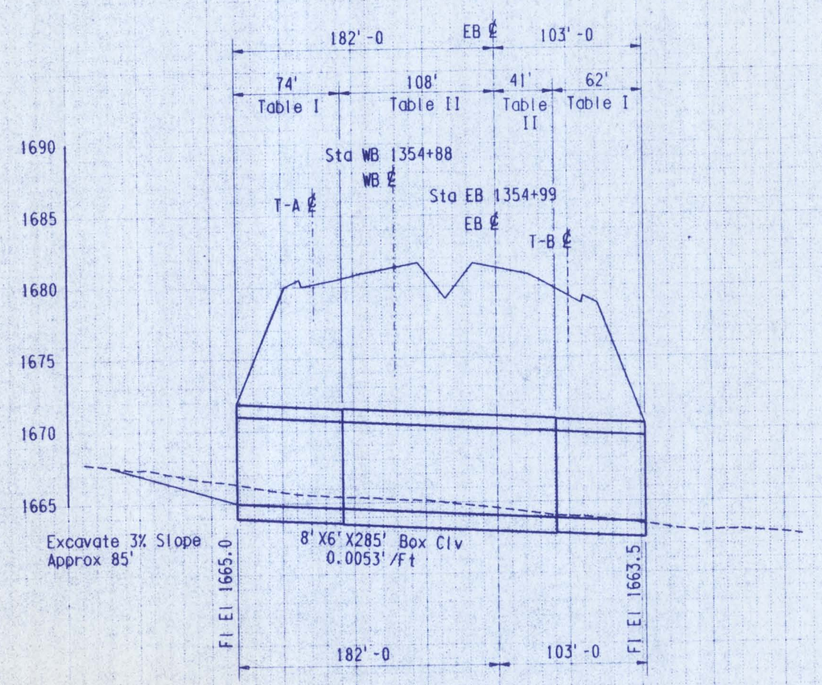
SURVEY NO.	FINI	ANS	REVISIONS	LOCATION	DATE

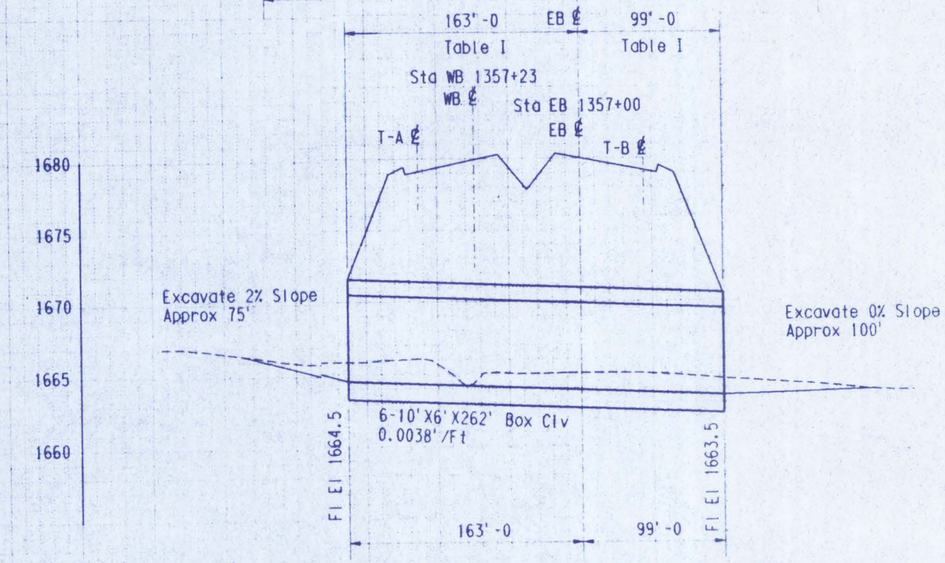
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY









5 0 5 10 15 FEET
VERTICAL SCALE

50 0 50 100 150 FEET
HORIZONTAL SCALE

	NAME	DATE
DESIGN	J. SPOFFORD	8/87
DRAWN	C. FORCE	8/87
CHECKED	B. BRAATEN	8/87
APPROVED	P. PATERSON	8/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

BOX CULVERT PROFILES
SUPERSTITION FREEWAY
SHEET 1

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET OF

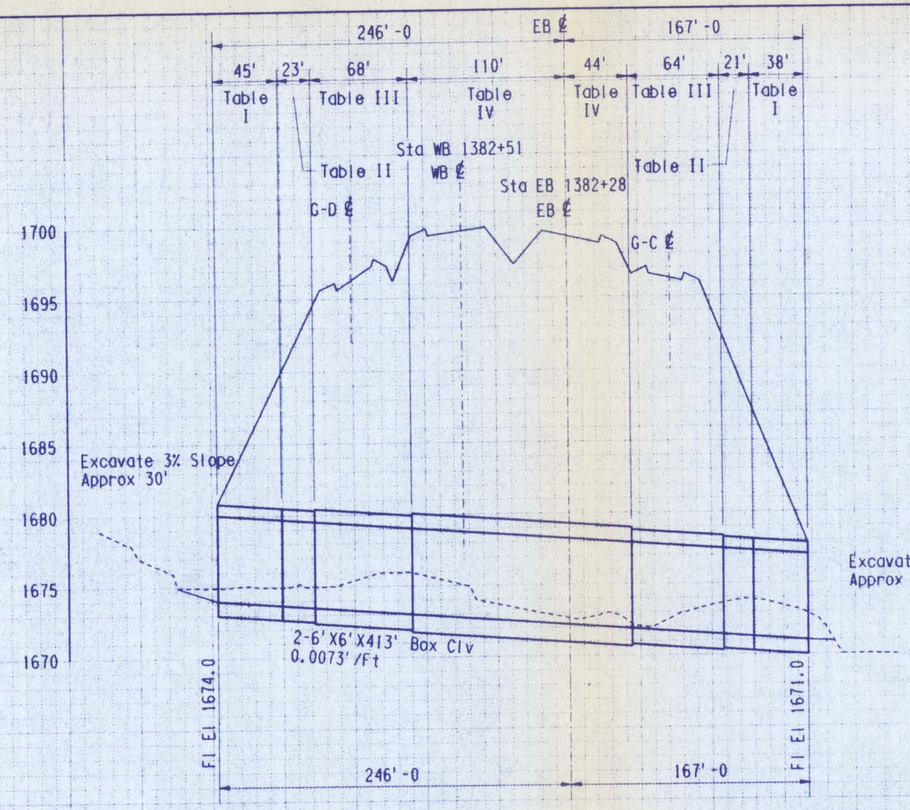
OF

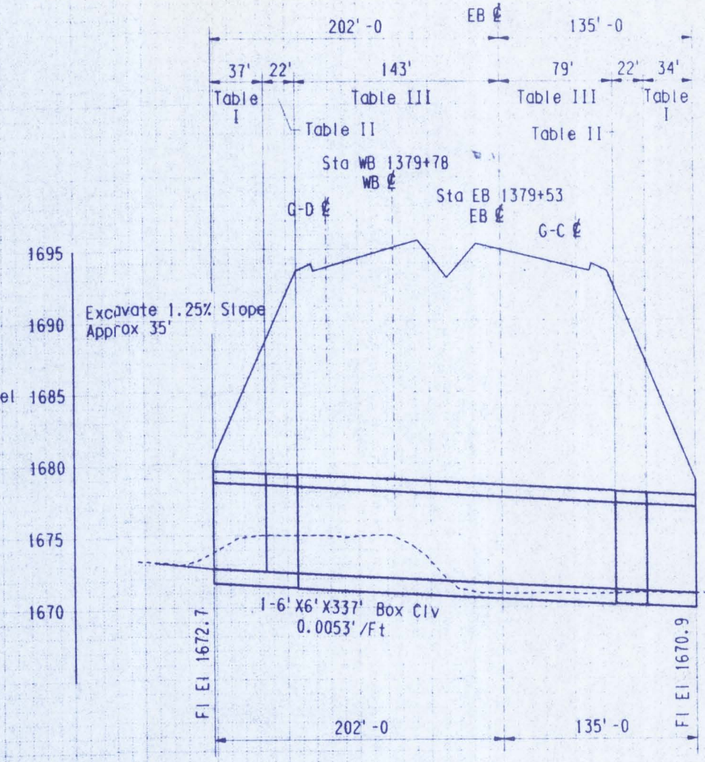
PLOTTING DATE 30-OCT-1987 07:51 CADD CONTROL DATE 10-30-87
CS:(315,100)(15KC644.R00 (315,100)(15KC644.R00

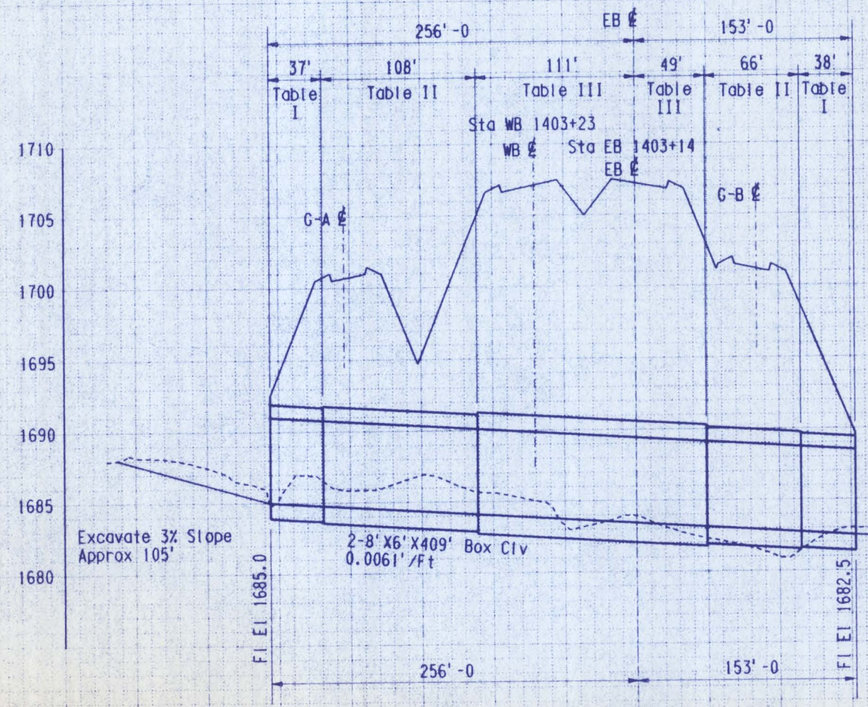
SURVEY NO.	FINISH	REVISIONS	LOCATION	DATE

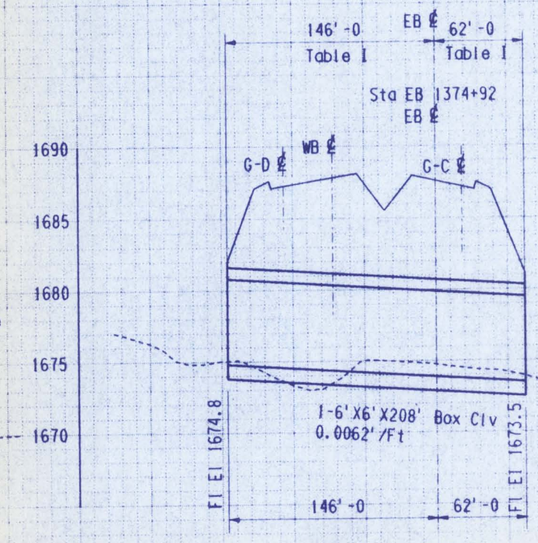
SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028 -513			









5 0 5 10 15 FEET
VERTICAL SCALE:
50 0 50 100 150 FEET
HORIZONTAL SCALE:

	NAME	DATE
DESIGN	J. SPOFFORD	8/87
DRAWN	C. FORCE	8/87
CHECKED	B. BRAATEN	8/87
APPROVED	P. PATERSON	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY
BOX CULVERT PROFILES
SUPERSTITION FREEWAY
SHEET 2

ROUTE	MILEPOST	LOCATION	SHEET	OF
SR 360	16.39-27.13	POWER RD TO US 60		

OF

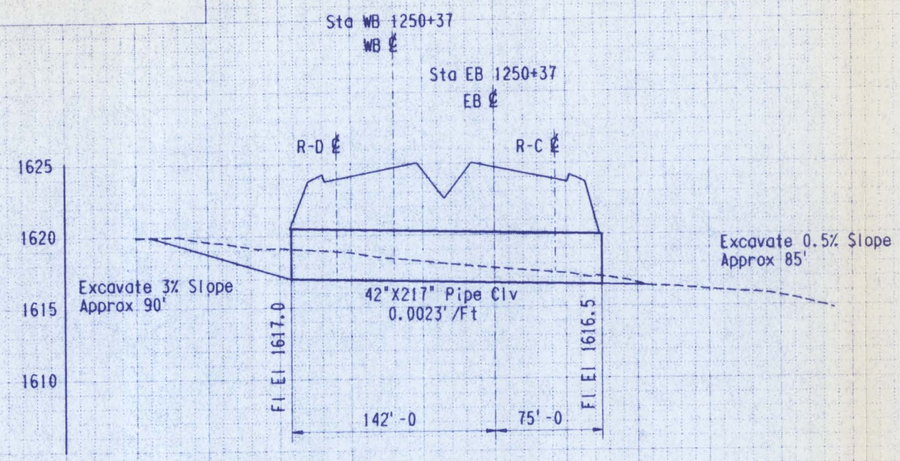
PLOTTING DATE 30-OCT-1987 13:04 CADD CONTROL DATE 10-30-87
DGN:[315,10011]54G643.R00 [315,10011]54G643.R00

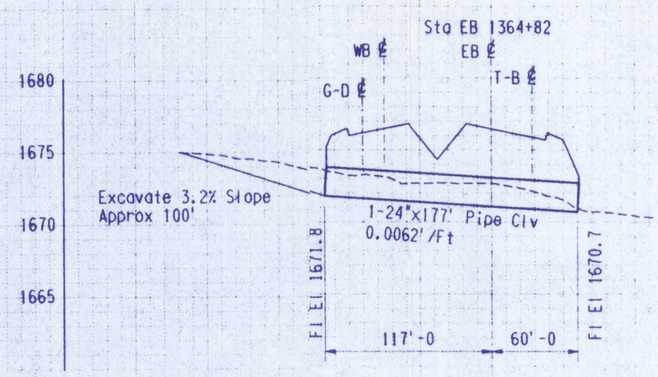
SURVEY NO.	FINISHED	REVISIONS	LOCATION	DATE

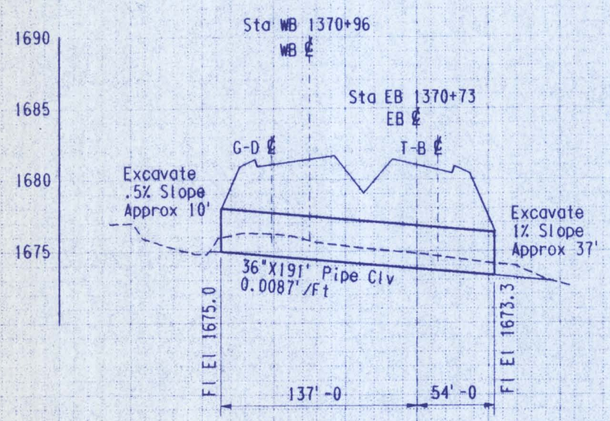
PLOTTING DATE 18-SEP-1987 08:11 CADD CONTROL DATE 9-18-87
DSI:(315,100)115ACG41.RDD (315,100)115ACG41.RDD

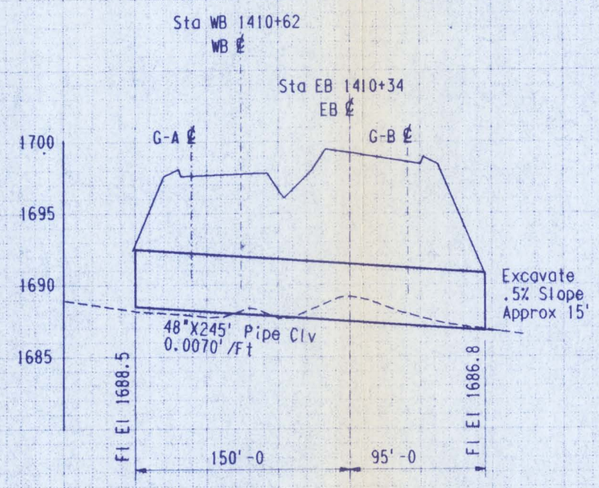
SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY

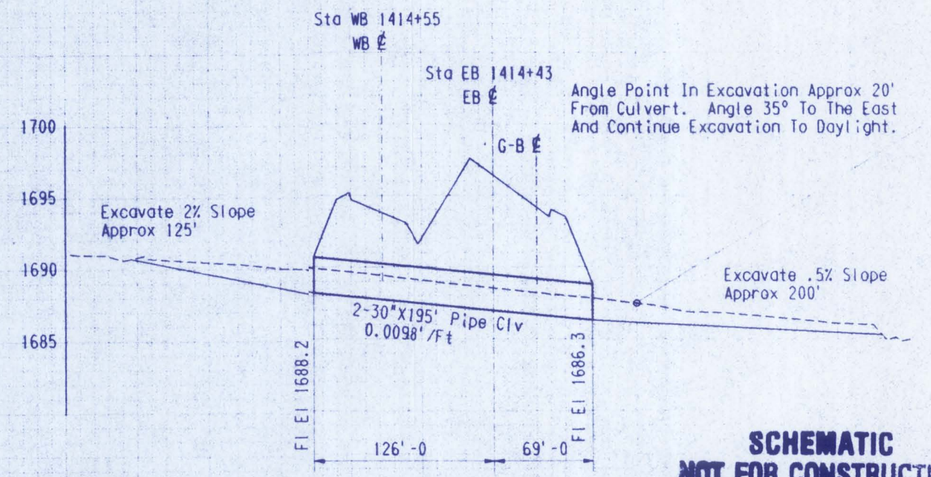
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			











SCHEMATIC
NOT FOR CONSTRUCTION

5 0 5 10 15 FEET
VERTICAL SCALE

50 0 50 100 150 FEET
HORIZONTAL SCALE

	NAME	DATE
DESIGN	J. SPOFFORD	8/87
DRAWN	C. FORCE	8/87
CHECKED	B. BRAATEN	8/87
APPROVED	P. PATERSON	8/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

PIPE CULVERT PROFILES
SUPERSTITION FREEWAY
SHEET 1

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET C669 OF C672

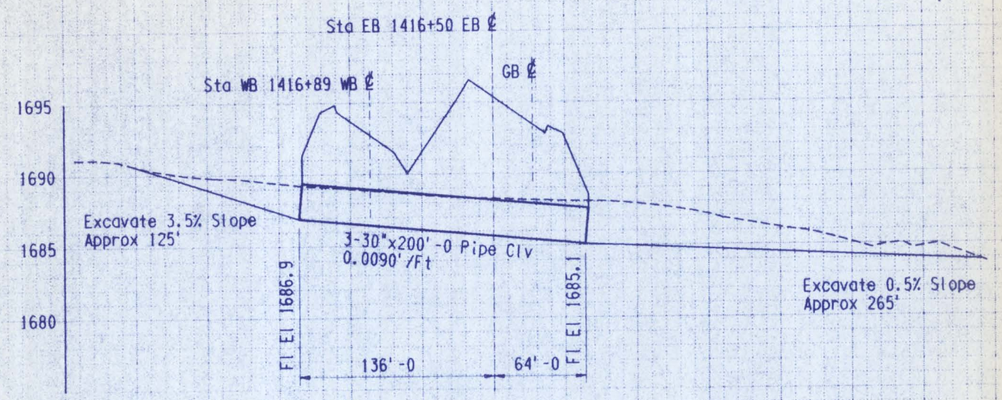
___ OF ___

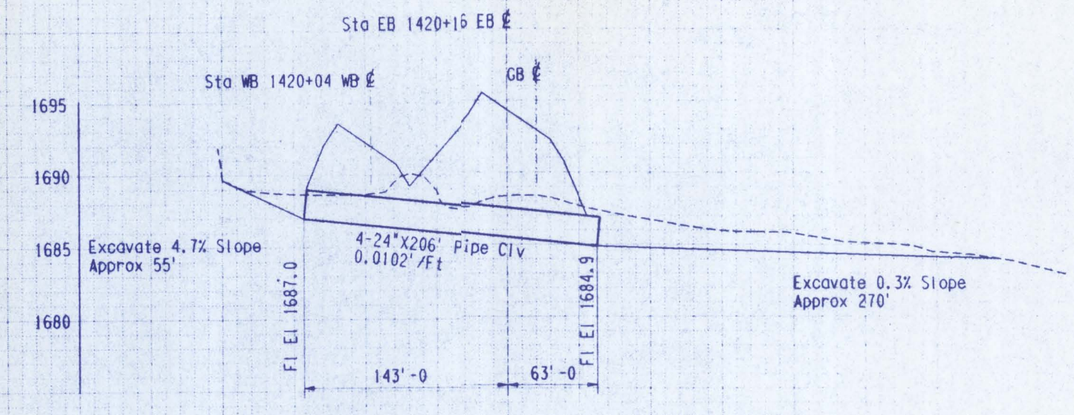
SURVEY NO.	FINISHED	REVISIONS	LOCATION	DATE

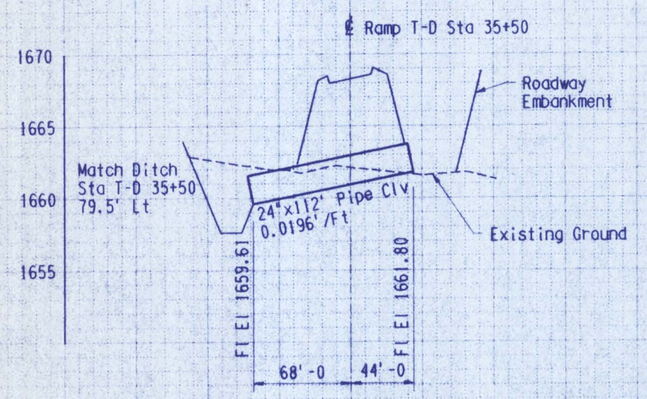
PLOTTING DATE 17-SEP-1987 11:36 CADD CONTROL DATE 9-17-87
QS1(315,100)1540640.RDD (315,100)1540640.RDD

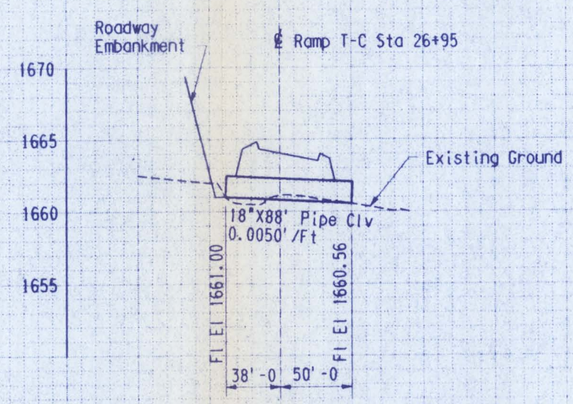
SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY

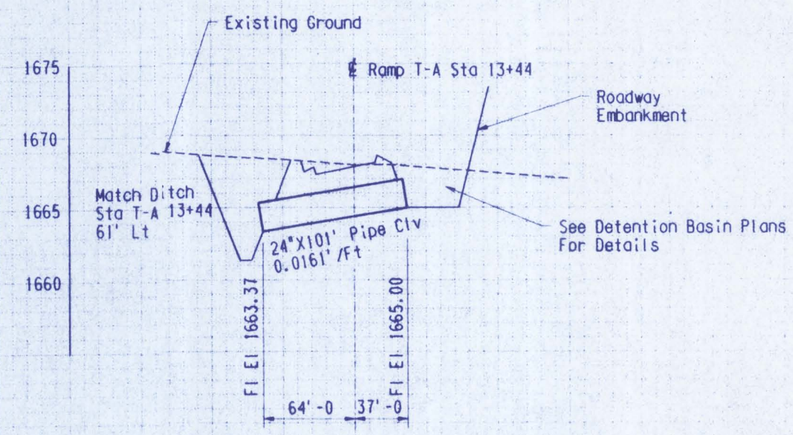
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F 028-1 513			











SCHEMATIC
NOT FOR CONSTRUCTION

5 0 5 10 15 FEET
VERTICAL SCALE
50 0 50 100 150 FEET
HORIZONTAL SCALE

	NAME	DATE
DESIGN	J. SPOFFORD	8/87
DRAWN	C. FORCE	8/87
CHECKED	B. BRAATEN	8/87
APPROVED	J. PATERSON	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY
PIPE CULVERT PROFILES
SUPERSTITION FREEWAY
SHEET 2

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

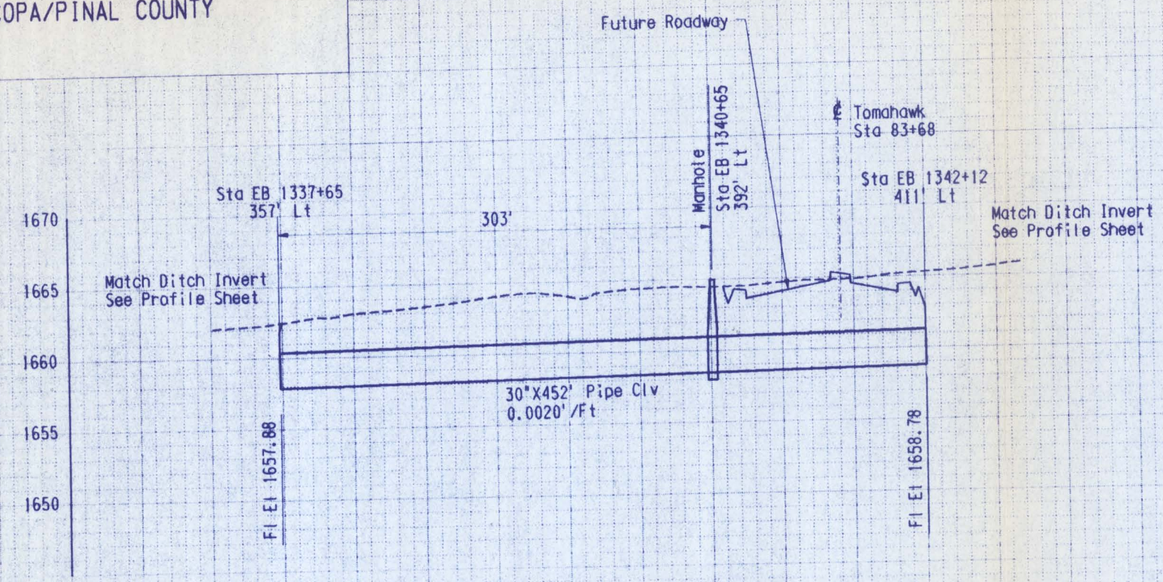
SHEET C670 OF C672

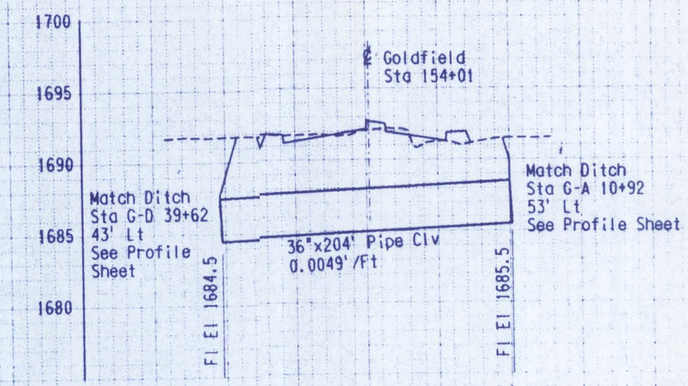
___ OF ___

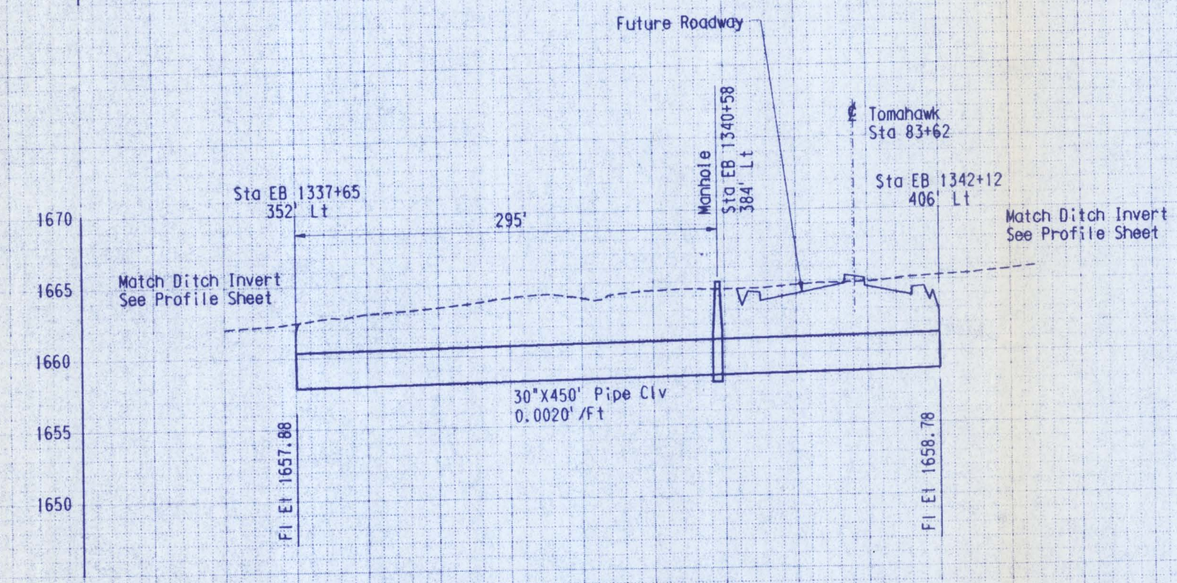
SURVEY NO.	FINISHED	REVISIONS	LOCATION	DATE

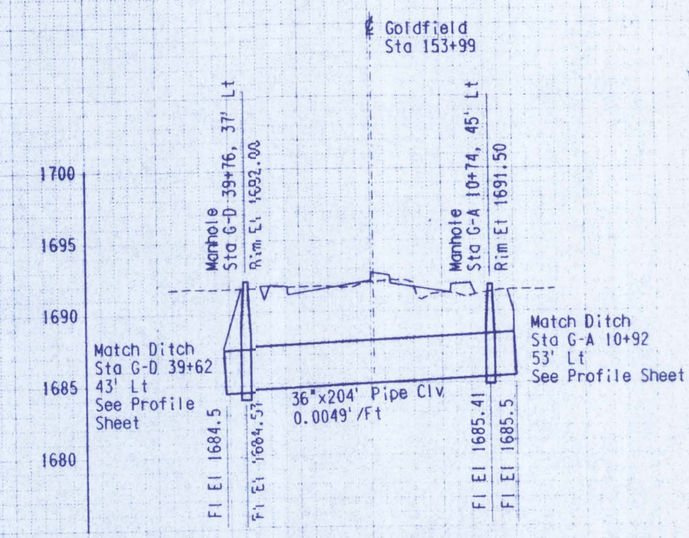
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY









5 0 5 10 15 FEET
VERTICAL SCALE

50 0 50 100 150 FEET
HORIZONTAL SCALE

SCHEMATIC
NOT FOR CONSTRUCTION

	NAME	DATE
DESIGN	J. SPOFFORD	8/87
DRAWN	C. FORCE	8/87
CHECKED	B. BRAATEN	8/87
APPROVED	P. PATERSON	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

PIPE CULVERT PROFILES
SUPERSTITION FREEWAY
SHEET 3

ROUTE: SR 360
MILEPOST: 16.39-27.13
LOCATION: POWER RD TO US 60

SHEET C671 OF C672

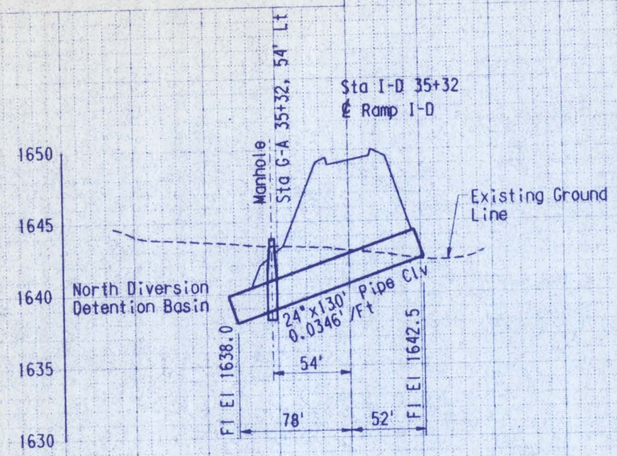
___ OF ___

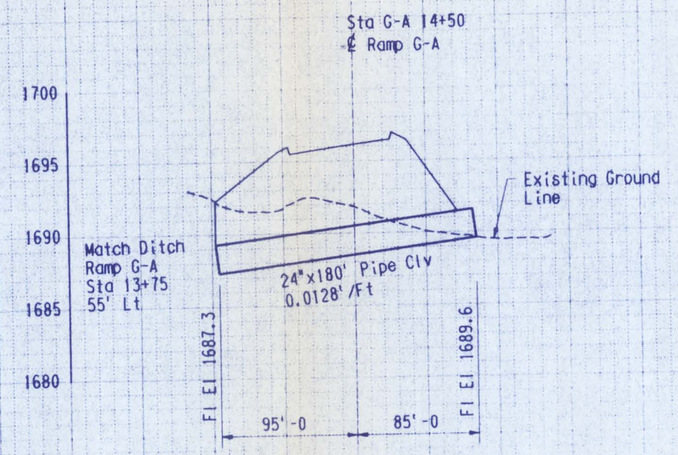
PLOTTING DATE 1-SEP-1987 10:52
DSI:(315,100)1154C645.RDD
CADD CONTROL DATE 9-1-87
(315,100)1154C645.RDD

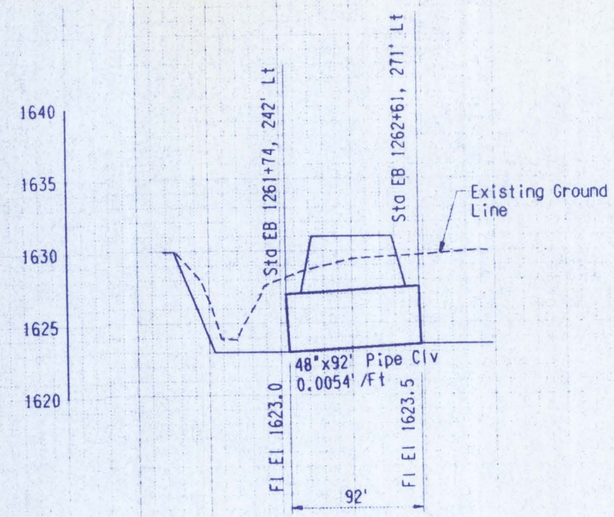
SURVEY NO.	FINISHED	REVISIONS	LOCATION	DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-513			

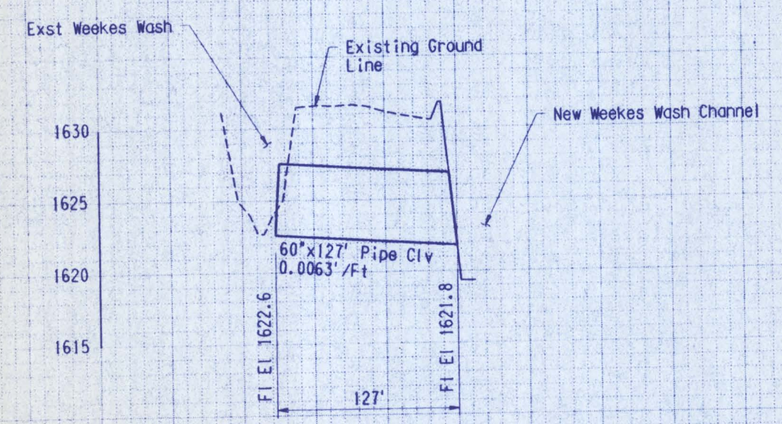
SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE II
MARICOPA/PINAL COUNTY



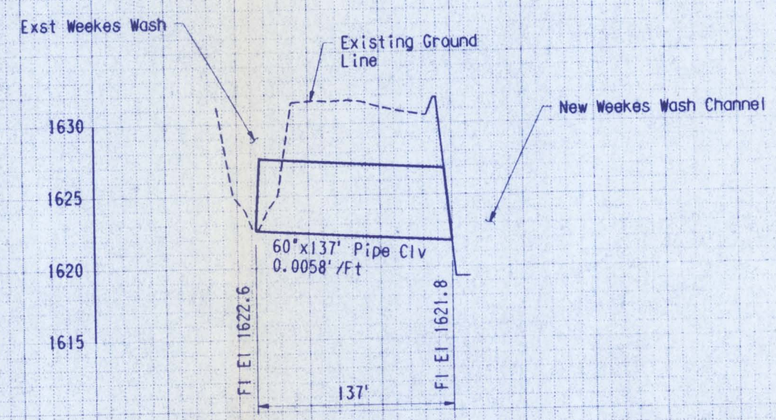




NORTH DIVERSION DETENTION
BASIN OUTLET



STA W 75+75



STA W 75+83

SCHEMATIC
NOT FOR CONSTRUCTION

5 0 5 10 15 FEET
VERTICAL SCALE
50 0 50 100 150 FEET
HORIZONTAL SCALE

	NAME	DATE
DESIGN	J. SPOFFORD	8/87
DRAWN	C. FORCE	8/87
CHECKED	B. BRAATEN	8/87
APPROVED	P. PATERSON	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY
PIPE CULVERT PROFILES
SUPERSTITION FREEWAY
SHEET 4

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET C672 OF C672

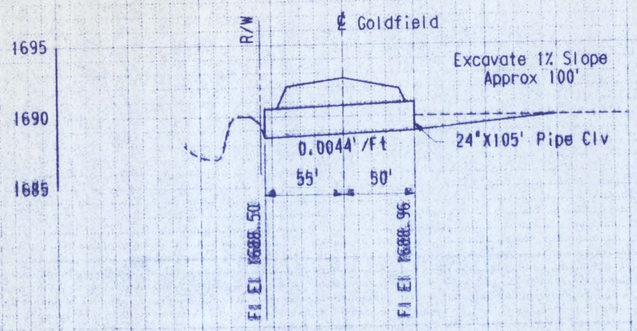
___ OF ___

PLOTTING DATE 23-SEP-1987 10:58 05:11:35,100:1154C654.ROD
CONTROL DATE 9-23-87 [315,100:1154C654.ROD]

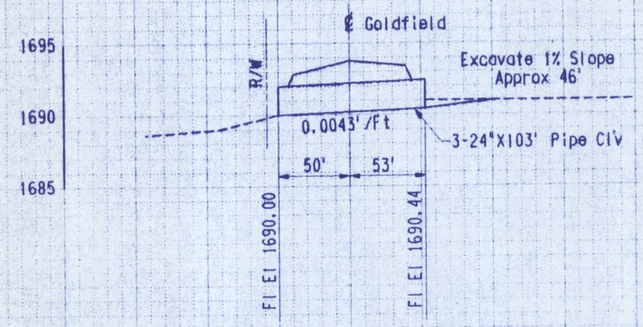
SURVEY NO.	FINISHED /	REVISIONS	LOCATION	DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-514			

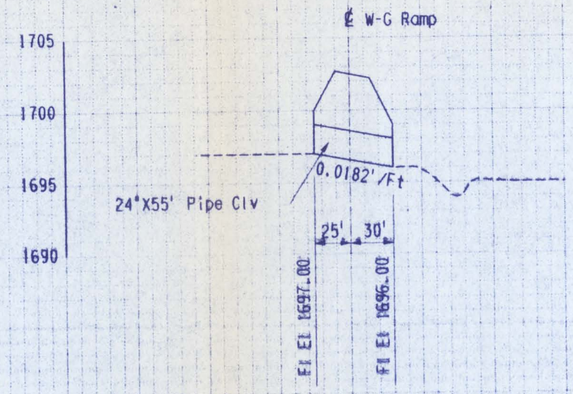
SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY



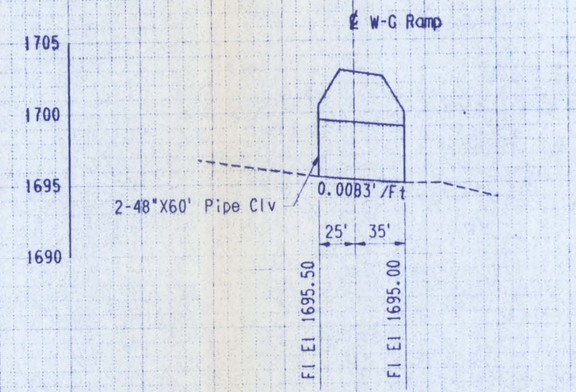
STA G 158+90



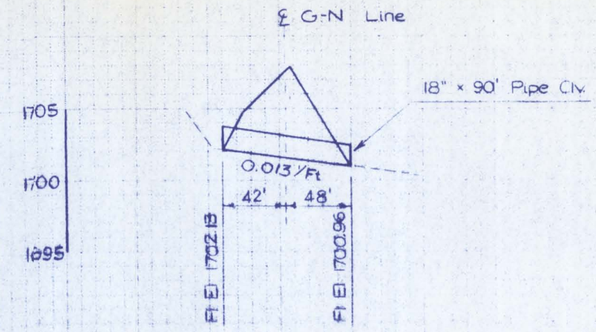
STA G 160+95



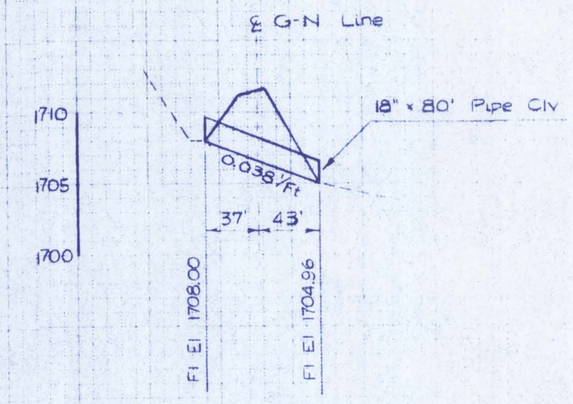
STA W-G 11+20



STA W-G 11+87



STA G-N 10+30



STA G-N 11+67

NOT FOR CONSTRUCTION

5 0 5 10 15 FEET
VERTICAL SCALE

50 0 50 100 150 FEET
HORIZONTAL SCALE

	NAME	DATE
DESIGN	J. SPOFFORD	8/87
DRAWN	K. YAPP	8/87
CHECKED	B. BRAATEN	8/87
APPROVED	J. SCHROEDER	9/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY
PIPE CULVERT PROFILES
SUPERSTITION FREEWAY
SHEET 1

ROUTE: SR 360
MILEPOST: 16.39-27.13
LOCATION: POWER RD TO US 60

SHEET NO. OF 729

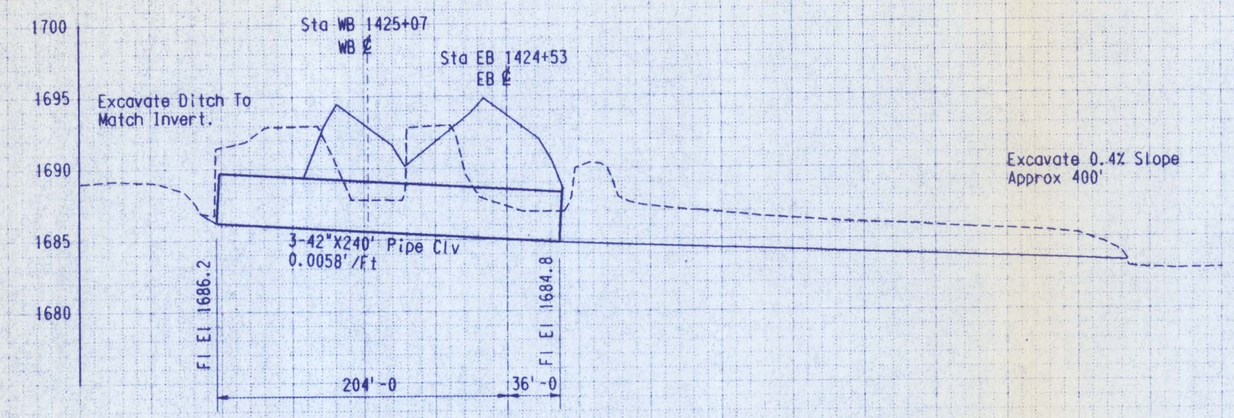
___ OF ___

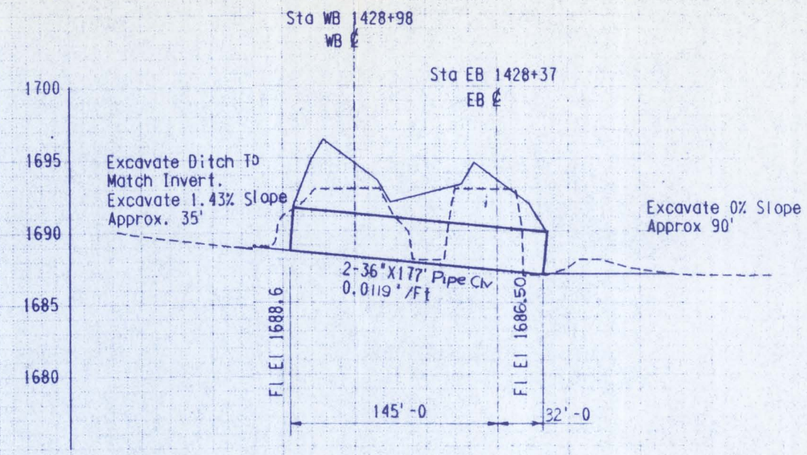
PLOTTING DATE 21-OCT-1987 16:15 CADD CONTROL DATE 10-21-87
USER:EMS,MOD1195465S.ROD (315,1MOD1195465S.ROD

SURVEY NO.	FINISHED PLANS	REVISIONS	LOCATION	DATE

SUPERSTITION FREEWAY
POWER RD TO US 60-PHASE III
MARICOPA/PINAL COUNTY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	F-028-1-514			





NOT FOR CONSTRUCTION

5 0 5 10 15 FEET
VERTICAL SCALE

50 0 50 100 150 FEET
HORIZONTAL SCALE

	NAME	DATE
DESIGN	J. SPOFFORD	8/87
DRAWN	C. FORCE	8/87
CHECKED	B. BRAATEN	8/87
APPROVED	J. SCHROEDER	10/87

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TUDOR ENGINEERING COMPANY

PIPE CULVERT PROFILES
SUPERSTITION FREEWAY
SHEET 2

ROUTE	MILEPOST	LOCATION
SR 360	16.39-27.13	POWER RD TO US 60

SHEET 108 OF 729

___ OF ___

CADD CONTROL DATE 10-15-87
1:15,1:00:15:42:42.RDD

PLOTTING DATE 15-OCT-1987 14:16
DS1:1:15,1:00:15:42:42.RDD

SURVEY NO.	FINISHED PLANS	REVISIONS	LOCATION	DATE

IRONWOOD TO IDAHO

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY. (SR 360)
Location IDAHO I-C RAMP
Project No. _____

DESIGN DATA
Frequency 10 years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = 8.0′ n ≐ 0.016
Curb Height = 6″

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
20+27.71	25+50	522.3	28.2	0.338	.95	10	4.4	1.41	—	1.41	0.0137	0.02	3125	0.16	8.0
					.95										
25+50.00	28+50.00	300.0	43.3	0.298	.95	10	4.4	1.25	0.31	1.56	0.0188	0.02	3125	0.16	8.0
					.95										
28+50.00	30+10.00	160.0	44.0	0.162	.95	10	4.4	0.68	0.46	1.14	0.0111	0.02	3125	0.16	8.0
					.95										
					.95										

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
25+50.00	LW-1.2	0.16	1.1	0.31
28+50.00	LW-1.2	0.16	1.1	0.46
30+10.00	LW-1.2 w/open curb	0.16	1.10	0.04

Inlet Type: C-4.01 Single
Double

C-4.02 Single
Double

ASSUME Qc TAKEN BY CURB INLET

Computed by: LWD 6/16/87 Checked by: BCB Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY. (SR 360)
Location IDAHO I-10 RAMP
Project No. _____

DESIGN DATA
Frequency 10 years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = 8.0' n = 0.016
Curb Height = 6"

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
30+77.77	35+50.00	472.2	29.8	0.323	.95	10	4.4	1.35	—	1.35	0.0090	0.02	3125	0.16	8.0
					.95										
35+50.00	38+50.00	300.0	32.0	0.220	.95	10	4.4	0.92	0.25	~~1.17~~	~~0.0079~~	~~0.02~~	~~3125~~	~~0.16~~	~~8.0~~ Remove
					.95										
38+50.00	39+75.00	125.0	29' TO 38'	0.090	.95	10	4.4	0.38	0.07	1.30	0.0063	0.02	3125	0.25	8.8 *
					.95										
					.95										

9-P

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
35+50.00	LW-1.2	0.16	1.35	
VOID 38+50.00	LW-1.2	0.16		
39+75.00	LW-1.2 w/ open curb	0.25	1.30	-

Q_{MAX} OF GRATE = 1.30 cfs

Computed by: [illegible] 6/16/87 Checked by: BCB Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: SUPERSTITION FRWY
Location: IDAHO ROAD (NORTH)
Project No.:

DESIGN DATA
Frequency: 10 years
P_6= in. P_{24}= in. P_1= in.
T_{all} = 8' n = 0.016
Curb Height = 7"

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
44+00	46+50(Rt)	250'	37' TO 43'	0.230	.95	10	4.4	0.96	-	0.96	0.0090	0.02	3125	0.148	7.4
					.95										
44+05	46+50(Lt)	250'	45' TO 55'	0.287	.95	10	4.4	1.20	-	1.20	0.0090	0.02	3125	0.155	7.75
					.95										
42+15	44+00(Rt)	185'	43' TO 40'	0.265	.95	10	4.4	1.11	-	1.11	0.0090	0.02	3125	0.16	8.0
					.95										
41+60	44+05(Lt)	245'	43' TO 40'	0.301	.95	10	4.4	1.26	-	1.26	0.0090	0.02	3125	0.16	8.0

9-P

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$	
44+00 (Rt)	LW-1.2'/CURB INLET	0.148	0.96		Q_{MAX} OF GRATE = 0.98 cfs
44+05 (Lt)	LW-1.2'/CURB INLET	0.155	1.05	0.15	ASSUME Q_c TAKEN BY CURB INLET
42+15 (Rt)	LW-1.2'/CURB INLET	0.16	1.10	0.01	ASSUME Q_c TAKEN BY CURB INLET
41+60 (Lt)	LW-1.2'/CURB INLET	0.16	1.10	0.16	ASSUME Q_c TAKEN BY CURB INLET

Inlet Type: C-4.01 Single
Double
C-4.02 Single
Double

Computed by: JS 7/28/87 Checked by: BCB Date:

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: SUPERSTITION FRWY
Location: IDAHO RD. (SOUTH)
Project No.:

DESIGN DATA
Frequency: 10 years
P_6= in. P_{24}= in. P_1= in.
T_{all} = 8.0 n = 0.016
Curb Height = 7"

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
*	37+95	41+60 (Lt)	245	40'	0.225	.95	10	4.4	0.94	-	0.94	0.0090	0.02	3125	0.15	7.5
						.95										
*	37+90	42+15 (Rt)	305	40'	0.280	.95	10	4.4	1.17	-	1.17	0.0090	0.02	3125	0.155	7.75
						.95										
	35+00	37+90 (Rt)	290	40' to 55'	0.378	.95	10	4.4	1.58	-	1.58	0.0090	0.02	3125	0.18	9.0
						.95										
	35+00	37+95 (Lt)	295	43 TO 39	0.310	.95	10	4.4	1.30	-	1.30	0.0090	0.02	3125	0.16	8.0

9-P

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$	
37+95 (Lt)	LW-1.2"/CURB INLET	0.15	0.94		Q_{MAX} OF GRATE = 1.0 cfs
37+90 (Rt)	LW-1.2"/CURB INLET	0.155	1.05	0.12	ASSUME Q_c TAKEN BY CURB INLET
35+00 (Rt)	LW-1.2"/CURB INLET	0.18	1.30	0.28	ASSUME Q_c TAKEN BY CURB INLET
35+00 (Lt)	LW-1.2"/CURB INLET	0.16	1.10	0.20	ASSUME Q_c TAKEN BY CURB INLET

Inlet Type: C-4.01 Single
Double
C-4.02 Single
Double

Computed by: JS 7/28/87 Checked by: BCB Date:

* DOES NOT INCLUDE 120 FT. UNDER STRUCTURE

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY (SR 360)
Location IRONWOOD R-C RAMP
Project No. _____

DESIGN DATA
Frequency 10 years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = 8.0′ n ≐ 0.016
Curb Height = 6″

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
22+36.84	22+04.00	32.8	81.0	0.061	.95	10	4.4	0.26	—	0.26					
22+04.00	17+00.00	504.0	26.0	0.301	.95	10	4.4	1.26	0.26	1.51	0.0151	0.032	2141	0.18	5.6
					.95										
17+00.00	13+00.00	400.0	29.8	0.273	.95	10	4.4	1.14	0.21	1.35	0.0271	0.02	3125	0.13	6.5
					.95										
					.95				0.55						
					.95										

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
17+00.00	LW-1.2	0.18	1.3	0.21
13+00.00	LW-1.2	0.13	0.8	0.55

Computed by: LWD 6/17/87 Checked by: BCB Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY. (SR 360)
Location IRONWOOD R-D RAMP
Project No. _____

DESIGN DATA
Frequency 10 years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = 8.0' n ≐ 0.016
Curb Height = 6"

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
22+27.35	16+00.00	627.4	28.0	0.403	.95	10	4.4	1.69	—	1.69	0.0163	0.02	3.125	0.16	8.0
					.95										
16+00.00	12+50.00	350.0	41.7	0.335	.95	10	4.4	1.40	0.59	1.99	0.0244	0.02	3.125	0.16	8.0
					.95										
					.95				0.89						
					.95										
					.95										

9-P

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
16+00.00	LW-1.2	0.16	1.1	0.59
12+50.00	LW-1.2	0.16	1.1	0.89

Computed by: LWD 6/17/87 Checked by: BCB Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

MEDIAN DRAINAGE WORKSHEET

V=

LOCATION DATA
Highway Superstition Fwy
Location Ironwood - Idaho
Project No.

DESIGN DATA
Frequency 10 years
P_6= in. P_{24}= in. P_1= in.
AHW =

2x2 $\frac{Z}{n}$ = 800

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Channel Type	S_o ft/ft	Z	n	D ft.	V fps
✓ 1239+14	1247+75	861	38	0.751	0.60	10	4.4	1.98	Triang	0.010	10	0.025	0.31	2.06
✓ 1247+75	1252+76	501	38	0.437	0.60	10	4.4	1.15	Triang	0.001	10	0.025	0.39	0.76
✓ 1262+16	1252+76	940	38	0.820	0.60	10	4.4	2.16	Triang	0.0015	10	0.025	0.45	1.07
1252+76 (sag)								3.31	Triang	0.001	10	0.025	0.58	
✓ 1275+50	1262+16	1334	38	1.164	0.60	10	4.4	3.07	Triang	0.012	10	0.025	0.35	2.51

Check Tc: Ave Slope = 0.0159 ft/ft D = 0.34 ft Area = 1.16 ft² V = 2.66 ft/s $T_c = \frac{1334 \text{ ft}}{(2.66)(60)}$ = 8.3 minutes < 10 minutes

INLET CALCULATIONS

Station	Inlet Type	Q cfs	HW ft.	DHW Elev.	Dike Elev.
✓ 1247+75	C-15.80	2.9	0.31		
✓ 1252+76	C-15.80	7.8	0.58		
✓ 1262+16	C-15.80	3.6	0.35		

Channel Type: Trapezoidal
Triangular

Inlet Type: C-15.08
C-15.09
C-15.10
Pipe Culvert

Computed by: BCB 6/25/87 Checked by: [illegible] 6/22/87 Date:

6-2

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

MEDIAN DRAINAGE WORKSHEET

LOCATION DATA
Highway: Superstition Fwy
Location: Ironwood - Idaho
Project No.:

DESIGN DATA
Frequency: 10 years
P_6= ____ in. P_{24}= ____ in. P_1= ____ in.
AHW = ____

$\frac{Z}{n}$ = 800

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Channel Type	S_o ft/ft	Z	n	D ft.	V fps
1289+13	1275+50	1363	38	1.189	0.60	10	4.4	3.14	Triang	0.017	10	0.035	0.34	2.72
Check Tc: Ave slope = 0.0108 ft/ft D = 0.37 ft Area = 1.37 ft² V = 2.29 ft/s Tc = $\frac{1363}{(2.29)(60)}$ = 9.9 minutes < 10 minutes														

INLET CALCULATIONS

Station	Inlet Type	Q cfs	HW ft.	DHW Elev.	Dike Elev.
1275+50	C-15.80	3.4	0.34		

Channel Type: Trapezoidal
Triangular

Inlet Type: C-15.08
C-15.09
C-15.10
Pipe Culvert

Computed by: BCB 6/25/87 Checked by: MEL 6/22/87 Date: ____

C-9

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location
Project No.

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n ≐ _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ ID	19+00	16+90	210	73 Ac	0.35	.95	10	4.4	1.5	–	1.5	0.016	0.02	3125	0.16	8
	(Begin Slotted Drain @ ID 16+90 — Locate CB @ ID 16+40)															
	19+00	16+40	260	73	0.44	.95	10	4.4	1.8	@ CB (See Inlet Calcs)						
✓ RC	38+15	EB 126+70	190	57	0.25	.95	10	4.4	1.0	–	1.0	0.014	0.02	3125	0.14	7.0
✓ RC	36+53	38+15	162	61 Ac	0.23	.95	10	4.4	0.95	0.1	1.05	0.013	0.02	3125	0.14	7.0
✓ ID	16+40	14+30	210	68 Ac	0.33	.95	10	4.4	1.37	–	1.37	0.013	0.02	3125	0.15	7.5
	(Begin Slotted Drain @ .95 ID 14+30 — Locate CB @ ID 13+90)															
	1640	13+90	250	66					1.6 cfs @ CB							

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ ID	16+40	50' Slotted	–	18	–
		w/LW ~ 1.2		–	–
✓ RC	38+15	LW — 1.2	0.14	0.9	0.1
✓ RC	36+53	LW — 1.2	0.14	0.9	0.1
✓ ID	13+90	40' Slotted	—	12	—
		w/LW — 1.2	–	—	–

Computed by: PBP Checked by: HEL Date: 6/22/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location
Project No.

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ EB	1239+14	1247+55	841	57.3	1.11	.95	10	4.4	4.6	–	4.6	0.011	0.02	3125	0.255	12.8
						.95										
✓ WB	1239+14	1247+95	881	57.3	1.16	.95	10	4.4	4.8	–	4.8	0.010	0.02	3125	0.26	13
						.95										
						.95										
						.95										
						.95										

9-P

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ EB	1247+55	30' Slotted	–	4.6	–
		W/LW - 1.2	–	–	–
✓ WB	1247+95	30' Slotted	–	4.6	0.2
		W/LW - 1.2	0.08	0.4	–

Computed by: PRP Checked by: MEL Date: 6/22/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location
Project No.

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n ≐ _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ RC	28+35	EB 1253+16.2	80	80	0.15	.95	10	4.4	0.6	–	0.6	0.0025	0.02	3125	0.15	7.5
	(Begin Slotted Drain @ .95 EB 1253+16.2 — Locate CB @ Sta 1352+76.2)															
✓ RC	25+85	EB 1252+76.2	90	84	0.17	.95	10	4.4	0.7	–	0.7	0.0025	0.02	3125	0.16	8.0
✓ RC	25+00	25+85	85	85	0.17	.95	10	4.4	0.7	–	0.7	0.0025	0.02	3125	0.16	8.0
✓ RC	23+00	25+00	200	90	0.41	.95	10	4.4	1.7	–	1.7	0.005	0.032	1953	0.24	7.5
✓ RC	23+00	EB 1247+55	90 Ave	95 Ave	0.20	.95	10	4.4	0.8	–	0.8	0.009	0.032	1953	0.17	5.3
						.95										

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ EB	1252+76.2	80' Slotted	–	4	—
		W/LW – 1.2	–	–	–
✓ RC	25+85	LW – 1.2	0.16	1.1	—
✓ RC	25+00	50' Slotted	–	23	—
		W/LW – 1.2	—	—	–
✓ RC	23+00	LW – 1.2	0.17	1.1	—

Computed by: PBP Checked by: AEL Date: 6/22/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location
Project No.

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ ID	12+00	13+90	190	65	0.28	.95	10	4.4	1.2	–	1.2	0.011	0.02	3125	0.15	7.5
✓ RC	34+60	36+53	193	64	0.28	.95	10	4.4	1.2	0.1	1.3	0.011	0.02	3125	0.16	8.0
✓ RC	33+20	34+60	140	68	0.22	.95	10	4.4	0.9	0.1	1.0	0.010	0.02	3125	0.15	7.5
✓ RC	31+90	33+20	130	70	0.21	.95	10	4.4	0.9	–	0.9	0.009	0.02	3125	0.15	7.5
✓ RC	30+50	31+90	140	73	0.23	.95	10	4.4	1.0	–	1.0	0.008	0.02	3125	0.16	8
✓ RC	29+25	30+50	125	75	0.22	.95	10	4.4	0.9	–	0.9	0.004	0.02	3125	0.16	8
✓ RC	28+35	29+25	90	78	0.16	.95	10	4.4	0.7	–	0.7	0.003	0.02	3125	0.16	8

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INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ ID	12+00	LW ~1.2	0.15	1.0	0.2
✓ RC	34+60	LW ~ 1.2	0.16	1.1	0.1
✓ RC	33+20	LW – 1.2	0.15	1.0	–
✓ RC	31+90	LW – 1.2	0.15	1.0	–
✓ RC	30+50	LW – 1.2	0.16	1.1	–
✓ RC	29+25	LW – 1.2	0.16	1.1	–
✓ RC	28+35	LW – 1.2	0.16	1.1	–

Computed by: PJP Checked by: AEL Date: 6/22/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location
Project No.

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n ≐ _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ ID	21+50	19+50	200	79 Ave	0.36	.95	10	4.4	1.5	-	1.5	0.017	0.02	3125	0.15	7.5
	(Begin Slotted Drain @ ID					.95	19+50		~ Locate CB @ ID				19+00)			
	21+50	19+00	250	79	0.45	.95	10	4.4	1.9 @ CB (See Inlet Calcs)							
						.95										
✓ EB	1265+70	IC 11+65	395	60 Ave	0.54	.95	10	4.4	2.3	-	2.3	0.016	0.02	3125	0.253	9.1
						.95										
						.95										

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ ID	19+00	50' Slotted	-	20	—
		W/LW ~1.2	-	-	—
✓					
EB	1265+70	W/LW ~1.2	0.253	2.2	0.1

Computed by: PBP Checked by: AEL Date: 6/22/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location
Project No.

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ ID	24+00	22+00	200	84 Ave	0.39	.95	10	4.4	1.6	-	1.6	0.017	0.02	3125	0.16	8
	(Begin Slotted Drain @ ID 22+00 — Locate CB @ ID 21+50)															
	24+00	21+50	250	84 Ave	0.48	.95	10	4.4	2.0	@ CB (See Inlet Calcs)						
						.95										
✓ Ic	14+25	12+15	210	80 Ave	0.39	.95	10	4.4	1.6	-	1.6	0.017	0.02	3125	0.16	8
	(Begin Slotted Drain @ Ic 12+15 — Locate CB @ 11+65)															
	14+25	11+65	260	77 Ave	0.46	.95	10	4.4	1.9	@ CB (See Inlet Calcs)						

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ ID	21+50	50' Slotted	-	20	—
		W/LW ~ 1.2	—	—	—
✓ Ic	11+65	50' Slotted	-	20	-
		W/LW ~ 1.2	—	—	—

Computed by: PEP Checked by: AEL Date: 6/23/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY.
Location
Project No.

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
√ WB	1275+50	ID 24+50	270 Ave	90 Ave	0.56	.95	10	4.4	2.3	–	2.3	0.013	0.0295	2119	0.22	7.5
	(Begin Slotted Drain @ ID 24+50 → Locate CB @ ID 24+00)															
	1275+50	ID 24+00	320 Ave	90 Ave	0.66	.95	10	4.4	2.8	@ CB (See Inlet Calcs)						
						.95										
√ EB	1274+45	IC 14+75	165' Ave	95 Ave	0.36	.95	10	4.4	1.5	–	1.5	0.015	0.02	3125	0.16	8
	(Begin Slotted Drain @ IC 14+75 → Locate CB @ 14+25)															
	1274+45	IC 14+25	215 Ave	93 Ave	0.46	.95	10	4.4	1.9	@ CB (See Inlet Calcs)						

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INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
√ ID	24+00	50' Slotted	–	20	–
		W/LW – 1.2	–	–	–
√ IC	14+25	50' Slotted	–	20	–
		W/LW – 1.2	–	–	–

Computed by: PBP Checked by: AEL Date: 6/23/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location
Project No.

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ WB	1289+12.9	1275+50	1363	57.3	1.79	.95	10	4.4	7.5	–	7.5	0.017	0.02	3125	0.28	14
✓ ID	30+77.8	27+10	368	23	0.19	.95	10	4.4	0.8	–	0.8	0.007	0.058	1078	0.21	3.6
						.95										
✓ EB	1289+12.9	1274+45	1468	57.3	1.93	.95	10	4.4	8.1	–	8.1	0.017	0.02	3125	0.29	14.5
✓ IC	20+27.7	16+32	396	23	0.21	.95	10	4.4	0.9	–	0.9	0.012	0.02	3125	0.135	6.8
						.95										
						.95										

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ WB	1275+50	40' Slotted	–	7.5	–
		w/LW – 1.2	–	–	–
✓ ID	27+10	LW – 1.2	0.21	1.6	–
✓ EB	1274+45	40' Slotted	–	8	–
		w/LW – 1.2	–	–	–
✓ IC	16+32	20' Slotted	–	2.5	–
		w/LW – 1.2	–	–	–

Computed by: PBP Checked by: AEL Date: 6/23/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location
Project No.

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n ≐ _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ ID	10+00	12+00	200	60	0.28	.95	10	4.4	1.15	-	1.15	0.010	0.02	3125	0.15	7.5
✓ WB	1254+40	ID 10+00	385	57.3	0.51	.95	10	4.4	2.1	-	2.1	0.004	0.02	3125	0.23	11.5
✓ WB	1254+40	1253+15	125	60	0.17	.95	10	4.4	0.7		0.7	0.003	0.02	3125	0.16	8.0
	(Begin Slotted Drain @ WB 1253+15 — Locate CB @ Sag Point WB 1252+76.2)															
						.95										
						.95										
						.95										

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ ID	10+00	LW - 1.2	0.15	0.9	0.25
✓ WB	1254+40	20' Slotted	—	3.3	—
		w/LW - 1.2	—	—	—
✓ WB	1252+76.2	80' Slotted	—	>>>	—
		w/LW - 1.2	—	—	—

Computed by: PBP Checked by: AEL Date: 6/23/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: SUPERSTITION FRWY
Location:
Project No.:

DESIGN DATA
Frequency: _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ WB	1247+95	RD 23+05	70	100	0.16	.95	10	4.4	0.7	–	0.7	0.003	0.02	3125	0.16	8
	(Begin Slotted Drain @					.95 RD 23+05			— Locate CB @ RD 23+25)							
						.95										
✓ RD	23+25	24+00	75	94	0.16	.95	10	4.4	0.7	–	0.7	0.003	0.02	3125	0.16	8
	(Begin	Slotted	Drain			.95 @ RD 24+00			– Locate		CB @	RD	24+20)			
						.95										
						.95										

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ RD	23+25	20' Slotted			
		N/LW - 1.2			
✓ RD	24+20	20' Slotted	0.16		
		W/LW - 1.2			

Computed by: PBP Checked by: AEL Date: 6/23/87

IDAHO TO TOMAHAWK

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY. (S.R. 360)
Location IDAHO I-A RAMP
Project No. _____

DESIGN DATA
Frequency 10 years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = 8.0' n ≐ 0.016
Curb Height = 6"

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
√	21+21.15	16+00.00	521.2	28.4	0.340	.95	10	4.4	1.42	—	1.42	0.0115	0.02	3/25	0.16	8.0
						.95										
√	16+00.00	13+00.00	300.0	41.3	0.285	.95	10	4.4	1.19	0.32	1.51	0.0176	0.02	3/25	0.15	7.5
						.95										
T_{MAX} = 9'	13+00.00	11+20	180	41' TO 41.6'	0.175	.95	10	4.4	0.73	0.51	1.24	0.0061	0.02	3/25	0.175	8.75
						.95										
						.95										

9-P

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
√	16+00.00	LW-1.2	0.16	1.1	0.32
√	13+00.00	LW-1.2	0.15	1.0	0.51
√	11+20	LW-1.2	0.175	1.24	—

Q_{MAX} = 1.25 cfs

Inlet Type: C-4.01 Single
Double

C-4.02 Single
Double

Computed by: DWD 6/16/87 Checked by: AEL 7/22/87 Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY. (S.R. 360)
Location IDAHO I-8 RAMP
Project No. _____

DESIGN DATA
Frequency 10 years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = 8.0' n = 0.016
Curb Height = 6"

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓	21+98.88	15+00.00	698.9	26.1	0.419	.95	10	4.4	1.75	—	1.75	0.0193	0.02	3125	0.16	8.0
						.95										
✓	15+00.00	12+00.00	300.0	30.7	0.211	.95	10	4.4	0.88	0.65	1.53	0.0204	0.02	3125	0.15	7.5
						.95										
✓	12+00.00	10+70.00	130.0	32.0	0.096	.95	10	4.4	0.40	0.53	0.93	0.0083	0.02	3125	0.15	7.5
						.95										
						.95										

9-P

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓	15+00.00	LW-1.2	0.16	1.1	0.65
✓	12+00.00	LW-1.2	0.15	1.0	0.53
✓	10+70.00	LW-1.2 w/ open curb	0.15	0.93	—

Inlet Type: C-4.01 Single
Double

C-4.02 Single
Double

Q_{MAX} OF GRATE = 1.0 cfs

Computed by: LWD 6/16/87 Checked by: AEL 7/22/87 Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location Idaho - Tomahawk
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ WB	1300+20	IB 24+25	245	92	0.52	.95	10	4.4	2.2	–	2.2	0.0045	0.04	1563	0.29	7.25
✓ EB	1289+12.9	1300+20	1107	57.3	1.46	.95	10	4.4	6.1		6.1	0.011	0.02	3125	0.29	14.5
✓ WB	1289+12.9	1301+04	1191	57.3	1.57	.95	10	4.4	6.5	–	6.5	0.010	0.02	3125	0.31	15.5
						.95										
✓ IA	22+80	21+21.1	159	23	0.08	.95	10	4.4	0.35	–	0.35	0.003	0.023	2717	0.13	5.6
						.95										
						.95										

9-P

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ IB	24+25	LW – 1.2	0.29	2.6	–
✓ EB	1300+20	30' Slotted	–	3.9	2.2
		W/LW – 1.2	0.27	2.2	–
✓ WB	1301+04	30' Slotted	–	4.1	2.5
		W/LW – 1.2	0.28	2.5	–
✓ IA	22+80	LW – 1.2	0.13	0.9	–

Computed by: PBP Checked by: AEL 7/22/87 Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY.
Location Idaho-Tomahawk
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ IA	24+00	WB 1301+04	128 Ave	97 Ave	0.29	.95	10	4.4	1.2	–	1.2	0.007	0.02	3125	0.16	8
	(Begin Slotted Drain @ .95 24+00 — Locate CB @ IA 24+50)															
✓ IA	24+50	WB 1301+04	178 Ave	95 Ave	0.39	.95	10	4.4	1.6	@ CB (See Inlet Calcs)						
✓ IA	24+50	25+45	95	86 Ave	0.19	.95	10	4.4	0.8	–	0.8	0.004	0.02	3125	0.16	8
	(Begin Slotted Drain @ IA .95 25+45 — Locate CB @ IA 25+95															
	24+50	25+95	145	85	0.28	.95	10	4.4	1.2	@ CB (See Inlet Calcs)						
						.95										

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ IA	24+50	50' Slotted	–	25	–
		w/LW-1.2	–	–	–
✓ IA	24+95	50' Slotted	–	30	–
		w/LW-1.2	–	–	–

Computed by: PBP Checked by: [illegible] 7/22/87 Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location Idaho - Tomahawk
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
					.95										
					.95										
26+40	27+30	90	76	0.16	.95	10	4.4	0.66	–	0.66	0.0022	0.02	3/25	0.16	8
	(EB 1305+80)				.95										
25+40	26+40	100	81	0.17	.95	10	4.4	0.77	–	0.77	0.0035	0.02	3/25	0.16	8
(EB 1303+90)	(EB 1304+90)				.95										
24+25	25+40	115	85	0.22	.95	10	4.4	0.9	–	0.9	0.004	0.02	3/25	0.16	8

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INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
IB	27+30	LW-1.2	.16	1.1	—
IB	26+40	LW-1.2	.16	1.1	—
IB	25+40	LW-1.2	.16	1.1	—

Computed by: PGP Checked by: AEL 7/22/87 Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: SUPERSTITION FRWY
Location: Idaho - Tomahawk
Project No.: _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n ≐ _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ WB	1308+50	1307+12.5	137.5	58	0.18	.95	10	4.4	0.8	> @ SAG.						
✓ WB	1307+12.5	(WB 1305+00) IA 27+40	130	65	0.19	.95	10	4.4	0.8							
✓ IA	25+95	26+90	95	76	0.17	.95	10	4.4	0.7	–	0.7	0.003	0.02	3125	0.16	8
	(Begin Slotted Drain @ ~~IA~~ 26+90 — Locate CB @ IA 27+40															
✓	25+95	27+40	145	76	0.25	.95	10	4.4	1.06	@ CB (See Inlet Calcs)						
						.95										
						.95										

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ WB	1307+12.5	80' Slotted	–	> 50 cfs	—
		w/LW – 1.2	—	—	–
✓ IA	27+40	50' Slotted	–	30	–
		w/LW – 1.2	—	—	–

Computed by: HZP. Checked by: REL 7/22/87 Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location Idaho - Tomahawk
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ TD	11+75	10+50	125	60	0.17	.95	10	4.4	0.7	–	0.7	.003	0.02	3125	0.16	8
	(Begin Slotted Drain @ TD 10+50 — Locate CB @ TD 10+00)															
✓	11+75	10+00	175	60	0.24	.95	10	4.4	1.0	@ CB (See Inlet Calcs)						
✓ WB	1308+50	TD 10+00	375	58	0.50	.95	10	4.4	2.1	–	2.1	0.003	0.02	3125	0.24	12
✓ WB	1308+50	1307+12.5	138	58	0.16	.95	10	4.4	0.7	0.1	0.8	0.003	0.02	3125	0.17	8.5 *
	*(Note: Begin Slotted Drain @ WB 1307+12.5 to get acceptable spread)															
						.95										

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ TD	10+00	50' Slotted	–	30	–
		W/LW – 1.2	–	–	–
✓ WB	1308+50	LW – 1.2	0.24	2.0	0.1
✓ WB	1307+12.5	40' Slotted	–	30	–
		W/LW – 1.2	–	–	–

Computed by: PBP Checked by: AEL 7/22/87 Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location Idaho - Tomahawk
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ IB	32+30	31+20	110	72	0.18	.95	10	4.4	0.8	–	0.8	0.003	0.02	3125	0.16	8
	(Begin Slotted Drain @ IB 31+20 ~ Locate CB @ IB 30+70)															
✓	32+30	30+70	160	72	0.26	.95	10	4.4	1.1	@ CB (See Inlet Calcs)						
						.95										
✓ IB	30+70	29+80	90	75	0.15	.95	10	4.4	0.6	–	0.6	0.003	0.02	3125	0.15	7.5
✓ IB	29+80	EB 1307+12.5	118	76	0.21	.95	10	4.4	0.9	At Sag						
✓ IB	27+30	EB 1307+12.5	133	80	0.24	.95	10	4.4	1.0							

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ IB	30+70	50' Slotted	–	30	–
		W/LW ~1.2	–	–	–
✓ IB	29+80	LW ~1.2	–	1.0	–
✓ EB	1307+12.5	80' Slotted	–	>50	–
		W/LW ~1.2	–	–	–

Computed by: PBP Checked by: AEL 7/22/97 Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location Idaho-Tomahawk
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ IB 35+50	34+40	110	66	0.17	.95	10	4.4	0.7	–	0.7	0.003	0.02	3125	0.16	8
(Begin Slotted Drain @ IB 34+40 – Locate CB @ IB 33+90)					.95										
✓ 35+50	33+90	160	66	0.24	.95	40	4.4	1.0	–	1.0	@ CB (See Inlet Calcs)				
✓ IB 33+90	32+80	110	70	0.18	.95	40	4.4	0.7	–	0.7	0.003	0.02	3125	0.16	8
(Begin Slotted Drain @ IB 32+80 – Locate CB @ IB 32+30)					.95										
✓ 33+90	32+30	160	70	0.26	.95	40	4.4	1.0	@ CB (See Inlet Calcs)						
					.95										

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ IB 33+90	50' Slotted	–	30	–
	W/LW ~ 1.2	–	–	–
✓ IB 32+30	50' Slotted	–	30	–
	W/LW - 1.2	–	–	–

Computed by: PRP Checked by: AEL 1/22/97 Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location Idaho - Tomahawk
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n ≐ _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ IB	37+55	36+00	155	61	0.22	.95	10	4.4	0.9	—	0.9	0.005	0.02	3125	0.16	8
	(Begin Slotted Drain @					.95	IB 36+00		~ Locate CB @ IB 35+50)							
✓	37+55	35+50	205	62	0.29	.95	10	4.4	1.2	@ CB (See Inlet Calc)						
						.95										
✓ TD	13+40	12+25	115	62	0.16	.95	10	4.4	0.7	—	0.7	0.003	0.02	3125	0.16	8
	(Begin Slotted Drain @ TD					.95	12+25		~ Locate CB @ TD 11+75)							
✓	13+40	11+75	165	62	0.23	.95	10	4.4	1.0	@ CB (See Inlet Calc)						

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ IB	35+50	50' Slotted	—	25	—
		W/LW ~1.2	—	—	—
✓ TD	11+75	50' Slotted	—	30	—
		W/LW ~ 1.2	—	—	—

Computed by: PBP Checked by: AEL 7/22/87 Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location Idaho - Tomahawk
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ TD	15+60	13+90	170	65	0.25	.95	10	4.4	1.06	–	1.06	0.007	0.02	3125	0.16	8
	(Begin Slotted Drain @ TD. 9 13+90 ~ Locate CB @ 13+40)															
✓	15+60	13+90	220	65	0.33	.95	10	4.4	1.4	@ CB (See Inlet Calcs)						
						.95										
✓ IB	39+00	EB 13 19+00	150	58	0.20	.95	10	4.4	0.8	–	0.8	0.007	0.02	3125	0.14	7
✓ IB	37+55	39+00	145	58	0.19	.95	10	4.4	0.8	–	0.8	0.007	0.02	3125	0.14	7
						.95										

9-P

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ TD	13+40	50' Slotted	–	20	–
		W/ LW – 1.2	–	–	–
✓ IB	39+00	LW – 1.2	0.14	0.9	–
✓ IB	37+55	LW – 1.2	0.14	0.9	–

Computed by: PBP Checked by: AEL 7/22/87 Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location Idaho - Tomahawk
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ TD	20+30	18+40	100	75 Adj	0.33	.95	10	4.4	1.4	–	1.4	0.012	0.02	3125	0.16	8
	(Begin Slotted Drain @ TD 18+40 — Locate CB @ TD 17+90)															
✓	20+30	17+90	240	75	0.41	.95	10	4.4	1.7 @ CB (See Inlet Calcs)							
						.95										
✓ TD	17+90	16+10	180	72	0.30	.95	10	4.4	1.24	–	1.24	0.009	0.02	3125	0.16	8
	(Begin Slotted Drain @ TD 16+10 — Locate CB @ TD 15+60)															
✓	17+90	15+60	230	72	0.38	.95	10	4.4	1.6 @ CB							

9-P

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ TD	17+90	50' Slotted	–	12	–
		w/LW - 1.2	–	–	–
✓ TD	15+60	50' Slotted	–	15	–
		w/LW - 1.2	–	–	–

Computed by: FBP Checked by: AEL 7/22/87 Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location Idaho - Tomahawk
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ EB	1310+00	TC 12+10	300	57	0.71	.95	10	4.4	3.0	—	3.0	0.01	0.02	3125	0.22	11
			210	65 Ave		.95	(Note: Spread = 7.8' @ TC 10+00)									
✓ TD	22+70	20+80	100	80 Ave	0.35	.95	10	4.4	1.5	—	1.5	0.015	0.02	3125	0.16	8
	(Begin Slotted Drain @ TD 20+80 — Locate CB @ TD 20+30)															
✓	22+70	20+30	240	80	0.44	.95	10	4.4	1.8	@ CB (See Inlet Calcs)						
						.95										
						.95										

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ EB	1310+00	20' Slotted	—	1.8	1.2
		W/LW-1.2	0.22	1.2	—
✓ TD	20+30	50' Slotted	—	7	—
		W/LW-1.2	—	—	—

Computed by: PBP Checked by: AEL 7/22/87 Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location Idaho-Tomahawk
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ TD	25+00	23+20	180	85 Ave	0.35	.95	10	4.4	1.5	–	1.5	0.015	0.02	3125	0.16	8
	(Begin Slotted Drain @ .95 TD 23+20 – Locate CB @ 22+70)															
✓	25+00	22+70	230	85	0.45	.95	10	4.4	1.9	@ CB	(See Inlet Calcs)					
✓ TC	14+50	12+60	190	81 Ave	0.35	.95	10	4.4	1.5	–	1.5	0.015	0.02	3125	0.16	8
	(Begin Slotted Drain @ ~~1.95~~ 12+60 – Locate CB @ 12+10)															
✓	14+50	12+10	240	80 Ave	0.44	.95	10	4.4	1.8	@ CB	(See Inlet Calcs)					
						.95										

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ TD	22+70	50' Slotted	–	7.0	–
		w/LW - 1.2	–	–	–
✓ TC	12+10	50' Slotted	–	7.0	–
		w/LW - 1.2	–	–	–

Computed by: _____ Checked by: BEL 7/22/87 Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: SUPERSTITION FRWY
Location: Idaho - Tomahawk
Project No.: _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
√ TD	25+00	27+20	220	38 Ave	0.51	.95	10	4.4	2.11	–	2.11	0.01	0.049	1276	0.27	5.5
			240	57		.95										
√ TC	16+30	15+00	130	106 Ave	0.32	.95	10	4.4	1.3	–	1.3	0.015	0.02	3125	0.15	7.5
	(Begin Slotted Drain @ 15+00 – Locate CB @ TC 14+50)					.95										
	16+30	14+50	180	102	0.42	.95	10	4.4	1.76	@ CB (See Inlet Calcs)						
						.95										
						.95										

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
√ TD	25+00	LW-1.2	0.27	2.4	–
√ TC	14+50	50' Slotted	–	7.0	–
		w/LW-1.2	–	–	–

Computed by: PBP Checked by: AEL 7/23/87 Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location Idaho - Tomahawk
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n ≐ _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ EB	1343+17.3	1328+50	1467.3	57.3	1.09	.95	10	4.4	7.09	–	7.09	0.015	0.02	3125	0.30	15
✓ WB	1343+17.3	1329+65	1352	57.3	1.78	.95	10	4.4	7.4	–	7.4	0.015	0.02	3125	0.29	14.5
						.95										
✓ TC	16+30	19+41.9	312	23	0.16	.95	10	4.4	0.69	–	0.69	0.008	0.02	3125	0.13	6.5
✓ TD	27+20	30+15.2	295.2	23	0.16	.95	10	4.4	0.69	–	0.69	0.006	0.049	1276	0.21	4.3
						.95										
						.95										

9-6

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ EB	1328+50	40' Slotted	–	8.0	–
		W/LW - 1.2	–	–	–
✓ WB	1329+65	40' Slotted	–	8.0	–
		W/LW - 1.2	–	–	–
✓ TC	16+30	LW - 1.2	0.13	0.8	–
✓ TD	27+20	LW - 1.2	0.21	1.6	–

Computed by: PEP Checked by: AEL 7/23/87 Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

MEDIAN DRAINAGE WORKSHEET

LOCATION DATA
Highway: Superstition Fwy
Location: Idaho - Tomahawk
Project No.: _____

DESIGN DATA
Frequency: 10 years
P_6 = _____ in. P_{24} = _____ in. P_1 = _____ in.
AHW = _____

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Channel Type	S_o ft/ft	Z	n	D ft.	V fps
✓	1340+70	1328+50	1220	38	1.064	0.60	10	4.4	2.81	Triang	0.015	10	0.025	0.33	2.58
	Check T_c: ave slope = 0.012 ft/ft				D = 0.34 ft		Area = 1.156 ft²		V = 2.43 ft/s		$T_c = \frac{1220}{2.43(60)}$ = 8.4 min.				
✓	1328+50	1317+86	1064	38	0.928	0.60	10	4.4	2.45	Triang	0.0094	10	0.025	0.34	2.12
✓ combine flows in ✓ sag	1317+86	1307+12	1074	38	0.937	0.60	10	4.1	2.31	Triang	.001	10	0.025	0.49	0.96
	Check T_c: Ave slope = 0.0037 ft/ft				D = 0.40 ft		Area ~ 1.60 ft²		V = 1.54 ft/s		$T_c = \frac{1074}{1.54(60)}$ = 11.6 min				
	1301+05	1307+12	607	38	0.530	0.60	10	4.4	1.40	Triang	.001	10	0.025	0.41	0.86

C-9

INLET CALCULATIONS

	Station	Inlet Type	Q cfs	HW ft.	DHW Elev.	Dike Elev.
✓	1328+50	C-15.90	3.3	0.33		
✓	1317+86	C-15.90	3.4	0.34		
✓	1307+12	C-15.80 (Sag)	8.0	0.60		

Channel Type: Trapezoidal
Triangular

Inlet Type: C-15.08
C-15.09
C-15.10
Pipe Culvert

Computed by: BCB 6/23/87 Checked by: B Date: 6/28/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

MEDIAN DRAINAGE WORKSHEET

LOCATION DATA
Highway: Superstition Fwy
Location: Idaho - Tomahawk
Project No.:

DESIGN DATA
Frequency: 10 years
P_6= ____ in. P_{24}= ____ in. P_1= ____ in.
AHW = ____

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Channel Type	S_o ft/ft	Z	n	D ft.	V fps
√ 1289+13	1301+04	1192	38	1.040	0.60	10	4.4	2.75	Triang	0.0106	10	0.025	.34	2.38
Check Tc: Ave Slope = 0.0084 ft/ft D = 0.36 ft Area = 1.30 ft² V = 2.12 ft/s Tc = 1192/2.12(60) = 9.4 minutes														

INLET CALCULATIONS

Station	Inlet Type	Q cfs	HW ft.	DHW Elev.	Dike Elev.
√ 1301+04	C-15.80	3.4	0.34		

Channel Type: Trapezoidal
Triangular

Inlet Type: C-15.08
C-15.09
C-15.10
Pipe Culvert

Computed by: BCB 6/23/87 Checked by: JB Date: 6/28/87

C-9

ARIZONA DEPARTMENT OF TRANSPORTATION

PAVEMENT DRAINAGE CALCULATION REPORT

LOCATION DATA

Highway: Superstition Freeway

Location: T-A Ramp, Crest to Tomahawk

Project No.: 1154

DESIGN DATA

Frequency: 10 years

P_6= _____ in.. P_{24}= _____ in. P_1= _____ in.

T_{all}: 8' n = 0.016

Curb Height = 6" & 7"

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
22+83	19+00	383	22'	0.193	.95	10	4.4	0.81	–	0.81	0.0067	0.00674	927	0.23	3.4
					.95										
19+00	13+50	550	22' TO 40'	0.385	.95	10	4.4	1.61	–	1.61	0.0188	.02	3125	0.16	8.0
					.95										
13+50	10+70	280	40' TO 46'	0.263	.95	10	4.4	1.10	0.51	1.61	0.0141	.02	3125	0.16	8.0
					.95										
					.95										

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
19+00	LW-1.2	0.23	0.81	
13+50	LW-1.2	0.16	1.10	0.51
10+70	LW-1.2 w/curb inlet	0.16	1.10	0.51

Inlet Type:

Q_{max} of grate = 1.95 cfs

Assume Q_c will be picked up by curb inlet portion of catch basin

Computed by: BCB 2/26/87 Checked by: LWD Date: 3/4/87

5/28/87

ARIZONA DEPARTMENT OF TRANSPORTATION

PAVEMENT DRAINAGE CALCULATION REPORT

LOCATION DATA

Highway: Superstition Freeway

Location: T-B Ramp, Crest to Tomahawk

Project No.: 1154

DESIGN DATA

Frequency: 10 years

P_6 = _____ in.. P_{24} = _____ in. P_1 = _____ in.

T_{all} = 8' n = 0.016

Curb Height = 6" & 7"

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
24+34	18+50	634	22' TO 23'	0.296	.95	10	4.4	1.24		1.24	0.0074	.02	3125	.16	8.0
					.95										
18+50	14+00	450	23' TO 28'	0.275	.95	10	4.4	1.15	0.14	1.29	0.021	.02	3125	0.14	7.0
					.95										
14+00	10+90	310	28' TO 37'	0.206	.95	10	4.4	0.86	0.39	1.25	0.016	0.02	3125	0.145	7.25
					.95										
					.95										

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
18+50	LW-1.2	.16	1.1	0.14
14+00	LW-1.2	0.14	0.90	0.39
10+90	LW-1.2 w/ WRC INLET	0.145	0.95	0.30

Inlet Type:

ASSUME CURB INLET WILL TAKE Qc

Computed by: RCB 2/26/87 Checked by: PBP Date: 6/24/87

JS 6/1/87

ARIZONA DEPARTMENT OF TRANSPORTATION

PAVEMENT DRAINAGE CALCULATION REPORT

LOCATION DATA

Highway: Superstition Freeway

Location: T-C RAMP, CREST TO TOMAHAWK

Project No.: 1154

DESIGN DATA

Frequency: 10 years

P_6= _____ in. P_{24}= _____ in. P_1= _____ in.

T_{all}: 8' n = 0.016

Curb Height = 6" & 7"

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
19+41	23+50	409	22' TO 34'	0.248	.95	10	4.4	1.04	-	1.04	0.0073	0.039	1600	0.20	5.1
					.95										
23+50	27+00	350	34' TO 40'	0.311	.95	10	4.4	1.30	-	1.30	0.016	0.02	3125	0.152	7.6
					.95										
27+00	28+90	190	40' TO 50'	0.182	.95	10	4.4	0.76	0.28	1.04	0.011	0.02	3125	0.154	7.7
					.95										
					.95										

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
23+50	LW-1.2	0.20	1.04	
27+00	LW-1.2	0.152	1.02	0.28
28+90	LW-1.2 3/CURB INLET	0.154	1.04	

Inlet Type:

Q_{max} of grate = 1.5 cfs

Computed by: RCB 3/23/87 Checked by: PBP Date: 6/24/87

† 20-0402 12/74 B 6/2/87

ARIZONA DEPARTMENT OF TRANSPORTATION

PAVEMENT DRAINAGE CALCULATION REPORT

LOCATION DATA

Highway: Superstition Freeway

Location: T-D Ramp, Crest to Tomahawk

Project No.: 154

DESIGN DATA

Frequency: 10 years

P_6 = _____ in. P_{24} = _____ in. P_1 = _____ in.

T_{all}: 8' n = 0.016

Curb Height = 6"

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
30+15	34+20	405	22' to 26.4'	0.216	.95	10	4.4	0.90	–	0.90	0.0045	.02	3125	0.16	8.0
					.95										
34+20	38+56	436	26.4' to 36'	0.286	.95	10	4.4	1.20	–	1.20	0.0144	0.017	3646	0.133	7.8
					.95										
					.95										
					.95										
					.95										

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
34+20	LW-1.0	.16	0.90	
38+56	LW-1.2 w/ CURB INLET	0.133	0.84	0.36

Inlet Type:

Q_{max} of grate = 1.1 cfs

Assume Qc will be taken by curb inlet portion

Computed by: RCB 3/23/87 Checked by: RBP Date: 6/24/87

JS 5/26/87

† 20-0402 12/74

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: SUPERSTITION
Location: TOMAHAWK RD (NORTH)
Project No.: 1154

DESIGN DATA
Frequency: 10 years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = 8' & 7' n = 0.016
Curb Height = 7"

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
84+90	86+55 (LT)	165	52' TO 40'	0.174	.95	10	4.4	0.73	–	0.73	0.0032	0.02	3125	0.16	8.0
					.95										
INTO SAME C.B. 83+80	84+90 (LT)	110	56' TO 52'	0.136	.95	10	4.4	0.57	–	0.57	0.0039	0.02	3125	0.135	6.75
83+10	83+80 (LT)	70	46' TO 56'	0.082	.95	10	4.4	0.34	–	0.34	0.0050	0.02	3125	0.11	5.5
					.95										
					.95										
(MAX T = 12') → 83+90	86+54 (RT)	265	36 TO 39'	0.239	.95	10	4.4	1.00	–	1.00	0.0024	0.02	3125	0.185	9.25

ADD Q's

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$	
84+90 (LT)	LW-1.2 W/CURB INLET	0.16	0.73	–	Q_{max} of grate = 1.1 cfs
83+80 (LT)	LW-1.2 W/CURB INLET	0.135	0.91	0.60	Q_{max} of grate = 0.85 cfs OVERFLOW INTO CURB INLET (0.6 cfs)
83+90 (RT	LW-1.2 W/CURB INLET	0.185	1.00	–	Q_{max} of grate = 1.35 cfs

Inlet Type: C-4.01 Single
Double
C-4.02 Single
Double

Computed by: JS. 5/26/87 Checked by: PBP Date: 7/29/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: SUPERSTITION
Location: TOMAHAWK RD (CENTER)
Project No.:

DESIGN DATA
Frequency: 10 years
P_6= in. P_{24}= in. P_1= in.
T_{all} = 7' & 8' n = 0.016
Curb Height = 7"

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
81+80	83+90(RT)	210'	40' TO 43	0.197	.95	10	4.4	0.82	-	0.82	0.0037	0.02	3125	0.16	8.0
					.95										
81+00	83+10(LT)	210'	40' TO 44'	0.195	.95	10	4.4	0.81	-	0.81	0.0037	0.02	3125	0.16	8.0
					.95										
* 78+00	81+00(LT)	180'	40'	0.165	.95	10	4.4	0.69	-	0.69	0.0037	0.02	3125	0.152	7.6
					.95										
* 78+50	81+80(RT)	210'	40'	0.193	.95	10	4.4	0.81	-	0.81	0.0037	0.02	3125	0.16	8.0

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$	
81+80(RT)	LW-1.2 w/CURB INLET	0.16	0.82		Q_{max} of grate = 1.1 cfs
81+00(LT)	LW-1.2 w/CURB INLET	0.16	0.81		Q_{max} of grate = 1.1 cfs
78+00(LT)	LW-1.2 w/CURB INLET	0.152	0.69		Q_{max} of grate = 1.03 cfs
78+50(RT)	LW-1.2 w/CURB INLET	0.16	0.81		Q_{max} of grate = 1.1 cfs

Inlet Type: C-4.01 Single
Double

C-4.02 Single
Double

Computed by: JB 5/27/87 Checked by: PBP Date: 7/29/87

* DOES NOT INCLUDE 120 FT UNDER STRUCTURE

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: SUPERSTITION FRWY
Location: TOMAHAWK RD. (CENTER) (con't)
Project No.:

DESIGN DATA
Frequency: 10 years
P_6= ____ in. P_{24}= ____ in. P_1= ____ in.
T_{all} = 8' n = 0.016
Curb Height = 7"

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
77+80	78+50 (RT)	70	40	0.064	.95	10	4.4	0.27	–	0.27	0.0037	0.02	3125	0.108	5.4
					.95										
					.95										
					.95										
					.95										
					.95										
					.95										

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
77+80 (RT)	LW-1.2'/CURB INLET	0.108	0.27	

Q_{MAX} of grate = 0.60 cfs

Inlet Type: C-4.01 Single / Double
C-4.02 Single / Double

Computed by: JS 6/2/87 Checked by: PBP Date: 7/24/87

9-P

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: SUPERSTITION FRWY
Location: TOMAHAWK RD. (SOUTH)
Project No.:

DESIGN DATA
Frequency: 10 years
P_6= in. P_{24}= in. P_1= in.
T_{all} = 10' & 16' n = 0.016
Curb Height = 7"

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
73+66	77+80 (RT)	414	40' TO 55'	0.523	.95	10	4.4	2.19	-	2.19	0.0063	0.02	3125	0.21	10.5
					.95										
73+66	78+00 (LT)	434	36' TO 44'	0.455	.95	10	4.4	1.90	-	1.90	0.0063	0.02	3125	0.20	10.0
					.95										
					.95										
					.95										
					.95										

9-P

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
73+66 (RT)	NONE - GUTTER ENDS			
	WITH END OF			
73+66 (LT)	TOMAHAWK RD.			
	- DRAINS INTO			
	EXISTING GRADER			
	DITCH.			

Inlet Type: C-4.01 Single
Double

C-4.02 Single
Double

Computed by: JS. 6/3/87 Checked by: PBP Date: 7/24/87

TOMAHAWK TO GOLDFIELD

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location Tomahawk to Goldfield
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n ≐ _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ TA	27+00	28+30	130	72 Acr	0.21	.95	10	4.4	0.9	–	0.9	0.005	0.02	3125	0.16	8
✓ WB	1343+17.3	1354+50	1133	57.3	1.50	.95	10	4.4	6.23	–	6.23	0.006	0.02	3125	0.32	16
✓ EB	1343+17.3	1354+15	1098	57.3	1.44	.95	10	4.4	6.03	–	6.03	0.006	0.02	3125	0.32	16
						.95										
						.95										
						.95										
						.95										

9-P

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
	26+30				
✓ TA	~~27+00~~	LW-1.2	0.16	1.1	–
✓ WB	1354+50	30' Slotted	–	6.0	0.23
		W/LW-1.2	0.09	0.23	–
✓ EB	1354+15	30' Slotted	–	6.0	–
		W/LW-1.2	–	–	–

Computed by: PRP Checked by: JB Date: 6/29/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: SUPERSTITION FWY.
Location: Tomahawk to Goldfield
Project No.: _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n ≐ _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
√ TA	22+83.2	24+10	126.8	100 true	0.29	.95	10	4.4	1.21	–	0.92	0.0044	0.02	3125	.175	8.7
	(Begin Slotted Drain @ TA 24+10 – Locate CB @ TA 24+60)															
	22+83.2	24+60	140	102 true	0.33	.95	10	4.4	–	1.4	@ CB (See Inlet Calcs)					
√ TA	25+60	24+60	100	90	0.21	.95	10	4.4	0.86	–	0.86	0.005	0.02	3125	.16	8
√ TA	25+60	26+70	110	83	0.21	.95	10	4.4	0.86	–	0.86	0.005	0.02	3125	.16	8
	(Begin Slotted Drain @ 26+70 – Locate CB @ TA 27+00)															
	25+60	27+00	140	83	0.27	.95	10	4.4	1.12	@ CB (See Inlet Calcs)						

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
√ TA	24+60	50' Slotted	–	30	–
√		w/LW-1.2	–	–	–
√ TA	25+60	LW-1.2	0.16	1.0	–
√ TA	27+00	30' Slotted	–	9.5	–
√		w/LW-1.2	–	–	–

Computed by: PBP Checked by: JB Date: 7/15/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location Tomahawk to Goldfield
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
√ TB	25+90	27+20	130	82	0.24	.95	10	4.4	1.0	–	1.0	.006	0.02	3125	0.16	8
	(Begin) Slotted Drain @ 27+80 – Locate CB @ TB 27+70)															
	25+90	27+70	180	83	0.34	.95	10	4.4	1.4	@ CB (See Inlet Calcs)						
√ TB	24+34.4	25+50	116	86	0.23	.95	10	4.4	0.95	–	0.95	0.004	0.023	2717	0.18	7.8
	24+34.4	25+90	156	86	0.31	.95	10	4.4	1.28	@ CB (See Inlet Calcs)						
√ TB	22+80	24+34.4	155	99 Ave	0.35	.95	10	4.4	1.46	–	1.46	0.002	0.058	1078	0.3	6.0
						.95										

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
TB	27+70	50' Slotted	–	20	–
		W/LW - 1.2	–	–	–
√ TB	25+90	40' Slotted	–	20	
		W/LW - 1.2	–	–	–
√ TB	22+80	LW - 1.2	0.3	1.46	–

Computed by: PEP Checked by: AEL Date: 7/10/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location Tomahawk to Goldfield
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n ≐ _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ WB	1359+60	1360+80	120	64	0.42	.95	10	4.4	1.8	–	1.8	0.004	0.02	3125	0.22	11
✓	1360+80	1362+70	190	57	Note:	.95	Spread	= 8'	@ 1361+00							
✓ TB	29+50	30+80	130	78	0.23	.95	10	4.4	1.0	–	1.0	0.006	0.02	3125	0.16	8
	(Begin Slotted Drain @					.95	TB 30+80		–	Locate CB @ TB 31+30)						
✓ TB	29+50	31+30	180	78	0.32	.95	10	4.4	1.35	@ CB (See Inlet Calcs)						
✓ TB	27+70	29+00	130	80	0.24	.95	10	4.4	1.0	–	1.0	0.006	0.02	3125	0.16	8
	(Begin Slotted Drain @					.95	TB 29+00		–	Locate CB @ 29+50)						
✓ 2-P	27+70	29+50	180	80	0.33		= 1.4 cfs									

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ WB	1362+70	20' Slotted	–	3.0	–
		w/LW – 1.2	–	–	–
✓ TB	31+30	50' Slotted	–	20	–
✓		w/LW – 1.2	–	–	–
✓ TB	29+50	50' Slotted	–	20	–
		w/LW – 1.2	–	–	–

Computed by: PBP. Checked by: FEL Date: 7/10/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location Tomahawk to Goldfield
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
TB	34+55	EB 1364+68.3	120	68	0.18	.95	10	4.4	0.75	–	0.75	0.003	0.02	3125	0.16	8
	(Begin Slotted Drain @ EB 1364+68.3 — Locate CB @ Sag)															
GD	11+65	WB 1364+65.7	120	60	0.165	.95	10	4.4	0.69	–	0.69	0.003	0.02	3125	0.16	8
	(Begin Slotted Drain @ WB 1364+65.7 — Locate CB @ Sag)															
						.95										
						.95										
						.95										

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
EB	1364+28.3	40' Slotted	–	2.3	–
		W/LW - 1.2	–	–	–
WB	1364+25.7	40' Slotted	–	2.3	–
		W/LW - 1.2	–	–	–

Computed by: PBP Checked by: AEL Date: 7/10/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location Tomahawk to Goldfield
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n ≐ _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ GD	15+50	13+50	200	60	0.28	.95	10	4.4	1.15	–	1.15	0.007	0.02	3125	0.16	8
	(Begin Slotted Drain @ 13+50 – Locate CB @ GD 13+00)															
✓ GD	13+00	15+50	250	60	0.34	.95	10	4.4	1.44	@ CB (See Inlet Calcs)						
✓ TB	35+80	37+30	150	65	0.22	.95	10	4.4	0.93	–	0.93	0.006	0.02	3125	0.15	7.5
✓ TB	34+55	35+80	125	68	0.20	.95	10	4.4	0.81	–	0.81	0.004	0.02	3125	0.16	8
✓ GD	11+65	13+00	135	62	0.19	.95	10	4.4	0.80	–	0.80	0.004	0.02	3125	0.16	8
						.95										

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ GD	13+00	50' Slotted	–	25	–
		w/LW - 1.2	·	–	–
✓ TB	35+80	LW - 1.2	0.15	1.0	–
✓ TB	34+55	LW - 1.2	0.16	1.1	–
✓ GD	11+65	LW - 1.25	0.16	1.1	–

Computed by: PBP Checked by: REC Date: 7/18/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location Tomahawk to Goldfield
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n ≐ _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ EB	1372+00	1374+40	240	60	0.33	.95	10	4.4	1.38	–	1.38	0.014	0.02	3125	0.15	7.5
	(Begin Slotted Drain @ EB 1372+00 .95 Locate CB @ TB 40+15)															
	1371+50	1374+40	290	60	0.40	.95	10	4.4	1.7	@ CB (See Inlet Calcs)						
✓ TB	40+15	37+80	235	60	0.32	.95	10	4.4	1.35	–	1.35	0.010	0.02	3125	0.16	8
	(Begin Slotted Drain @ TB 37+80 .95 – Locate CB @ TB 37+30)															
✓ TB	37+30	40+15	285	60	0.39	.95	10	4.4	1.64	@ CB (See Inlet Calcs)						
						.95										

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ TB	40+15	50' Slotted	–	8	–
		w/ LW - 1.2	–	–	–
✓ TB	37+30	50' Slotted	–	20	–
		w/ LW - 1.2	–	–	–

Computed by: HBP Checked by: AEL Date: 7/18/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: SUPERSTITION FRWY
Location: Tomahawk to Goldfield
Project No.: _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n ≐ _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ GD	23+00	21+00	200	80 Ave	0.37	.95	10	4.4	1.55	–	1.55	0.016	0.02	3125	0.16	8
	(Begin Slotted Drain @ GD 21+00 – Locate CB @ GD 20+50)															
✓ GD	23+00	20+50	250	80 Ave	0.46	.95	10	4.4	1.92	@ CB (See Inlet Calcs)						
✓ GD	20+50	18+00	250	75 Ave	0.43	.95	10	4.4	1.80	(See Calcs for GD 23+00)						
✓ GD	18+00	16+00	200	70 Ave	0.32	.95	10	4.4	1.34	–	1.34	0.014	0.02	3125	0.15	7.5
	(Begin Slotted Drain @ GD 16+00 – Locate CB @ GD 15+50)															
GD	18+00	15+50	250	70 Ave	0.40	.95	10	4.4	1.7	@ CB (See Inlet Calcs)						

9-p

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ GD	20+50	50' Slotted	–	6.0	–
		w/ LW-1.2	–	–	–
✓ GD	18+00	50' Slotted	–	6.0	–
		w/ LW-1.2	–	–	–
✓ GD	15+50	50' Slotted	–	8.0	–
		w/ LW-1.2	–	–	–

Computed by: FBP Checked by: HEL Date: 7/18/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location Tomahawk to Goldfield
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
√ GC	12+40	1400	160	80 Ave	0.29	.95	10	4.4	1.23	–	1.23	0.014	0.02	3125	0.21	7.0
√ GD	25+00	23+50	150	85 Ave	0.29	.95	10	4.4	1.23	–	1.23	0.0135	0.02	3125	0.15	7.6
	(Begin Slotted Drain @ GD 23+50 – Locate CB @ GD 23+00)															
GD	25+00	23+00	200	85 Ave	0.39	.95	10	4.4	1.63	@ CB	(See Inlet Calcs)					
√ GC	12+40	10+40	200	65 Ave	0.30	.95	10	44	1.25	–	1.25	0.016	0.02	3125	0.21	7.0
						.95										
						.95										

9-P

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
√ GC	12+40	w/LW – 1.2	0.21	1.23	–
√ GD	23+00	50' Slotted	–	8.5	–
		W/LW – 1.2	–	–	–
√ GC	10+40	LW – 1.2	0.21	1.25	–

Computed by: FBP Checked by: AEC Date: 7/18/81

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: SUPERSTITION FRWY
Location: Tomahawk to Goldfield
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ EB	1395+25	1380+50	1475	57.3	1.0	.95	10	4.4	8.1	–	8.1	0.016	0.02	3125	0.30	15
✓ GC	16+28	20+04.5	377	23	0.2	.95	10	4.4	0.8	–	0.8	0.010	0.02	3125	0.14	7.0
✓ GC	16+28	14+50	178	93 Ave	0.38	.95	10	4.4	1.6	–	1.6	0.014	0.02	3125	0.16	8.0
	(Begin Slotted Drain @ GC 14+50 – Locate CB @ GC 14+00)															
✓ GC	16+28	14+00	228	92 Ave	0.48	.95	10	4.4	2.0	@ CB (See Inlet Calcs)						
						.95										
						.95										

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ EB	1380+50	40' Slotted	–	5.8	–
		W/LW – 1.2	0.25	2.3	–
✓ GC	16+28	LW – 1.2	0.14	0.9	–
✓ GC	14+00	50' Slotted	–	7.5	–
		W/LW – 1.2	–	–	–

Computed by: PBP Checked by: HEL Date: 7/18/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

MEDIAN DRAINAGE WORKSHEET

LOCATION DATA
Highway: Superstition Freeway
Location: Tomahawk to Goldfield
Project No.: 1154

DESIGN DATA
Frequency: 10 years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
AHW = _____

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Channel Type	S_o ft/ft	Z	n	D ft.	V fps
✓ 1393+50	1380+50	1300	38	1.134	0.60	10	4.4	3.00	Triang	.016	10	0.025	0.33	2.75
Check Tc: ave slope = 0.0121 ft/ft D = 0.35 ft Area = 1.23 ft² V = 2.45 ft/s Tc = (1300/(2.45)(60)) = 8.8 min.														
✓ 1380+50	1364+28	1622	38	1.415	0.60	10	4.4	3.74	Triang	.002	10	0.025	0.52	1.38
Check Tc: ave Slope = 0.0123 ft/ft D = 0.38 ft Area = 1.44 ft² V = 2.59 ft/s Tc = (1622/(2.59)(60)) = 10.4 min.														
✓ 1354+15	1364+28	1013	38	0.894	0.60	10	4.4	2.33	Triang	.002	10	0.025	0.44	1.20
Check Tc: ave Slope = 0.0053 ft/ft D = 0.36 ft Area = 1.30 ft² V = 1.80 ft/s Tc = (1013/(1.80)(60)) = 9.4 min.														
1364+28 (sag)								6.07	Triang	0.002	10	0.025	0.63	

C-9

INLET CALCULATIONS

Station	Inlet Type	Q cfs	HW ft.	DHW Elev.	Dike Elev.
✓ 1390+50	C-15.80	3.3	0.33		
✓ 1364+28 }	Add 2 Q's flowing				
✓ 1364+28 }	into sag	8.8	0.63		

Channel Type: Trapezoidal
Triangular

Inlet Type: C-15.08
C-15.09
C-15.10
Pipe Culvert

Computed by: BCB 6/23/87 Checked by: AEL 7/23/87 Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

MEDIAN DRAINAGE WORKSHEET

LOCATION DATA
Highway: Superstition Freeway
Location: Tomahawk to Goldfield
Project No.: 1154

DESIGN DATA
Frequency: 10 years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
AHW = _____

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Channel Type	S_o ft/ft	Z	n	D ft.	V fps
✓ 1343+17	1354+15	1098	38	0.96	0.60	11	4.2	2.42	Triang	0.006	10	0.025	0.37	1.77
Check Tc: Ave.		Slope = 0.0050	ft/ft	D = 0.39 ft			Area = 1.52 ft²		V = 1.67 ft/s	Tc = 1098/(1.67)(60)	= 11	min.		

C-9

INLET CALCULATIONS

Station	Inlet Type	Q cfs	HW ft.	DHW Elev.	Dike Elev.
✓ 1354+15	C-15.80	4.0	0.37		

Channel Type: Trapezoidal
Triangular

Inlet Type: C-15.08
C-15.09
C-15.10
Pipe Culvert

Computed by: BCB 6/23/87 Checked by: AEL Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY (S.R. 360)
Location GOLDFIELD G-A RAMP
Project No. _____

DESIGN DATA
Frequency 10 years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = 8.0' n ≐ 0.016
Curb Height = 6"

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
20+44.15	15+00.00	544.2	30.5	0.381	.95	10	4.4	1.59	—	1.59	0.0134	0.02	3125	0.16	8.0
					.95										
15+00.00	12+50.00	250.0	43.2	0.248	.95	10	4.4	1.04	0.49	1.53	0.0080	0.02	3125	0.16	8.0
					.95										
12+50.00	10+75	175.0	44.0	0.177	.95	10	4.4	0.74	0.43	1.17	0.0079	0.02	3125	0.16	8.0
					.95										
					.95										

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
15+00.00	LW-1.2	0.16	1.1	0.49
12+50.00	LW-1.2	0.16	1.1	0.43
10+75	LW-1.2 w/ OPEN curb	0.16	1.1	0.07

Inlet Type: C-4.01 Single
Double

C-4.02 Single
Double

ASSUME Qc TAKEN BY CURB INLET

Computed by: LWD 6/15/87 Checked by: JS Date: 7/10/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY (S.R. 360)
Location GOLDFIELD G-B RAMP
Project No. _____

DESIGN DATA
Frequency 10 years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = 8.0' n ≐ 0.016
Curb Height = 6"

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
20+49.50	14+00.00	649.5	27.4	0.408	.95	10	4.4	1.71	—	1.71	0.0221	0.02	3125	0.15	7.5
					.95										
14+00.00	10+90	310	28' TO 38'	0.213	.95	10	4.4	0.89	0.71	1.60	0.0150	0.02	3125	0.16	8.0
					.95										
					.95										
					.95										
					.95										

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
14+00.00	LW-1.2	0.15	1.0	0.71
11+00.00	LW-1.2 w/open curb	0.16	1.1	0.5

Inlet Type: C-4.01 Single
Double

C-4.02 Single
Double

ASSUME Q_c TAKEN BY CURB INLET

Computed by: LWD 6/16/87 Checked by: JB Date: 7/10/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY (S.R. 360)
Location GOLDFIELD G-C RAMP
Project No. _____

DESIGN DATA
Frequency 10 years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = 8.0' n = 0.016
Curb Height = 6"

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
20+04.53	24+00.00	395.5	34.1	0.309	.95	10	4.4	1.29	—	1.29	0.0099	0.02	3125	0.16	8.0
					.95										
24+00.00	28+00.00	400.0	43.9	0.403	.95	10	4.4	1.68	0.19	1.87	0.0190	0.02	3125	0.16	8.0
					.95										
28+00.00	29+50.00	150	40' TO 44'	0.144	.95	10	4.4	0.60	0.77	1.37	0.0055	0.02	3125	0.18	9.0
					.95										
					.95										

T_{MAX} = 10'

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
24+00.00	LW-1.2	0.16	1.1	0.19
28+00.00	LW-1.2	0.16	1.1	0.77
29+50.00	LW-1.2 w/ open curb	0.18	1.3	0.07

Inlet Type: C-4.01 Single
Double

C-4.02 Single
Double

ASSUME Q_c IS TAKEN BY CURB INLET

Computed by: LWD 6/15/87 Checked by: JJ Date: 7/10/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY (S.R. 360)
Location GOLDFIELD G-D RAMP
Project No. _____

DESIGN DATA
Frequency 10 years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = 8.0' n = 0.016
Curb Height = 6"

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
31+13.30	35+50.00	436.7	27.4	0.275	.95	10	4.4	1.15	—	1.15	0.0073	0.02	3125	0.16	8.0
					.95										
35+50.00	39+85	435.0	22' TO 38'	0.323	.95	10	4.4	1.35	0.05	1.40	0.0081	0.02	3125	0.16	8.0
					.95										
					.95										
					.95										
					.95										

9-P

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
35+50.00	LW-1.2	0.16	1.1	0.05
39+85.00	LW-1.2 w/open curb	0.16	1.1	0.3

Inlet Type: C-4.01 Single
Double

C-4.02 Single
Double

ASSUME CURB INLET WILL TAKE Qc

Computed by: LWD 6/15/87 Checked by: JJ Date: 7/10/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: SUPERSTITION FRWY
Location: GOLDFIELD RD
Project No.:

DESIGN DATA
Frequency: 10 years
P_6= in. P_{24}= in. P_1= in.
T_{all} = 8' n = 0.016
Curb Height = 7"

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
	152+00	154+36 (Rt)	236	44' to 40'	0.270	.95	10	4.4	1.13	-	1.13	0.0085	0.02	3125	0.157	7.85
						.95										
*	148+35	152+00 (Lt)	245	40'	0.225	.95	10	4.4	0.94	-	0.94	0.0241	0.02	3125	0.13	6.5
						.95										
*	148+35	152+00 (Rt)	245	40'	0.225	.95	10	4.4	0.94	-	0.94	0.0241	0.02	3125	0.13	6.5
						.95										
						.95										

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$	
152+00 (Rt)	LW-1.2'/CURB INLET	0.157	1.08	0.05	ASSUME Q_c TAKEN BY CURB INLET
148+35 (Lt)	LW-1.2'/CURB INLET	0.13	0.80	0.14	ASSUME Q_c TAKEN BY CURB INLET
148+35 (Rt)	LW-1.2'/CURB INLET	0.13	0.80	0.14	ASSUME Q_c TAKEN BY CURB INLET

Inlet Type: C-4.01 Single
Double
C-4.02 Single
Double

Computed by: BS 7/14/87 Checked by: PBP Date: 7/23/87

* DOES NOT INCLUDE 120 FT UNDER STRUCTURE

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: SUPERSTITION FRWY
Location: GOLDFIELD ROAD
Project No.:

DESIGN DATA
Frequency: 10 years
P_6= in. P_{24}= in. P_1= in.
T_{all} = 8' n = 0.016
Curb Height = 7"

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
156+51	157+85 (RT)	134	36' TO 38'	0.114	.95	10	4.4	0.48	–	0.48	0.0069	0.02	3125	0.118	5.9
					.95										
154+36	156+51 (RT)	215	38' TO 44'	0.202	.95	10	4.4	0.84	–	0.84	0.011	0.02	3125	0.13	6.5
					.95										
154+23	156+51 (LT)	228	38' TO 55'	0.243	.95	10	4.4	1.02	–	1.02	0.012	0.02	3125	0.14	7.0
					.95										
152+00	154+23 (LT)	223	55' TO 40'	0.282	.95	10	4.4	1.18	–	1.18	0.0085	0.02	3125	0.158	7.9

T_{MAX} = 12'

9-P

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$	
157+85 (RT)	LW-1.2' W/CURB INLET	0.118	0.48		Q_{max} of grate = 0.69 cfs
154+36 (RT)	LW-1.2' W/CURB INLET	0.13	0.80	0.04	ASSUME Q_c TAKEN BY CURB INLET
154+23 (LT)	LW-1.2' W/CURB INLET	0.14	0.90	0.12	ASSUME Q_c TAKEN BY CURB INLET
152+00 (LT)	LW-1.2' W/CURB INLET	0.158	1.07	0.11	ASSUME Q_c TAKEN BY CURB INLET

Inlet Type: C-4.01 Single
Double
C-4.02 Single
Double

Computed by: J.S. 7/13/87 Checked by: PBP Date: 7/23/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: SUPERSTITION FRWY
Location: GOLDFIELD ROAD
Project No.:

DESIGN DATA
Frequency: 10 years
P_6= ____ in. P_{24}= ____ in. P_1= ____ in.
T_{all} = 8' n = 0.016
Curb Height = 7"

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
INTO SAME C.B.	159+33	160+00 (LT)	67	34	0.052	.95	10	4.4	0.22	–	0.22	0.0018	0.02	3125	0.11	5.5
	157+85	159+33 (LT)	148	34' TO 36'	0.119	.95	10	4.4	0.50	-	0.50	0.0018	0.02	3125	0.15	7.5
						.95										
	156+51	157+85 (LT)	134	36' TO 47'	0.128	.95	10	4.4	0.54	-	0.54	0.0069	0.02	3125	0.122	6.1
						.95										
INTO SAME C.B.	159+33	160+00 (RT)	67	34	0.052	.95	10	4.4	0.22	-	0.22	0.0018	0.02	3125	0.11	5.5
	157+85	159+33 (RT)	148	34' TO 36'	0.114	.95	10	4.4	0.48	-	0.48	0.0018	0.02	3125	0.15	7.5

9-P

INLET CALCULATIONS

Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$	
159+33 (LT)	LW-1.2 W/CURB INLET	0.15	0.72		Q_{MAX} of grate = 1.0 cfs
157+85 (LT)	LW-1.2 W/CURB INLET	0.122	0.54		Q_{MAX} of grate = 0.74 cfs
159+33 (RT)	LW-1.2 W/CURB INLET	0.15	0.70		Q_{MAX} of grate = 1.0 cfs

Inlet Type: C-4.01 Single / Double
C-4.02 Single / Double

Computed by: J.S. 7/13/87 Checked by: PBP Date: 7/24/87

GOLDFIELD TO U.S. 60

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location GOLDFIELD TO US60
Project No. 1154.01

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
GB	32+70	29+25	345	140	1.1	.95	10	4.4	4.65	–	4.65	0.004	0.074	845	0.48	6.5
GB	29+25	26+50	275	150	0.95	.95	10	4.4	3.96	–	3.96	0.006	0.074	845	0.43	5.8
GB	26+00	24+50	150	85	0.29	.95	10	4.4	1.20	–	1.20	0.008	0.02	3125	0.16	8.0
	(Begin Slotted Drain @ Sta. GB 26+00 ~ Locate CB @ GB 26+50)															
	26+50	24+50	200	85	0.39	.95	10	4.4	1.63	~	See Inlet Calcs					
						.95										
						.95										

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
GB	32+70	LW ~ 1.2	0.48	5.8	–
GB	29+25	LW – 1.2	0.43	4.7	–
GB	26+50	50' Slotted	–	25	
		w/ LW – 1.2	–	–	–

Computed by: PBP 06/05/87 Checked by: AEL 7/22/87 Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location GOLDFIELD TO US 60
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ EB	1395+25	1405+48	1023	57.3	1.34	.95	10	4.4	5.6	–	5.6	0.014	0.02	3125	0.27	13.5
✓ GB	20+49.5	21+50	100.5	44 Ave	0.10	.95	10	4.4	0.4	–	0.4	.003	0.02	3125	0.13	6.5
✓ GA	20+44.15	23+50	305.9	22	0.15	.95	10	4.4	0.65	–	0.65	.008	0.02	3125	0.13	6.5
✓ GA	23+50	25+00	150	95 Ave	0.33	.95	10	4.4	1.4	–	1.4	0.013	0.02	3125	0.15	7.5
✓ GA	25+90	25+00	90	85 Ave	0.18	.95	10	4.4	0.7		0.7	0.010	0.016	3906	0.11	7.0
	(Begin Slotted drain @ GA 25+00 — Locate CB @ GA 26+40)															
✓	26+40	25+00	140	83 Ave	0.27	.95	10	4.4	1.1	–	1.1 @ CB	(See Inlet Calcs)				

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ EB	1405+48	40' Slotted	–	5.0	0.6
		W/LW - 1.2	0.11	0.6	–
✓ GB	21+50	LW - 1.2	0.13	0.8	–
✓ GA	23+50	LW - 1.2	0.13	0.8	–
✓ GA	25+00	20' Slotted	–	1.2	0.2
		W/LW - 1.2	0.08	0.2	–
✓ GA	26+40	50' Slotted W/LW - 1.2	–	12	–

Computed by: PBP Checked by: AEL 7/22/87 Date: _____

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: SUPERSTITION FRWY
Location: GOLDFIELD TO US60
Project No.: _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ GB	23+00	24+00	100	90 AV	0.21	.95	10	4.4	0.88	–	0.88	0.006	0.02	3125	0.15	7.5
	(Begin Slotted Drain @ GB 24+00 – Locate CB @ GB 24+50)															
✓	23+00	24+50	150	88 AV	0.30	.95	10	4.4	1.3	@ CB	(See Inlet Calcs)					
✓ GB	21+50	22+50	100	95 AV	0.22	.95	10	4.4	0.9	–	0.9	0.005	0.02	3125	0.16	8.0
	(Begin Slotted Drain @ GB 22+50 – Locate CB @ GB 23+00)															
✓	21+50	23+00	150	93 AV	0.32	.95	10	4.4	1.3	@ CB	(See Inlet Calcs)					
						.95										

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ GB	24+50	50' Slotted	–	44	–
✓		W/LW – 1.2	–	–	–
✓ GB	23+00	50' Slotted	–	40	–
✓		W/CW – 1.2	–	–	–

Computed by: PBP Checked by: AEC Date: 7/23/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway SUPERSTITION FRWY
Location Goldfield to US60
Project No. _____

DESIGN DATA
Frequency _____ years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
T_{all} = n = _____
Curb Height =

RUNOFF CALCULATIONS

	From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Q_c cfs	Q_T cfs	S_o ft/ft	S_x ft/ft	z/n	D ft.	T ft.
✓ WB	1395+25	1407+80	1255	57.3	1.65	.95	10	4.4	6.9	–	6.9	0.011	0.02	3125	0.29	14.5
✓ WB	1381+65	1395+25	1360	57.3	1.70	.95	10	4.4	7.5	–	7.5	0.016	0.02	3125	0.29	14.5
✓ GD	31+13.3	27+20	393	23	0.21	.95	10	4.4	0.9	–	0.9	0.008	0.074	845	0.25	3.4
✓ GD	27+20	25+00	220	35 AVE	0.49	.95										
	WB 1381+65	1379+30	235	57.3		.95	10	4.4	2.0	–	2.0	0.012	0.037	1690	0.23	6.2
						.95										
						.95										

INLET CALCULATIONS

	Station	Inlet Type	D ft.	Q_i cfs	$Q_c = Q_T - Q_i$
✓ WB	1407+80	40' Slotted	–	9.0	–
✓		W/LW – 1.2	–	–	–
✓ WB	1381+65	40' Slotted	–	7.0	0.5
		W/LW – 1.2	0.10	0.5	–
✓ GD	27+20	LB – 1.2	0.25	2.1	–
✓ GD	25+00	LB – 1.2	0.23	2.0	–

Computed by: PBP Checked by: AEL Date: 7/23/87

ARIZONA HIGHWAY DEPARTMENT
STRUCTURES SECTION
HYDRAULICS BRANCH

MEDIAN DRAINAGE WORKSHEET

$\frac{Z}{n} = 800$

LOCATION DATA
Highway: Superstition Freeway
Location: Goldfield to US 60
Project No.: 1154

DESIGN DATA
Frequency: 10 years
P_6= _____ in. P_{24}= _____ in. P_1= _____ in.
AHW = _____

RUNOFF CALCULATIONS

From Station	To Station	L ft.	W ft.	D.A. acr.	C	T_c min.	I in/hr	Q cfs	Channel Type	S_o ft/ft	Z	n	D ft.	V fps
✓ 1395+25	1407+25	1200	38	1.047	0.60	10	4.4	2.76	Triang	0.011 .013	10	.025	0.35	2.25
check Tc: ave slope		=0.0091	ft/ft	D= 0.36 ft		Area=	1.30 ft²		V=2.12 ft/s	Tc=	1200/(2.12×60) = 9.4 min		< 10 min ∴ OK	
✓ 1407+25	1410+72	347	38	0.303	0.60	10	4.4	0.80	Triang					
✓ 1410+72	1417+00	628	40 AVE	0.577	0.95	10	4.4	2.41	Pavement					
✓ 1410+72	1417+00	628	43 AVE	0.620	0.60	10	4.4	1.64	Triang					
Total of 3 Sections								4.85	Triang	0.004	10	.025	.52	1.79

C-9

INLET CALCULATIONS

Station	Inlet Type	Q cfs	HW ft.	DHW Elev.	Dike Elev.
✓ 1407+25	C-15.80	3.4	0.35		
✓ 1417+00	C-15.80	6.4	0.52		

Channel Type: Trapezoidal
Triangular

Inlet Type: C-15.08
C-15.09
C-15.10
Pipe Culvert

Computed by: KCB 6/22/87 Checked by: AEL Date: 7/23/87

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SUPERSTITION

STATION: 1250+37

DESIGNER: JS LWD

DATE: 4/30/87 9/11/87

HYDROLOGIC AND CHANNEL INFORMATION

DRAINAGE AREA _____

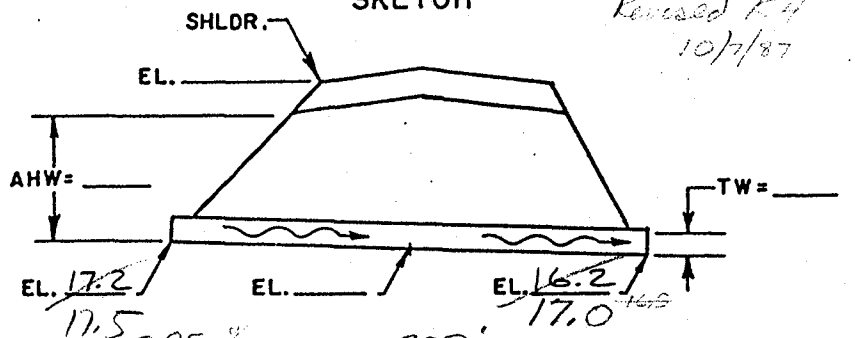
Q_1 = 29 (Q_{50}) TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25})
(Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH

Revised KH 10/7/87



S_0 = 0.42% (0.25%) L = 203' (240) L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q (CFS)	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_0 - LS_0$												
SIZE	ENTR. TYPE			HW/D	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_0	LS_0	HW					
42"	Q50	29		0.70	2.45	0.5	0.88	1.65	2.58		2.58	1.00 (1.01)	2.45	2.45				INLET CONTROL
				[illegible]	2.42	0.5	0.79	1.77	2.60		2.60	0.51	1.32	2.42				

SUMMARY & RECOMMENDATIONS

SINGLE BARREL C.M.P.

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SUPERSTITION

STATION: 1261+95

DESIGNER: LWD JB

DATE: 9/8/87 10/13/87

HYDROLOGIC AND CHANNEL INFORMATION

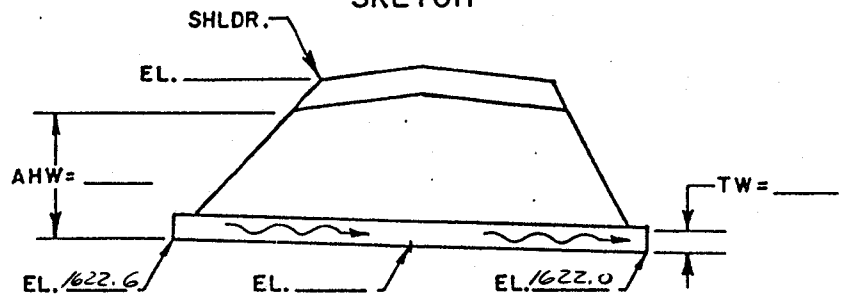
DRAINAGE AREA _____

Q_1 = 717 (Q_{50})
Q_2 = 859 (Q_{100})

TW_1 = _____
TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = 0.0038'/Ft L = 156' L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$												
SIZE	ENTR. TYPE			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_o	LS_o	HW					
2-10×6	Q_{50}	717		0.96	5.76	0.5	0.99	3.4	4.7		4.7	0.59	5.10	5.76				INLET CONTROL
2-10×6	Q_{100}	859		1.10	6.60	0.5	1.40	3.8	4.9		4.9	0.59	5.71	6.60				INLET CONTROL

SUMMARY & RECOMMENDATIONS

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SUPERSTITION

STATION: 1351+~~50~~ 20

DESIGNER: JS WD

DATE: 4/30/87 9/2/87

HYDROLOGIC AND CHANNEL INFORMATION

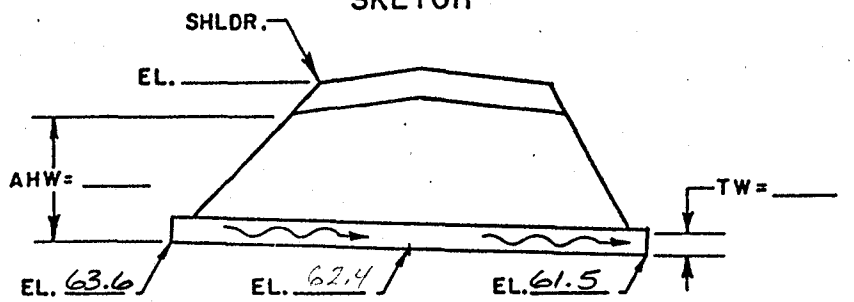
DRAINAGE AREA _____

Q_1 = 515 (Q_{50})
Q_2 = 610 (Q_{100})

TW_1 = _____
TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = ~~0.53%~~ 0.54% L = ~~396'~~ 388' L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q (CFS)	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$												
SIZE	ENTR. TYPE			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	H_o	LS_o	HW					
2-8'x6'	Q50	515		~~0.80~~ .82	~~4.80~~ .92	0.5	~~0.97~~ 0.99	~~3.15~~ 3.2	~~4.58~~ .6		~~4.58~~ .6	2.10	~~3.45~~ 3.5	~~4.80~~ .72				INLET CONTROL
2-8'x6'	Q100	610		~~0.94~~ .96	~~5.64~~ .52	0.5	1.40	~~3.50~~ 3.60	~~4.75~~ .8		~~4.75~~ .8	2.10	~~4.05~~ 4.1	~~5.64~~ .74				INLET CONTROL

SUMMARY & RECOMMENDATIONS

TWO BARREL REINFORCED CONCRETE BOX CULVERT

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SUPERSTITION

STATION: ~~1355+00~~ 1411

DESIGNER: JS LWD

DATE: 4/30/87 9/9/87

HYDROLOGIC AND CHANNEL INFORMATION

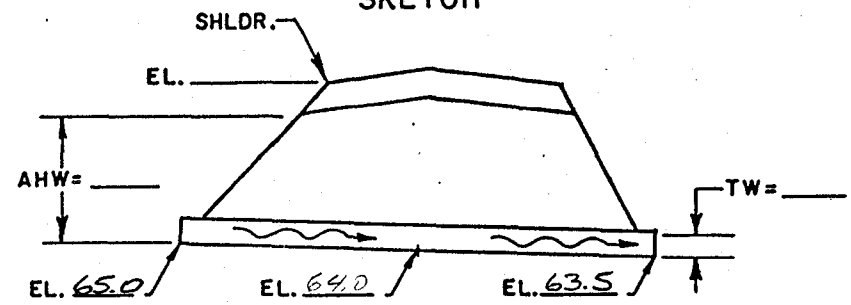
DRAINAGE AREA _____

Q_1 = 178 (Q_{50}) TW_1 = _____

Q_2 = 210 (Q_{100}) TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = ~~0.50%~~ 0.53% L = ~~297'~~ 285' L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q (cfs)	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_0 - LS_0$												
SIZE	ENTR. TYPE			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_0	LS_0	HW					
8'x6'	Q_{50}	178		0.64 ~~0.66~~	3.84 ~~3.96~~	0.5	0.49 ~~0.44~~	2.50	4.25		4.25	1.51 ~~1.49~~	3.22 ~~3.20~~	3.84 ~~3.96~~				INLET CONTROL
8'x6'	Q_{100}	210		0.72 ~~0.73~~	4.32 ~~4.38~~	0.5	0.67 ~~0.60~~	2.90 ~~2.90~~	4.40 ~~4.45~~		4.40 ~~4.45~~	1.51 ~~1.49~~	3.56	4.32 ~~4.38~~				INLET CONTROL

SUMMARY & RECOMMENDATIONS

SINGLE BARREL REINFORCED CONCRETE BOX CULVERT

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SUPERSTITION

STATION: ~~1358+00~~ 1357+00

DESIGNER: BB CWD

DATE: 4/30/87 9/9/87

HYDROLOGIC AND CHANNEL INFORMATION

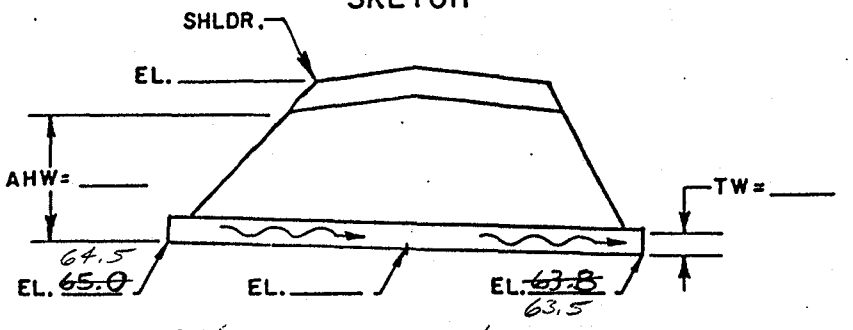
DRAINAGE AREA _____

Q_1 = 1607 (Q_{50})
Q_2 = 1895 (Q_{100})

TW_1 = _____
TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = 0.38% ~~0.44%~~ L = 262' ~~270'~~ L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q (CFS)	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$												
SIZE	ENTR. TYPE			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_o	LS_o	HW					
6-10'x6'	Q_{50}	1607		0.72	4.32	0.5	0.65	2.80	4.40		4.40	1.19	3.86	4.32				INLET CONTROL
6-10'x6'	Q_{100}	1895		0.80	4.80	0.5	0.91	3.15	4.58		4.58	1.19	4.30	4.80				INLET CONTROL

SUMMARY & RECOMMENDATIONS

6 BARREL BOX CULVERT – OVERSIZED TO INSURE BACKWATER (HW) WILL NOT ENCROACH INTO THE LAND NORTH OF THE R/W

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SUPERSTITION

STATION: 1364+82

DESIGNER: LWD JB

DATE: 9/8/87 10/10/87

HYDROLOGIC AND CHANNEL INFORMATION

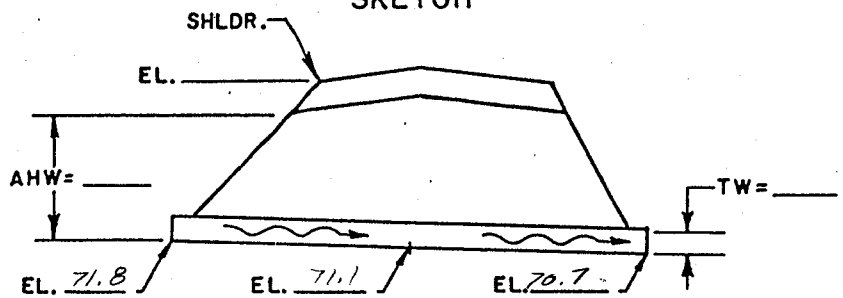
DRAINAGE AREA _____

Q_1 = 8 (Q_{50})
Q_2 = 10 (Q_{100})

TW_1 = _____
TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = 0.62% L = 177 L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_0 - LS_0$												
SIZE	ENTR. TYPE			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_0	LS_0	HW					
1-24"	Q_{50}	8		0.73	1.46	0.5	0.97	1.00	1.50		1.50	1.10	1.37					INLET CONTROL
1-24"	Q_{100}	10		0.84	1.68	0.5	1.45	1.10	1.55		1.55	1.10	1.90					OUTLET CONTROL

SUMMARY & RECOMMENDATIONS

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SUPERSTITION

STATION: ~~1371+00~~ 0+76

DESIGNER: JS LWD

DATE: 4/30/87 9/10/87

HYDROLOGIC AND CHANNEL INFORMATION

DRAINAGE AREA _____

Q_1 = 21 (Q_{50})

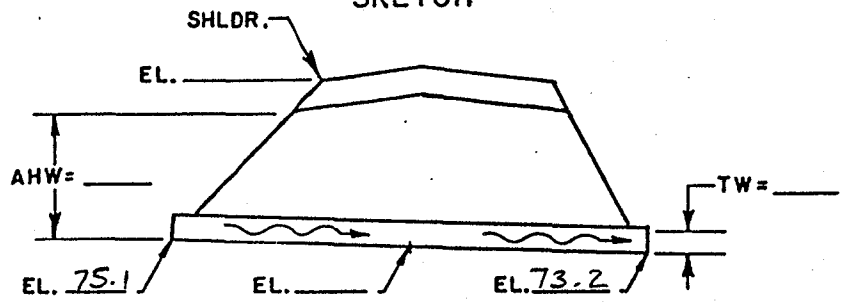
Q_2 = 26 (Q_{100})

TW_1 = _____

TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = ~~0.87%~~ 1.08% L = ~~217'~~ 176' L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q (CFS)	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_0 - LS_0$												
SIZE	ENTR. TYPE			HW/D	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_0	LS_0	HW					
36"	Q50	21		0.73	2.19	0.5	~~0.95~~	~~1.42~~ 1.45	2.21 2		2.21 2	~~1.89~~ 1.90	~~1.21~~ 1.17	2.19				INLET CONTROL
36"	Q100	26		0.81	2.43	0.5	~~1.45~~ 1.23	1.65	2.38 2		2.38 2	~~1.89~~ 1.90	~~1.89~~ 1.70	2.43				INLET CONTROL

SUMMARY & RECOMMENDATIONS

SINGLE BARREL C.M.P.

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SUPERSTITION 4+92

STATION: 1375+00

DESIGNER: BB LWD

DATE: 4/30/87 9/10/87

HYDROLOGIC AND CHANNEL INFORMATION

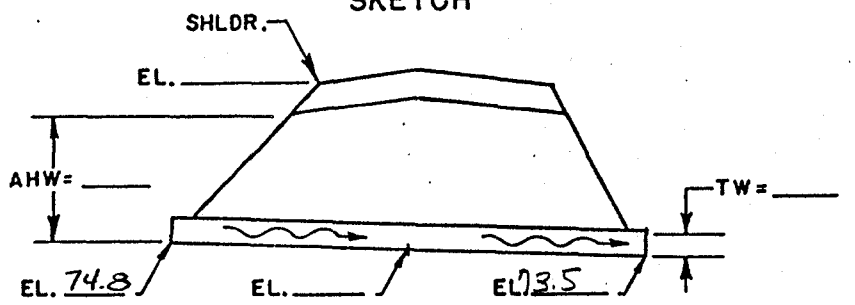
DRAINAGE AREA _____

Q_1 = 138 (Q_{50}) TW_1 = _____

Q_2 = 170 (Q_{100}) TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = 0.62% L = 208' L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q (CFS)	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_0 - LS_0$												
SIZE	ENTR. TYPE			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	H_0	LS_0	HW					
6'x6'	Q_{50}	138		0.66	3.96	0.5	0.47	2.55	4.28		4.28	1.29	3.46	3.96				INLET CONTROL
6'x6'	Q_{100}	170		0.75	4.50	0.5	0.70	3.00	4.50		4.50	1.29	3.91	4.50				INLET CONTROL

SUMMARY & RECOMMENDATIONS

SINGLE BARREL REINFORCED CONCRETE BOX CULVERT

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SUPERSTITION

STATION: 1379+50 4

DESIGNER: BB LWD

DATE: 4/30/87 9/10/87

HYDROLOGIC AND CHANNEL INFORMATION

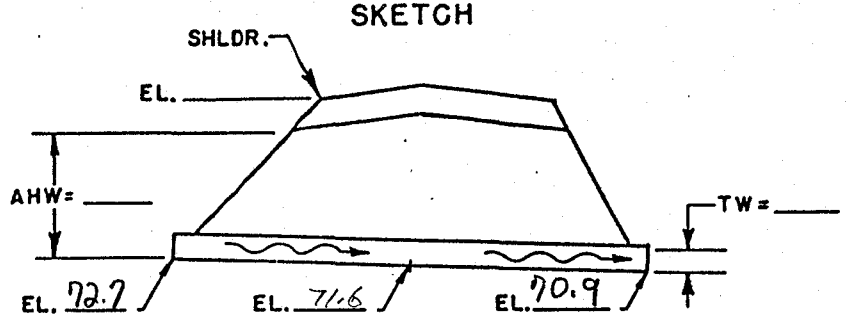
DRAINAGE AREA _____

Q_1 = 89 (Q_{50}) TW_1 = _____

Q_2 = 108 (Q_{100}) TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = ~~0.51~~ 0.53 % L = ~~352~~ 37' L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q (CFS)	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$												
SIZE	ENTR. TYPE			HW/D	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_o	LS_o	HW					
6'x6'	Q50	89		0.48~~8~~	2.~~97~~ 88	0.5	0.2~~8~~ 2	1.90	3.95		3.95	1.~~80~~ 79	2.~~40~~ 38	2.~~97~~ 88				INLET CONTROL
6'x6'	Q100	108		0.5~~6~~ 5	3.3~~6~~ 0	0.5	0.3~~8~~ 4	2.1~~8~~ 6	4.08		4.08	1.~~80~~ 79	2.63	3.3~~6~~ 0				INLET CONTROL

SUMMARY & RECOMMENDATIONS

SINGLE BARREL REINFORCED CONCRETE BOX CULVERT

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SUPERSTITION

STATION: 1382+~~50~~ 28

DESIGNER: JS LWD

DATE: 4/30/87 9/9/87

HYDROLOGIC AND CHANNEL INFORMATION

DRAINAGE AREA _____

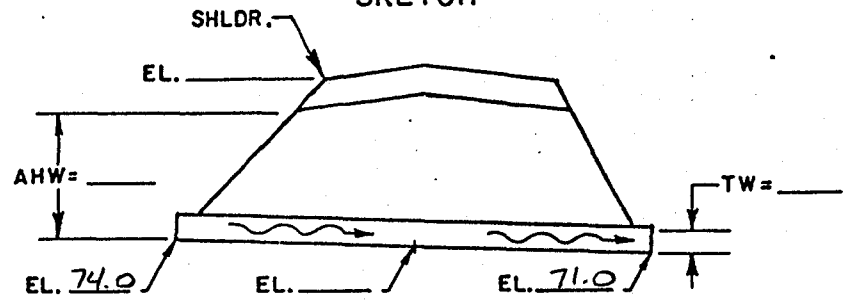
#37 #36

Q_1 = 227 (Q_{50}) + 121 (Q_{25}) = 348 TW_1 = _____

Q_2 = 264 (Q_{100}) + 147 (Q_{50}) = 411 TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = 0.7~~2~~3 % L = 41~~6~~3' L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q (CFS)	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$												
SIZE	ENTR. TYPE			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_o	LS_o	HW					
2-6'x6'	Q50	348		0.76	4.56	0.5	1.05	3.0	4.50		4.50	3.0~~0~~1	2.5~~8~~4	4.56				INLET CONTROL
2-6'x6'	Q100	411		0.85	5.10	0.5	1.35	3.4	4.70		4.70	3.0~~0~~1	3.0~~5~~4	5.10				INLET CONTROL

SUMMARY & RECOMMENDATIONS

TWO BARREL REINFORCED CONCRETE BOX CULVERT

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SUPERSTITION

STATION: 1403+20

DESIGNER: BB LWD

DATE: 4/30/87 9/10/87

HYDROLOGIC AND CHANNEL INFORMATION

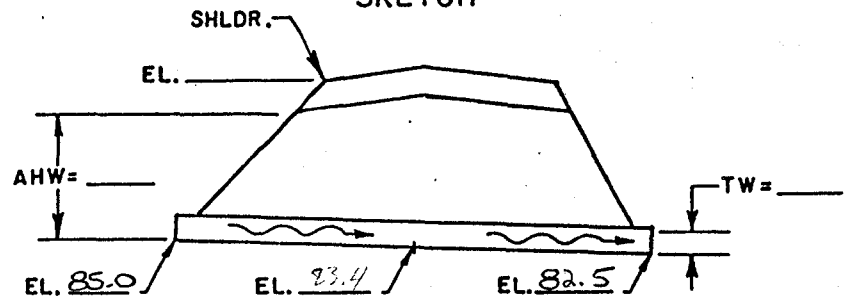
DRAINAGE AREA _____

Q_1 = 408 (Q_{50})
Q_2 = 482 (Q_{100})

TW_1 = _____
TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = 0.6~~0~~1 % L = ~~420~~ 409' L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

HEADWATER COMPUTATION

CULVERT DESCRIPTION: SIZE	CULVERT DESCRIPTION: ENTR. TYPE	Q (CFS)	CAP. CHART HW	INLET CONT.: HW/D	INLET CONT.: HW	OUTLET CONTROL HW = H + h_o − LS_o: K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_o	LS_o	HW	CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
2-8'x6'	Q50	408		0.70	4.20	0.5	~~0.69~~ 0.70	~~2.78~~ 3	~~4.38~~ 6		~~4.38~~ 6	~~2.52~~ .47	~~2.58~~ 7	4.20				INLET CONTROL
2-8'x6'	Q100	482		0.78	4.68	0.5	~~0.94~~ 0.98	~~3.10~~ 05	~~4.58~~ 2		~~4.58~~ 2	~~2.52~~ .49	~~2.97~~ 3.01	4.68				INLET CONTROL

SUMMARY & RECOMMENDATIONS

TWO BARREL REINFORCED CONCRETE BOX CULVERT

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SUPERSTITION

STATION: 1410+~~50~~ +35

DESIGNER: JS LWD

DATE: 4/30/87 9/22/87

HYDROLOGIC AND CHANNEL INFORMATION

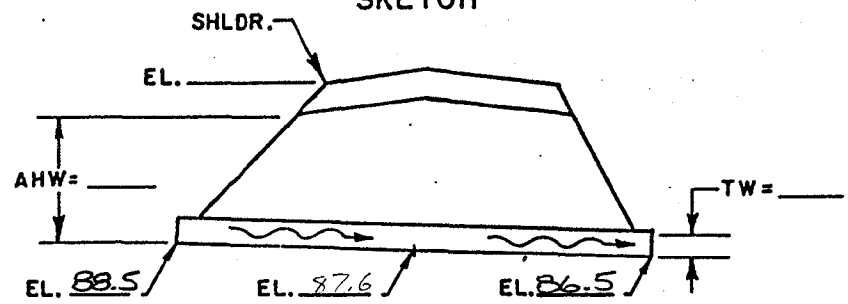
DRAINAGE AREA _____

Q_1 = 43 (Q_{50}) TW_1 = _____

Q_2 = 53 (Q_{100}) TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = ~~0.72%~~ 0.82% L = ~~276'~~ 45' L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q (CFS)	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$												
SIZE	ENTR. TYPE			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_o	LS_o	HW					
48"	Q_{50}	43		~~0.73~~ 2	~~2.92~~ .92	0.5	~~1.15~~ .08	1.95	2.98		2.98	~~1.99~~ 2.01	~~2.14~~ .05	~~2.92~~ .92				INLET CONTROL
48"	Q_{100}	53		0.81	3.24	0.5	~~1.75~~ .62	2.20	3.10		3.10	~~1.99~~ 2.51	~~2.86~~ .71	3.24				INLET CONTROL

SUMMARY & RECOMMENDATIONS

SINGLE BARREL C.M.P.

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SUPERSTITION

STATION: 1414+~~50~~ +45

DESIGNER: JS LWD

DATE: 4/30/87 9/22/87

HYDROLOGIC AND CHANNEL INFORMATION

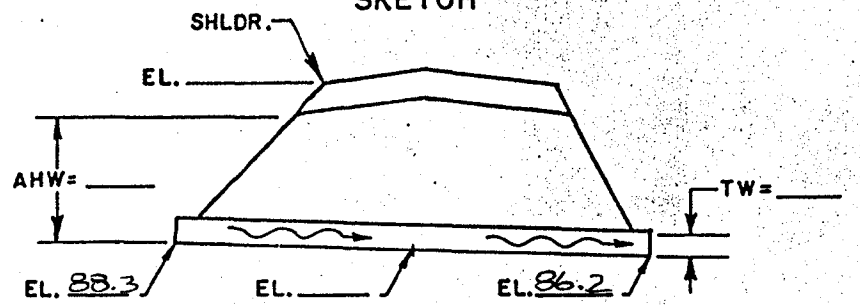
DRAINAGE AREA _____

Q_1 = 35.5 (Q_{50}) TW_1 = _____

Q_2 = 44 (Q_{100}) TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = ~~0.98%~~ 1.08% L = ~~216'~~ 195' L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q (CFS)	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$												
SIZE	ENTR. TYPE			HW/D	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_o	LS_o	HW					
2-30"	Q50	35.5		0.8~~6~~5	2.1~~8~~2	0.5	1.~~80~~60	1.45	1.98		1.98	2.1~~2~~1	1.~~66~~47	2.1~~8~~2				INLET CONTROL
2-30"	Q100	44		~~1.00~~ 0.99	2.~~50~~45	0.5	2.~~60~~50	1.~~52~~60	2.0~~1~~5		2.0~~1~~5	2.1~~2~~1	2.~~49~~41	2.~~50~~44				INLET CONTROL

SUMMARY & RECOMMENDATIONS

TWO BARREL C.M.P.

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SUPERSTITION

STATION: ~~1417+00~~ 1417+50

DESIGNER: JS LWD

DATE: 4/30/87 9/12/87

HYDROLOGIC AND CHANNEL INFORMATION

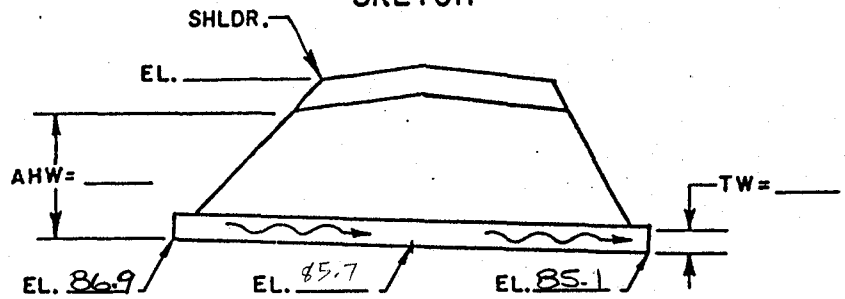
DRAINAGE AREA _____

Q_1 = 35.5 (Q_{50}) TW_1 = _____

Q_2 = 44 (Q_{100}) TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25})
(Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = ~~0.77%~~ 0.90% L = ~~234'~~ 200' L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q (CFS)	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$												
SIZE	ENTR. TYPE			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_o	LS_o	HW					
3-30"	Q50	35.5		0.665	1.66	0.5	~~0.87~~ .75	1.15	1.83		1.83	1.80	~~0.90~~ .75	1.66				INLET CONTROL
3-30"	Q100	44		0.76	1.90	0.5	~~1.35~~ .13	~~1.35~~ 0	~~1.93~~ 0		~~1.93~~ 0	1.80	~~1.48~~ .23	1.90				INLET CONTROL

SUMMARY & RECOMMENDATIONS

THREE BARREL C.M.P.

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SUPERSTITION

STATION: 1420+00 +16

DESIGNER: JS LWD

DATE: 4/30/87 9/22/87

HYDROLOGIC AND CHANNEL INFORMATION

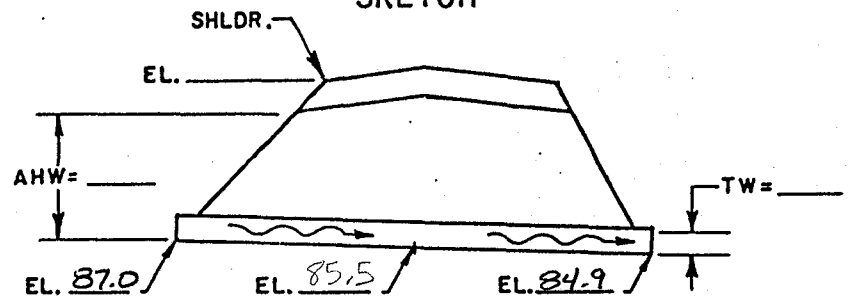
DRAINAGE AREA _____

Q_1 = 38 (Q_{50})
Q_2 = 47 (Q_{100})

TW_1 = _____
TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = ~~0.98%~~ 1.02% L = ~~215~~ 206' L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_0 - LS_0$												
SIZE	ENTR. TYPE	(CFS)	HW	$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_0	LS_0	HW					
4-24"	Q_{50}	38		1 ~~0.84~~	2 ~~1.68~~	0.5	.55 ~~1.6~~	1.10	1.55		1.55	2.10 ~~2.11~~	1.00 ~~1.04~~	2 ~~1.68~~				INLET CONTROL
4-24"	Q_{100}	47		3 ~~0.90~~	.86 ~~1.90~~	0.5	.95 ~~2.4~~	0 ~~1.20~~	0 ~~1.60~~		0 ~~1.60~~	2.10 ~~2.11~~	5 ~~1.83~~	.86 ~~1.90~~				INLET CONTROL

SUMMARY & RECOMMENDATIONS

FOUR BARREL C.M.P.

TUDOR ENGINEERING COMPANY

BY JB DATE 5/8/87 PROJECT SUPERSTITION SHEET NO. 1 OF
CHKD. BY BCB DATE 6/20/87 DRAINAGE JOB NO. 1154

CULVERT REPLACEMENT @ STA 1425+00

At station 1425+00, there is an existing 5'x4' Box Culvert under EB U.S.60 and two existing 48" CMP's under the WB Lanes.

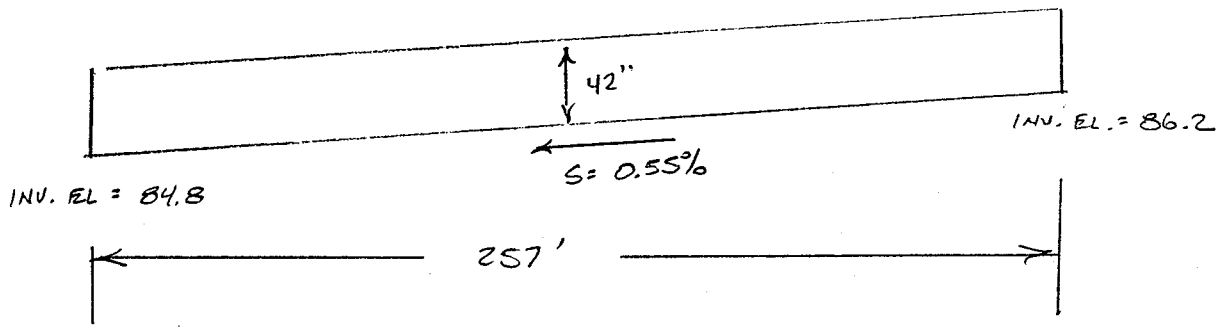
The elevations of all of the existing culverts are not suitable for the required clearance under the proposed Superstition Freeway.

Replacing the entire length of the culverts will be a neater, cleaner installation. The newest of the existing was constructed in 1964, so it will not hurt to replace everything.

Since there is no standard for a multiple headwall installation for 48" pipe, the new installation will consist of 42" pipe. Comparison of the opening areas of the two sizes results in three 42" CMP's being required to replace the existing two 48" CMP's.

The smaller diameter has one other advantage also, being half a foot smaller in diameter, it will allow higher invert elevations at the ends, making daylighting the flow lines easier.

INSTALLATION: (3x42")



CULVERT REPLACEMENT @ Sta 1428+50

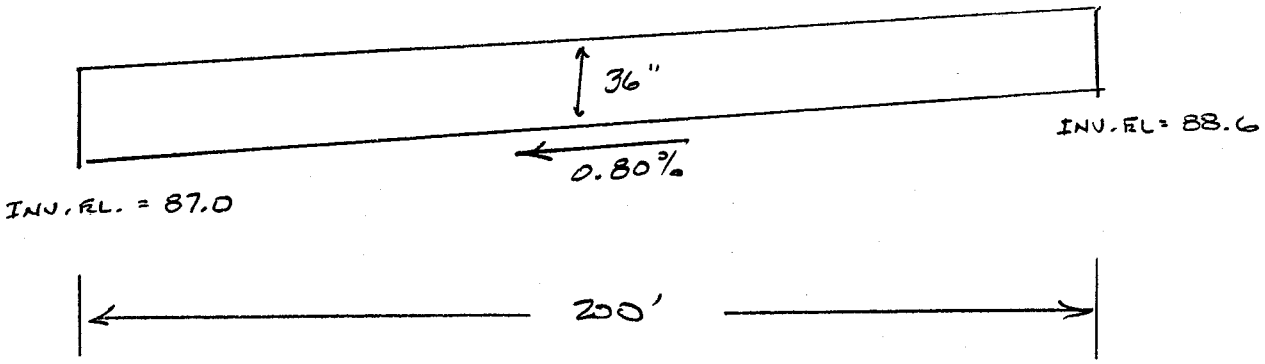
At station 1428+50, this is an existing 4'x3' box culvert under EB US 60, and a 48" CMP under WB US 60.

The elevations of all of the existing culverts are not suitable for the required clearance under the proposed Superstition Freeway.

By replacing both of the existing culverts, all the old, less reliable items will be removed, thereby eliminating the possiblity of having to tear up the new roadway in the near future. The existing culverts are a minmum of 20 years old.

To get the clearance required under the new roadway, smaller diameter culverts will have to be used. To replace the existing single 48" CMP, two 36" CMP's will be used. By comparing opening areas, the new CMP's will be more than adequate.

INSTALLATION: (2x36")



TUDOR ENGINEERING COMPANY

BY B DATE 7/27/87 SUBJECT Superstition Fenny SHEET NO. 1 OF 2
CHKD. BY WD DATE 8/13/87 JOB NO. 1154

CULVERT INSTALLATIONS ALONG
GOLDFIELD ROAD

GOLDFIELD STA 158+90

This culvert will pass the runoff from the area between U.S. 60 & Superstition, east of Goldfield.

The culvert now in use for this area is an 18" ϕ CMP in approximately the same place as the new culvert is proposed.

The new culvert will be an 24" ϕ, in keeping with ASMC's standard of using a minimum of a 24" ϕ for all culvert installations.

DESIGN PARAMETERS:

24" Diameter (Single Barrel)
92' Length (30° Skew)
INV. in : 1688.96
Inv. out : 1688.50
Slope : 0.0050%

GOLDFIELD STA 160+95

At this culvert crossing, currently an 18" CMP is in use. The existing Goldfield road also is in a dip section, to allow overtopping at high flows.

In a effort to pass more flow without overtopping the roadway, a multiple 24"Φ culvert installation will be constructed. Due to clearance constraints, a 24"Φ culvert is the largest that can be installed.

DESIGN PARAMETERS:

24" Diameter (3 Barrel)
88' Length (30° Skew)
INV. IN : 1690.44
INV. OUT : 1690.00
Slope : 0.0050%

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SUPERSTITION

STATION: I-D 35+32

DESIGNER: JS RDH 10/15/87

DATE: 10/7/87

HYDROLOGIC AND CHANNEL INFORMATION

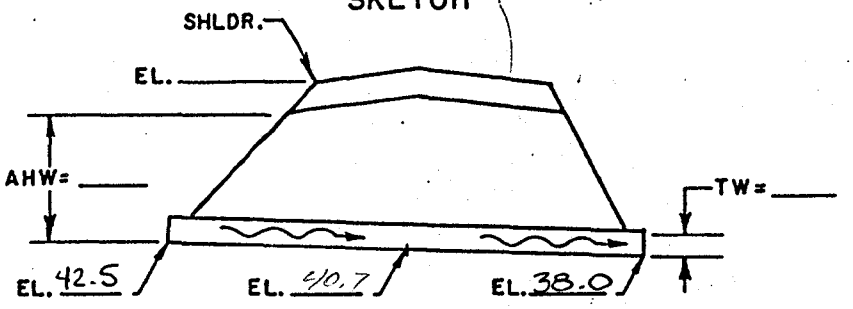
DRAINAGE AREA _____

Q_1 = 1.5 (Q_{50})
Q_2 = 2.5 (Q_{100})

TW_1 = _____
TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = 0.0346'/FT L = 130' L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_0 - LS_0$												
SIZE	ENTR. TYPE			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_0	LS_0	HW					
24"	Q_{50}	1.5		<0.5	1.0	0.5	<0.4	0.5	1.25		1.25	4.5						SEE BELOW
24"	Q_{100}	2.5		<0.5	1.0	0.5	<0.4	0.5	1.25		1.25	4.5						SEE BELOW

SUMMARY & RECOMMENDATIONS

USING 24" Ø CULVERT AS REQUIRED MINIMUM (BY ASMC) - FLOW IS SO LOW FOR THIS SIZE CULVERT THAT THE HW CANNOT BE CORRECTLY COMPUTED.

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SUPERSTITION

STATION: T-A 13+44

DESIGNER: JB KDH 10/15/87

DATE: 10/7/87

HYDROLOGIC AND CHANNEL INFORMATION

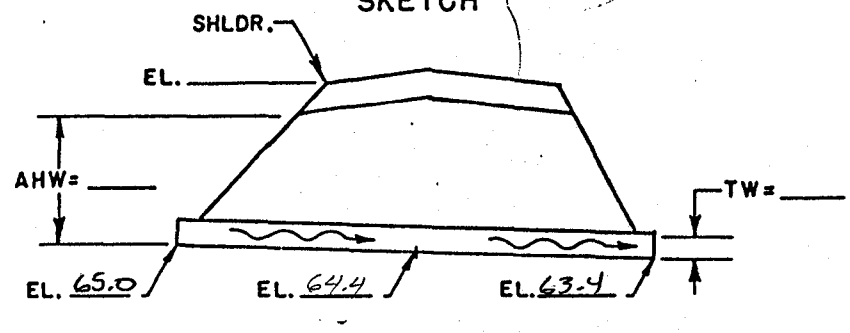
DRAINAGE AREA _____

Q_1 = 1.5 (Q_{50})
Q_2 = 2.5 (Q_{100})

TW_1 = _____
TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = 0.0158'/FT L = 101' L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_0 - LS_0$												
SIZE	ENTR. TYPE			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_0	LS_0	HW					
24"	Q50	1.5		<0.5	1.0	0.5	<0.4	0.5	1.25		1.25	1.60						SEE BELOW
24"	Q100	2.5		<0.5	1.0	0.5	<0.4	0.5	1.25		1.25	1.60						SEE BELOW

SUMMARY & RECOMMENDATIONS

USING 24" Q CULVERT AS REQUIRED BY ASMC AS MINIMUM, FLOW IS SO LOW FOR THIS SIZE CULVERT THAT THE HW CANNOT BE CORRECTLY COMPUTED.

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SUPERSTITION

STATION: T-C 26+95

DESIGNER: JS CDH 10/15/87

DATE: 10/7/87

HYDROLOGIC AND CHANNEL INFORMATION

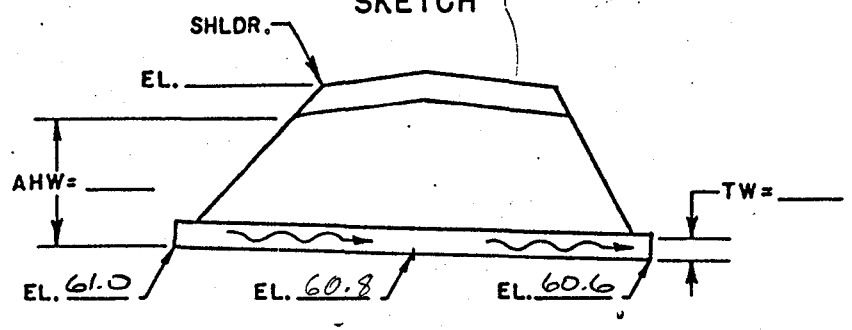
DRAINAGE AREA _____

Q_1 = 1.5 (Q_{50}) TW_1 = _____

Q_2 = 2.5 (Q_{100}) TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = 0.0045'/FT L = 88' L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_0 - LS_0$												
SIZE	ENTR. TYPE			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_0	LS_0	HW					
24"	Q_{50}	1.5		<0.5	1.0	0.5	<0.4	0.5	1.25		1.25	0.40						SEE BELOW
24"	Q_{100}	2.5		<0.5	1.0	0.5	<0.4	0.5	1.25		1.25	0.40						SEE BELOW

SUMMARY & RECOMMENDATIONS

USING 24" Ø AS REQUIRED BY ASMC AS MINIMUM, FLOW IS SO LOW FOR THIS CULVERT SIZE, THAT THE HW CANNOT BE CORRECTLY COMPUTED.

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SUPERSTITION

STATION: T-D 35+50

DESIGNER: JS KDH 10/15/87

DATE: 10/7/87

HYDROLOGIC AND CHANNEL INFORMATION

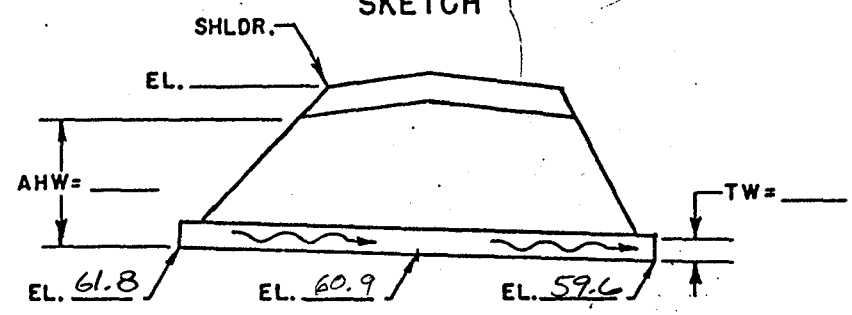
DRAINAGE AREA _____

Q_1 = 1.5 (Q_{50})
Q_2 = 2.5 (Q_{100})

TW_1 = _____
TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = 0.0196'/FT L = 112' L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$												
SIZE	ENTR. TYPE			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_o	LS_o	HW					
24"	Q50	1.5		<0.5	1.0	0.5	<0.4	0.5	1.25		1.25	2.19						SEE BELOW
24"	Q_{100}	2.5		<0.5	1.0	0.5	<0.4	0.5	1.25		1.25	2.19						SEE BELOW

SUMMARY & RECOMMENDATIONS

USING 24" Φ AS REQUIRED BY ASMC AS MINIMUM, FLOW IS SO LOW FOR THIS SIZE CULVERT THAT THE HW CANNOT BE CORRECTLY COMPUTED.

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SUPERSTITION

STATION: G-A 15+60

DESIGNER: JS KDH 10/15/87

DATE: 10/7/87

HYDROLOGIC AND CHANNEL INFORMATION

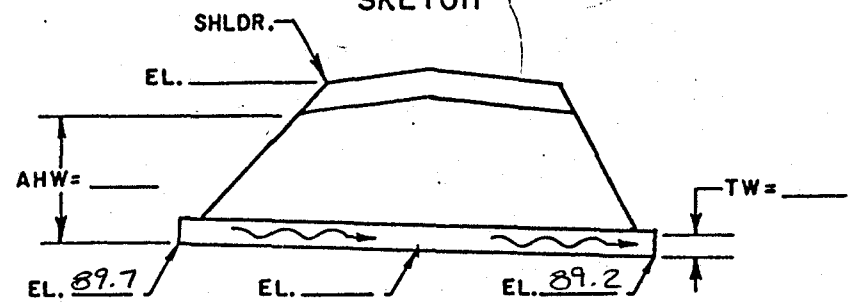
DRAINAGE AREA _____

Q_1 = 1.5 (Q_{50})
Q_2 = 2.5 (Q_{100})

TW_1 = _____
TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = 0.0037'/FT L = 135' L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL HW = H + h_o − LS_o												
SIZE	ENTR. TYPE			HW/D	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_o	LS_o	HW					
24"	Q_{50}	1.5		<0.5	1.0	0.5	<0.4	0.5	1.25		1.25	0.50						SEE BELOW
24"	Q_{100}	2.5		<0.5	1.0	0.5	<0.4	0.5	1.25		1.25	0.50						SEE BELOW

SUMMARY & RECOMMENDATIONS

USING A 24"Ø CULVERT, AS REQUIRED AS MINIMUM (BY ASMC) – FLOW IS SO LOW FOR THIS SIZE CULVERT THAT THE HW CANNOT BE CORRECTLY COMPUTED.

TUDOR ENGINEERING COMPANY

BY JS DATE 10/27/87 SUBJECT SUPERSTITION SHEET NO. ____ OF ____
CHKD. BY KDH DATE 10/28/87 JOB NO. 1154

DRAINAGE → GOLDFIELD/US 60

Culvert on G-N Line to drain island area east into existing median of U.S. 60

Sta G-N 11+67

Pavement El @ west edge G-N 1710.93

Use 6:1 slope down for ± 9' → El = 1709.44

To drain area, use 24" ϕ pipe culvert, but this diameter causes excess excavation in island area for the culvert inlet due to clearance needed under roadway.
Therefore, use an 18" ϕ pipe culvert.

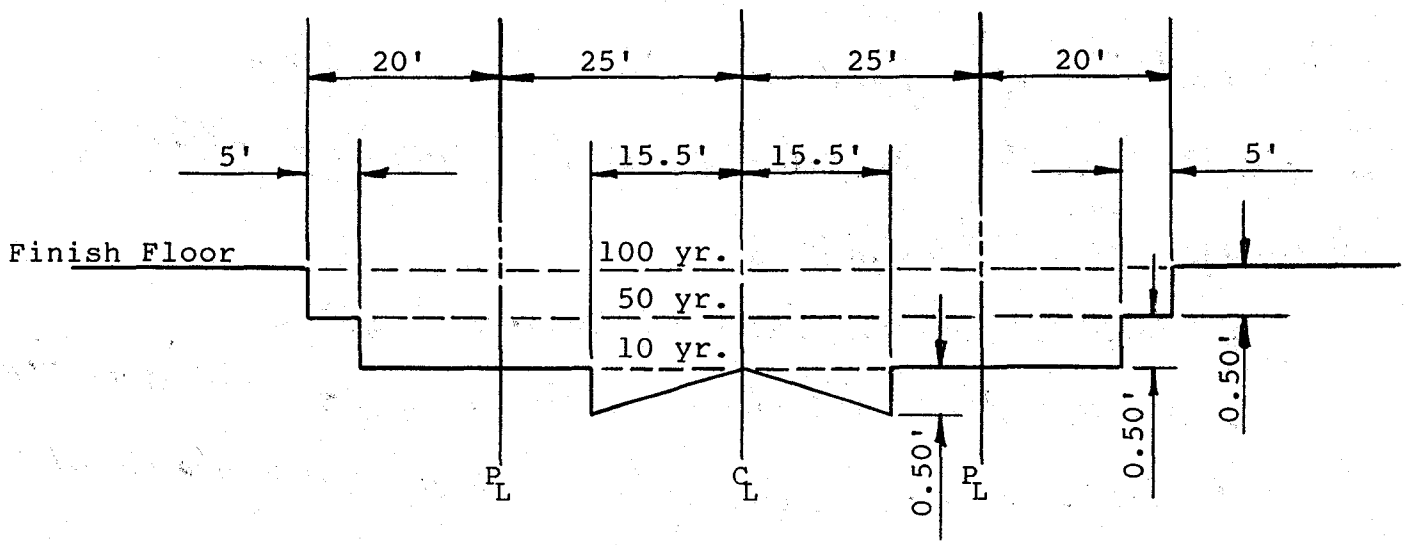
Inlet El. = 1708.00
Outlet El. = 1704.96
Length = 80 FT
Slope = 0.038 ′/FT

BROWN ENGINEERING CO., INC.

3835 NORTH 32ND STREET
PHOENIX, ARIZONA 85018
955-4660

TYPICAL 50' R.O.W.

6" VERTICAL CURB



10 YEAR

Area = 10.39
W.P. = 32.01
H.R. = 0.3246
n = 0.015
Slope = Varies

50 YEAR

Area = 35.39
W.P. = 52.01
H.R. = 0.6804
n = 0.017884
Slope = Varies

100 YEAR

Area = 68.89
W.P. = 53.35
H.R. = 1.29128
n = 0.01781116
Slope = Varies

SLOPE	V f/s			Q cf/s		
	10	50	100	10	50	100
0.00200	2.08	2.87	4.43	21.61	101.57	305.18
0.00500	3.30	4.54	7.00	34.29	160.67	482.23
0.00748	4.03	5.55	8.56	41.87	196.41	589.70
0.00762	4.07	5.60	8.64	42.29	198.18	595.21
0.00843	4.28	5.89	9.09	44.47	208.45	626.21
0.00948	4.54	6.25	9.64	47.17	221.19	664.10
0.00986	4.63	6.37	9.83	48.11	225.43	677.19
0.01050	4.78	6.57	10.15	49.66	232.51	699.23
0.01376	5.47	7.53	11.61	56.83	266.49	799.81
0.01500	5.71	7.86	12.13	59.33	278.17	835.64
0.01803	6.26	8.62	13.29	65.04	305.06	915.55
0.02135	6.81	9.38	14.47	70.76	331.96	996.84
0.02872	7.90	10 88	16.78	82.08	385.04	1155.97

3.0 - DESIGN METHODOLOGY:

11-2 / This section of report describes the methodology associated with Final design of the flowing off-site drainage facilities.

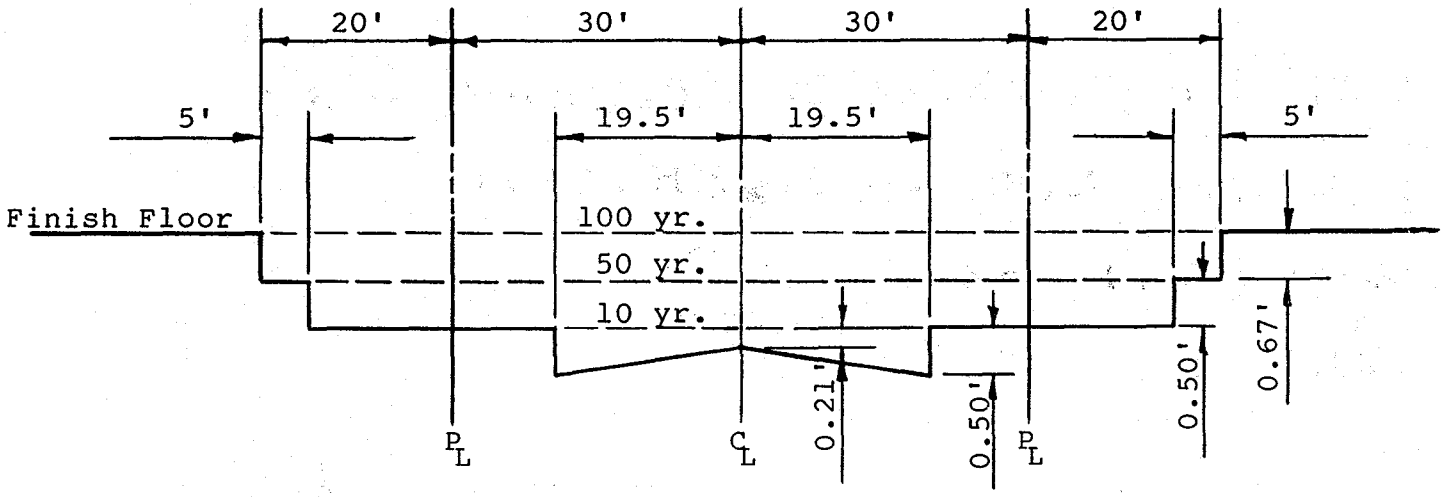
- North Diversion Dome Detention basin
- Weekes Wash detention basin (100 yr, 24 hr duration)
- Pass-Through culverts (50 yr, 24 hours duration)

BROWN ENGINEERING CO., INC.

3835 NORTH 32ND STREET
PHOENIX, ARIZONA 85018
955-4660

TYPICAL 60' R.O.W.

6" VERTICAL CURB



10 YEAR	50 YEAR	100 YEAR
Area = 13.845	Area = 43.845	Area = 84.045
W.P. = 40.01	W.P. = 62.01	W.P. = 63.35
H.R. = 0.3460	H.R. = 0.7071	H.R. = 1.3268
n = 0.0150	n = 0.0179	n = 0.01784
Slope = Varies	Slope = Varies	Slope = Varies

SLOPE	V f/s			Q cf/s		
	10	50	100	10	50	100
0.00884	4.57	6.19	9.46	63.29	271.40	731.54
0.03748	9.42	12.74	19.49	130.42	558.59	1638.04

PHASE III : IRONWOOD ROAD to US 60

By: Tudor Engineering Company (November 1987)

SUBJECT : SUPERSTITION FREEWAY (SR 360)

PROJECT NO. : F-028-1-314PE-514C

CONTRACT NO. : 86-35

FOR : ADOT

i - This project does not deal with offsite watershed. and Basicly Rely on "SUPERSTITION FREEWAY-COMPREHENSIVE OFFSITE DRAINAGE PLAN" by A-N West on Feb. 1987.

TUDOR ENGINEERING COMPANY

BY JS DATE 10/27/87 SUBJECT SUPERSTITION FRWY SHEET NO. ____ OF ____
CHKD. BY KDH DATE 10/28/87 JOB NO. 1154

US60/GOLDFIELD DRAINAGE (con't)

Catch Basin on north end of curbed island
G11

Drain into island & run ditch south on island to near Sta G-N 10+30 & drain into existing U.S. 60 median.

Pavement EL. @ G11 → 1708.22
use 18"Φ pipe & C.B. depth of 2 FT, since pipe runs into island, not under pavement.

Use 20 L.F. of 18"Φ RCP @ 0.006'/FT - daylight to ditch on island. Outlet EL - 1706.10

Elevations on island side of G-N Line:

Pavement - 1704.81
Top curb - 1705.39
4:1 slope @ 13' - 1702.14

Elevations on east side of G-N Line:

Pavement - 1707.95
Elev. @ exist. ditch - 1701.00

Length - 90' (to clear all embankment)
Slope - 0.013'/FT
Inlet EL - 1702.13
Outlet EL - 1700.96
CMP Pipe Clv. (18"Φ)
Sta G-N 10+30, NO SKEW