OSBORN ROAD STORM DRAIN

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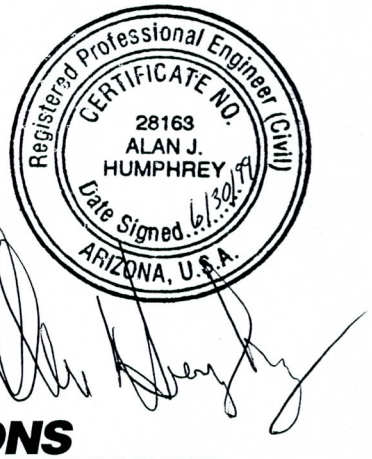
ALTERNATIVE ANALYSIS REPORT

JUNE 30, 1999



Submitted to:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Submitted by:

PB PARSONS BRINCKERHOFF

100 YEARS

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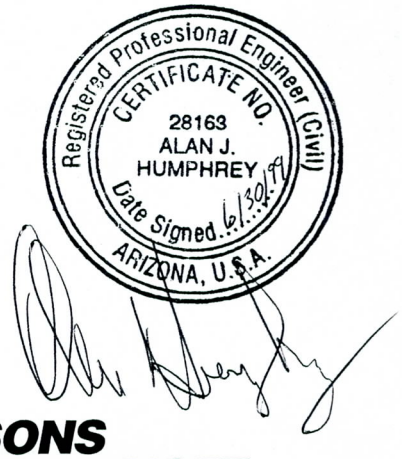

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EXECUTIVE SUMMARY

Location

The project site is located in Scottsdale, Arizona. It is bounded on the south and west by the Papago Buttes, on the north by the Arizona Canal and on the east by Indian Bend Wash. The general alignment of the project is along Osborn Road between 60th Street and the wash. The Osborn Road Storm Drain, which is approximately 2.5 miles long, begins at a detention basin located at the Marriott Brighton Gardens assisted living facility at Thomas Road and 61st Place. The proposed storm drain will convey flows from this existing detention basin to a second proposed detention basin in Paiute Park, east of the Cross Cut Canal and south of Osborn Road. A second section of storm drain conveys the runoff from Paiute Park to Indian Bend Wash. The routing of the storm drain between Paiute Park and Indian Bend Wash is the subject of this Alternative Analysis Report.

Study Purpose

The *Scottsdale-Tempe-Phoenix (STP) Papago Regional Flood Control Project Watershed Study, 1997* by Kimley-Horn and Associates, Inc. recommended construction of a storm drain along Osborn Road from Paiute Park to Indian Bend Wash. A subsequent change order (*Change Order #2, Alternatives for Osborn Road Alignment, STP Papago Regional Flood Control Project, 1998* by Kimley-Horn and Associates, Inc.) considered three additional routes for the storm drain between Paiute Park and Indian Bend Wash. The purpose of this Alternative Analysis Report is to re-examine the four alternative alignments described in *Change Order #2* in greater detail to ensure the most efficient and least disruptive alignment is carried forward to final design. The original alignments identified in *Change Order #2* were examined to determine the cost and feasibility of locating a large diameter storm drain along the alignment. Parsons Brinckerhoff has considered the alignments to a level of detail that was beyond the scope of *Change Order #2.*

Alternative Descriptions

The first segment of the storm sewer from Paiute Park to Indian Bend Wash is routed along the same alignment for the four alternatives analyzed. The inlet at Paiute Park is located about 900 feet south of Osborn Road and just west of 66th Street. The storm drain is routed north to Osborn Road in an alley that parallels 66th Street. From there, the system continues eastward to 71st Street. The alignment between Paiute Park and 71st Street is common to all four alternatives. Alternative D is routed southward at 71st Street. The other three alternatives continue east on Osborn Road, past Scottsdale Road.

Alternative D, 71st Street Alignment

The 71st Street Alignment is the recommended alternative. The routing is hydraulically feasible, but utility conflicts result in a pipe slope of 0.0015 feet per foot from Scottsdale Road to Indian Bend Wash. Although this is flatter than the desired minimum slope of 0.0020 feet per foot, it is an improvement over the absolute minimum of 0.0010 feet per foot found in Alternative B.

Advantages

The principal advantage of this alignment is the construction of one mile of storm drain from the Osborn Road/71st Street intersection to Earll Drive and Indian Bend Wash through neighborhoods which do not currently have storm drain protection. For the incremental comparative cost of 10% over the cost of Alternative A, this alternative provides a second storm drain system between Paiute Park and Indian Bend Wash. This alternative takes full advantage of existing storm drain systems by leaving them intact.

Alternative D causes the least disruption of traffic to all the alternatives, thereby having the least potential for changes during construction due to access and maintenance of traffic issues. Construction on the heavily traveled area of Osborn Road east of Scottsdale Road is avoided altogether.

Disadvantages

As with Alternative B, the route is approximately one-half mile longer than Alignment A. Consequently, the comparative cost of Alternative D is $585,400 more than Alternative A.

1.0 INTRODUCTION

1.1 Location

The project site is located in Scottsdale, Arizona. It is bounded on the south and west by the Papago Buttes, on the north by the Arizona Canal and on the east by Indian Bend Wash. The general alignment of the project is along Osborn Road between 60th Street and the wash. The project area is shown on the Vicinity Map, Figure 1. The Osborn Road Storm Drain, which is approximately 2.5 miles long, begins at a detention basin located at the Marriott Brighton Gardens assisted living facility at Thomas Road and 61st Place. The proposed storm drain will convey flows from this existing detention basin to a second proposed detention basin in Paiute Park, east of the Cross Cut Canal and south of Osborn Road. A second section of storm drain conveys the runoff from Paiute Park to Indian Bend Wash. The routing of the storm drain between Paiute Park and Indian Bend Wash is the subject of this Alternative Analysis Report.

1.2 History

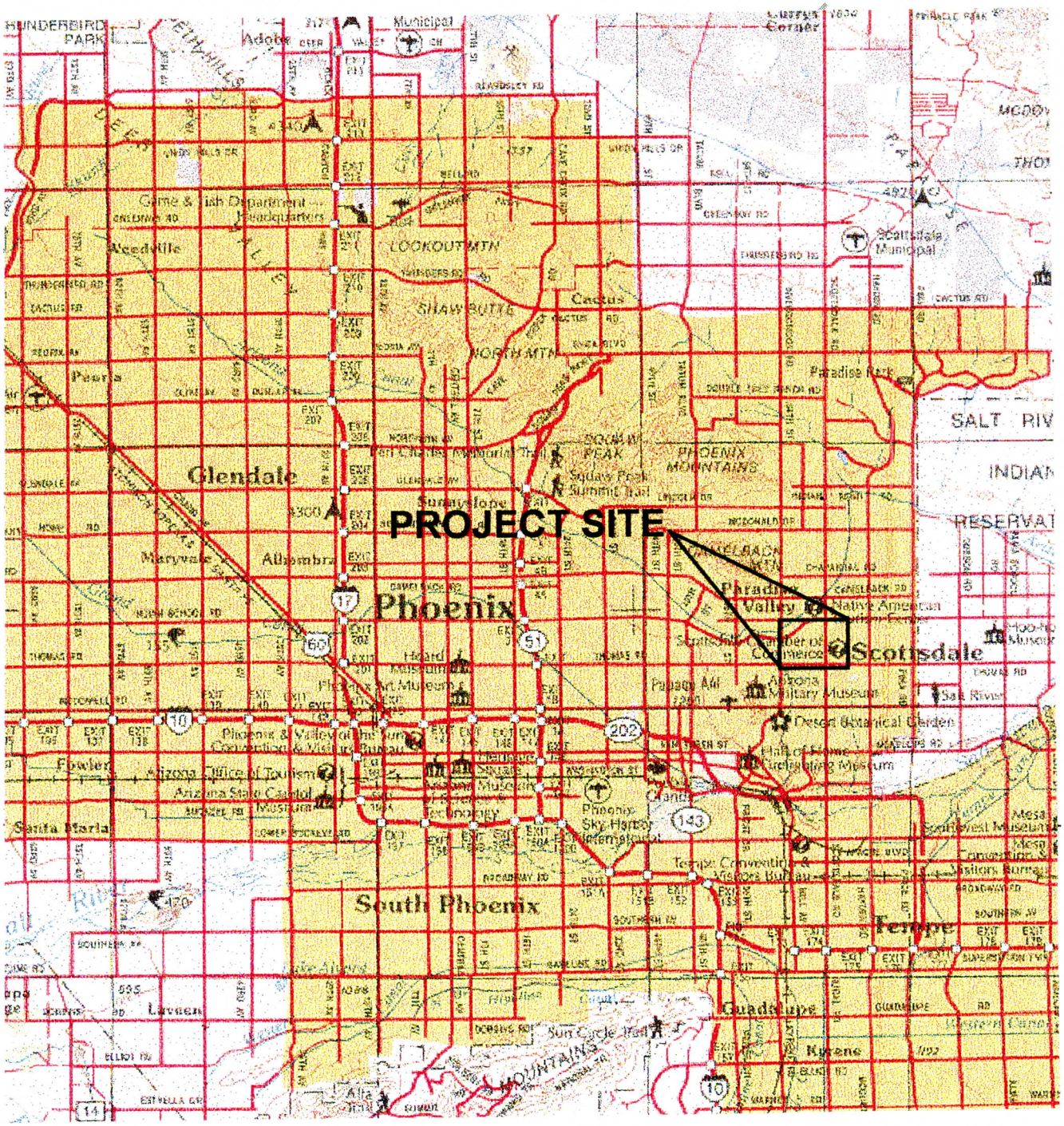
Runoff generated on the east slopes of the Papago Buttes flows east/northeast and ponds along the west side of the Cross Cut Canal. The canal is elevated above the adjacent grade, trapping runoff and causing localized flooding. The flooding prompted the Flood Control District of Maricopa County to authorize a study titled *Scottsdale-Tempe-Phoenix (STP) Papago Regional Flood Control Project Watershed Study, 1997* by Kimley-Horn and Associates, Inc. The study documents the hydrology of the area and recommends improvements to mitigate the flooding.

The study recommended construction of a storm drain along Osborn Road from Paiute Park to Indian Bend Wash. A subsequent change order (*Change Order #2, Alternatives for Osborn Road Alignment, STP Papago Regional Flood Control Project, 1998* by Kimley-Horn and Associates, Inc.) considered three additional routes for the storm drain between Paiute Park and Indian Bend Wash. The study recommends Alternative A for construction. This alignment exits Paiute Park to the north, along the alley west of 66th Street. It continues east on Osborn Road to Indian Bend Wash. Preliminary plans (30%) were prepared for the horizontal and vertical alignment of the storm drain from Marriott Brighton Gardens to Indian Bend Wash. The plans show the Alternative A alignment between Paiute Park and Indian Bend Wash.

1.3 Study Purpose

The purpose of this Alternative Analysis Report is to re-examine the four alternative alignments described in *Change Order #2* in greater detail to ensure the most efficient and least disruptive alignment is carried forward to final design. The original alignments identified in *Change Order #2* were examined to determine the cost and feasibility of locating a large diameter storm drain along the alignment. Parsons Brinckerhoff has considered the alignments to a level of detail that was beyond the scope of *Change Order #2.*

Vicinity Map



Osborn Outfall
Alternative Analysis

The horizontal alignment of the various alternatives is shown in Figures 2 through 5. These are the only alignments to be considered. Figure 6 shows existing storm drains in the vicinity.

Utility conflicts have been examined to sufficient detail to determine available corridors within each alignment. Existing gravity flow utilities such as sanitary sewers, storm drains and irrigation lines were located using as-built plans. Potential conflicts with gravity flow utilities were identified. Survey crews have verified the vertical location of the utilities based on current Scottsdale datum (NAVD88).

Preliminary hydraulic models were prepared for each alternative to determine pipe sizes required to convey the peak flows from the 10-year, 6-hour storm. Cost estimates were prepared for the feasible alternatives to document the probable costs for constructing the storm drain system along each alignment.

1.4 Alternative Descriptions

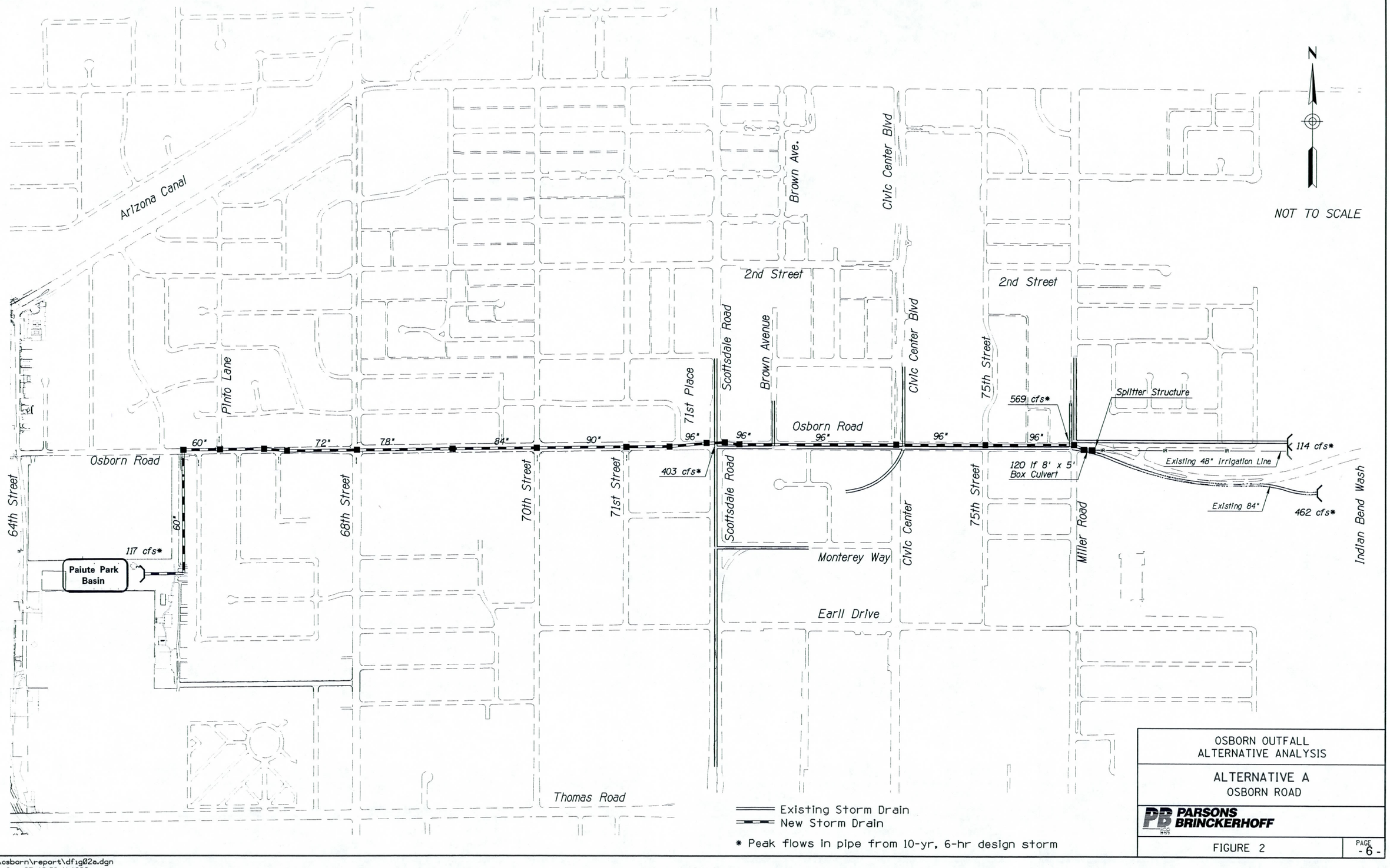
The first segment of the storm sewer from Paiute Park to Indian Bend Wash is routed along the same alignment for the four alternatives. The inlet at Paiute Park is located about 900 feet south of Osborn Road and just west of 66th Street. The storm drain is routed north to Osborn Road in an alley that parallels 66th Street. From there, the system continues eastward to 71st Street. The alignment between Paiute Park and 71st Street is common to all four alternatives. Alternative D is routed southward at 71st Street. The other three alternatives continue east on Osborn Road, past Scottsdale Road.

Alternative A, Osborn Road

As shown in Figure 2, the alignment for Alternative A is along Osborn Road from the alley west of 66th Street to Miller Road. East of Miller Road, the proposed pipe connects to an existing storm drain within Osborn Road and an existing 48-inch irrigation pipe within Old Osborn Road. The existing pipes discharge to Indian Bend Wash.

There are existing large diameter storm drains in Osborn Road. The first is east of Scottsdale Road, between Brown Avenue and Scottsdale Road. The existing 48-inch pipe conveys runoff west from the intersection of Brown Avenue and Osborn Road to Scottsdale Road. An existing 84-inch pipe in Scottsdale Road collects the Brown Avenue discharge and conveys it south to Thomas Road. A second existing storm drain begins east of Brown Avenue and terminates at Indian Bend Wash, south of the new Osborn Road alignment. Existing utilities in Osborn Road severely limit the available corridors for new storm drain. Installation of the proposed storm drain will require the replacement or abandonment of the existing storm drain within Osborn Road from Scottsdale Road to Miller Road.

The existing 84-inch storm drain in Scottsdale Road currently conveys flows from areas north of Osborn Road. The storm flows are delivered to the 84-inch pipe by the Brown Avenue lateral discussed above and by a 66-inch pipe in Scottsdale Road north of



OSBORN OUTFALL
ALTERNATIVE ANALYSIS

ALTERNATIVE A
OSBORN ROAD

PB PARSONS BRINCKERHOFF

FIGURE 2

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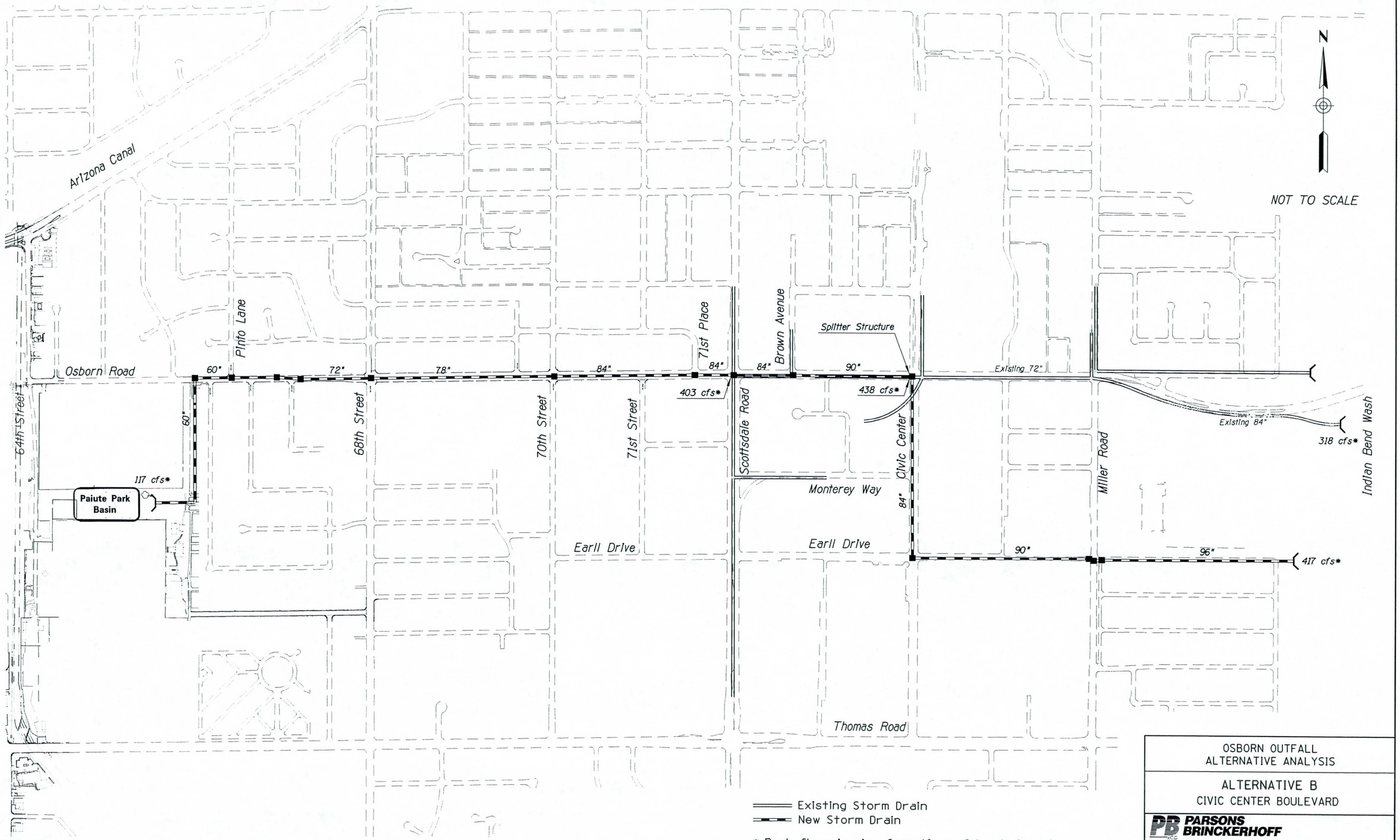

OSBORN OUTFALL
ALTERNATIVE ANALYSIS

ALTERNATIVE B
CIVIC CENTER BOULEVARD

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FIGURE 3

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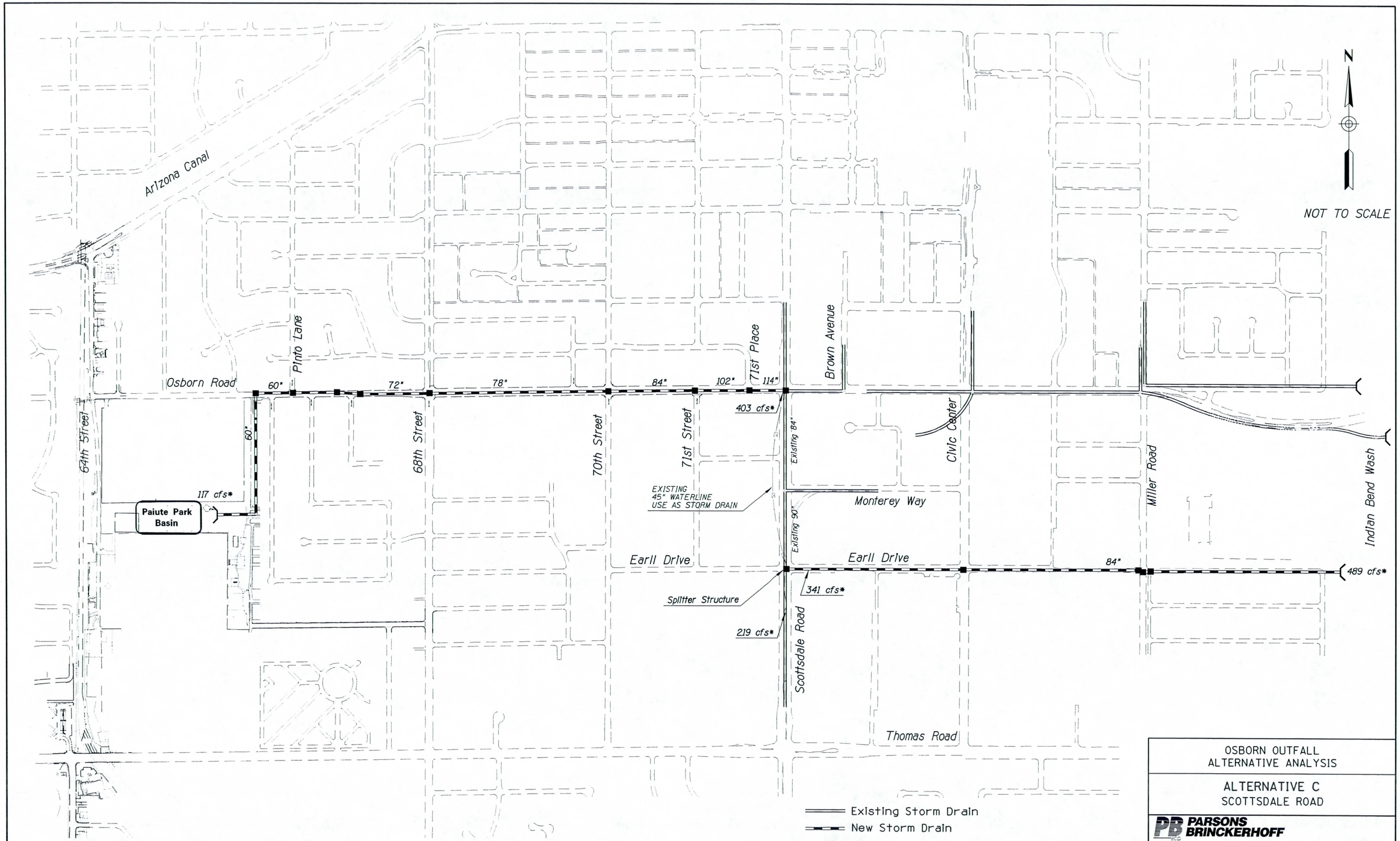

OSBORN OUTFALL
ALTERNATIVE ANALYSIS

ALTERNATIVE C
SCOTTSDALE ROAD

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FIGURE 4

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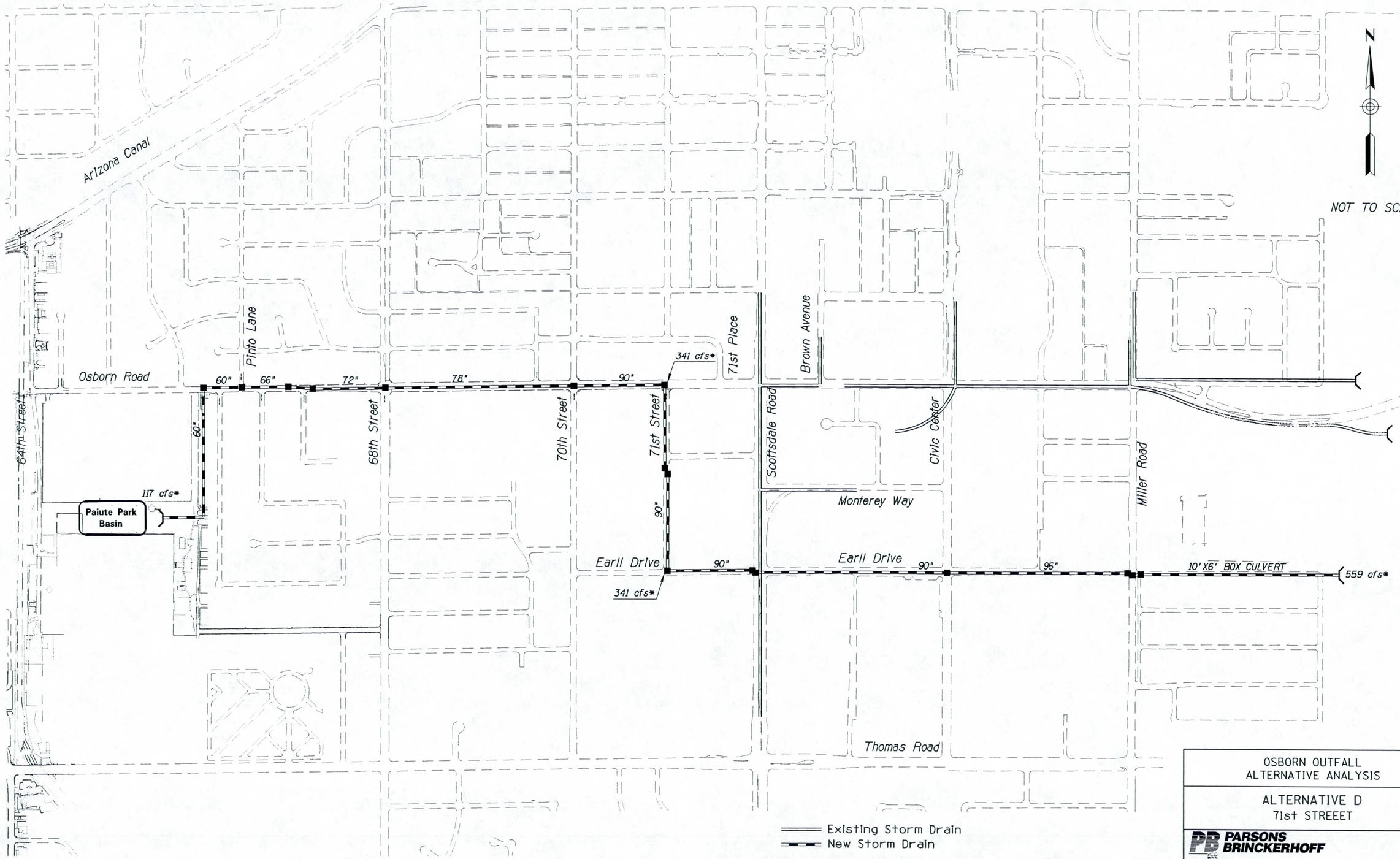

OSBORN OUTFALL
ALTERNATIVE ANALYSIS

ALTERNATIVE D
71st STREEET

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FIGURE 5

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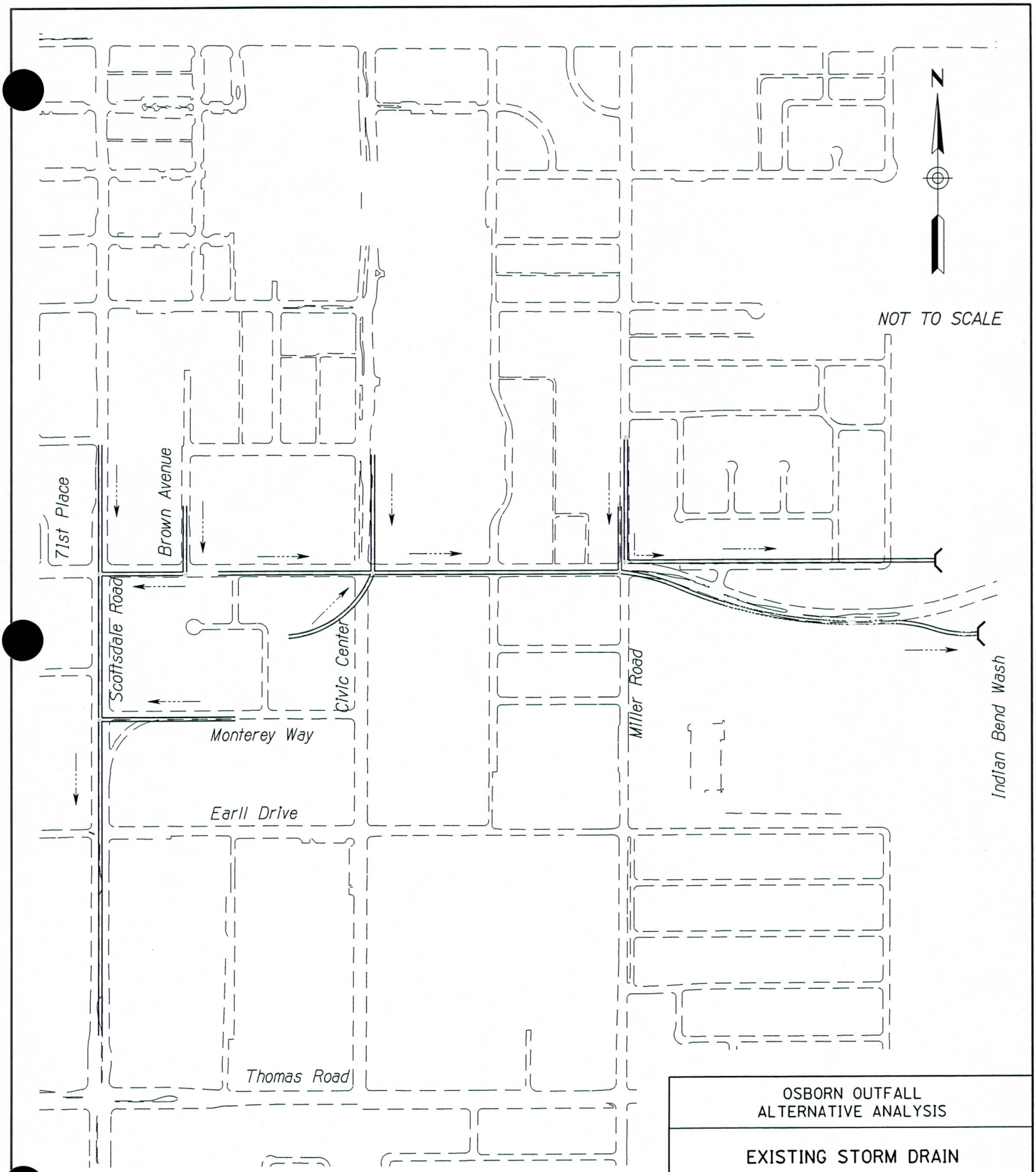

OSBORN OUTFALL
ALTERNATIVE ANALYSIS

EXISTING STORM DRAIN

PARSONS BRINCKERHOFF

FIGURE 6

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Osborn Road. Flows from the 66-inch pipe will continue to discharge to the existing 84-inch pipe. The proposed pipe will cross under the 66-inch pipe within the Scottsdale Road/Osborn Road intersection. Flows from the Brown Avenue lateral will be collected by the proposed pipe. Lack of a corridor for the proposed storm drain between Scottsdale Road and Brown Avenue requires the existing 48-inch lateral to be replaced with the proposed storm drain.

In order to collect runoff generated upstream from the proposed pipe alignment, it is necessary to acquire the existing 48-inch Salt River Project (SRP) irrigation pipe that runs between Miller Road and Indian Bend Wash. The pipe follows the Old Osborn Road alignment. Preliminary discussions with SRP staff indicate that the 48-inch pipe may be available for purchase. The irrigation line is needed to supplement the capacity of the existing storm drain in Osborn Road between Miller Road and Indian Bend Wash.

Alternative B, Civic Center Boulevard

Alternative B follows the same alignment along Osborn Road as Alternative A between the alley and Civic Center Boulevard. At Civic Center, the proposed storm drain turns south to Earll Drive, then east to Indian Bend Wash. Inlets would be provided on Earll Drive at the intersections of Civic Center Boulevard and Miller Road. The existing inlets at Civic Center Boulevard and Osborn Road would continue to discharge to the existing Osborn Road storm drain system.

Flows in the existing storm drains in the Scottsdale Road/Osborn Road intersection will be handled as described in Alternative A.

Alternative C, Scottsdale Road

The route for Alternative C is east on Osborn Road to Scottsdale Road, south to Earll Drive and east to Indian Bend Wash. The south leg of the system along Scottsdale Road would utilize the existing storm drain in Scottsdale Road. The pipe at the intersection of Scottsdale Road and Osborn Road is 84 inches in diameter. It changes size to 90-inch at Monterey Way. An existing 45-inch abandoned water line parallels the west side of the existing storm drain in Scottsdale Road. The water line is available for use as a storm drain, if required.

In this alternative, the Scottsdale Road storm drain will continue to convey flows from the existing 66-inch pipe north of Osborn Road and the Brown Avenue lateral. In addition, it must convey the runoff generated north of Osborn Road and the discharge from Paiute Park. Existing storm drains collect runoff from an area south of Osborn Road and east of Scottsdale Road. The storm drains discharge the runoff to the Scottsdale Road pipe at Monterey Way.

Alternative D, 71st Street

Alternative D diverts south from Osborn Road to Earll Drive at 71st Street, one block west of Scottsdale Road. This is the only alternative which crosses Scottsdale Road at

Earll Drive, all others cross at Osborn Road. The proposed pipe continues east along Earll Drive to Indian Bend Wash.

Local runoff will be collected along Osborn Road to 71st Street, along 71st Street to Earll Drive and along Earll Drive to Indian Bend Wash. As in the other alternatives, the major concentration points east of Scottsdale Road are at Civic Center Boulevard and Miller Road.

1.5 Design Criteria

Tailwater Considerations

A large diameter storm drain is needed to convey runoff from the detention basin in Paiute Park to Indian Bend Wash. The proposed storm drain will also collect local runoff as it passes through the residential and commercial areas between Paiute Park and Indian Bend Wash. The proposed storm drain is conveying runoff from a different watershed through the watershed east of the Cross Cut Canal. Care is to be taken to assure that the imported flows do not cause damage between the park and the wash.

The proposed system is to be designed to convey the peak flow produced in the 10-year, 6-hour storm. Peak flows are to be determined using the hydrology produced during the original STP Papago Study.

The storm drain discharges to Indian Bend Wash. The watershed contributing to Indian Bend Wash above the system outfall is much larger than the project watershed. The peak flow from the 10-year, 6-hour storm in Indian Bend Wash is not expected to coincide with the peak flow in the proposed storm drain. For purposes of system design, the tailwater elevation at the outlet is assumed to be at the pipe soffit. The proposed pipe will not be designed to operate with large flows in Indian Bend Wash, but the function of the system must be considered as if there were a high water surface elevation in the wash.

Alternative A has somewhat different tailwater considerations than Alternatives B, C and D. Alternative A conveys all flows along Osborn Road to the existing storm drain and irrigation pipe at Miller Road. Osborn Road dips across Indian Bend Wash. Runoff in the gutters of Osborn Road flows directly to the wash. There is no berm to prevent flows from encroaching into the neighborhoods west of the wash. If high tailwater conditions in the wash cause the storm drain to back up, excess flow will be conveyed to the wash along Osborn Road.

The situation is somewhat different along the Earll Drive alignments. The water surface elevation in Indian Bend Wash at Earll Drive is 1230.62 (Scottsdale datum) at the peak of the 10-year storm. The peak flow is approximately 8,000 cfs. The existing ground elevation west of Indian Bend Wash exceeds the high water elevation of 1230.62 near Miller Road (at Earll Drive). The grate elevation of the inlets at the Miller Road/Earll Drive intersection are expected to be approximately 1231.0. A berm protects the houses west of the wash from flooding. The elevation at the top of the berm is

approximately 1233.0 at Earll Drive. Therefore, an open storm drain discharging to Indian Bend Wash would allow storm water from the wash to back up and flow out of the inlets at Miller Road if the flow in the wash exceeds the 10-year peak. A flap gate or similar flow check device is required to keep wash flows from discharging into the adjacent neighborhoods.

However, providing a flap gate on the main line at Indian Bend Wash may potentially cause flooding at the Miller Road/Earll Road intersection, even during relatively low tailwater conditions in the wash. As water rises in the wash, the storm drain system begins to back up until it creates enough differential head to open the flap gate. The system could back up several feet above the water surface in the wash before enough differential head has been created. This could cause flooding at Miller Road and possibly at Civic Center Boulevard (grate elevation approximately 1236.0).

The local peak flow is expected to drain to the wash before the water surface in the wash rises high enough to close a flap gate, but the detention basin in Paiute Park is expected to discharge more than 50 cfs for 2 and a half hours after the peak flow in the storm drain. These are the flows that would be expected to discharge from the inlets. If the proposed storm drain is blocked by high a water surface in Indian Bend Wash, runoff from Paiute Park would discharge from the inlets at Miller Road and flow south and east toward Indian Bend Wash and Thomas Road. The berm along the west side of Indian Bend Wash prevents flow from entering the wash north of Thomas Road.

Therefore, flap gates or check valves are proposed on the inlets at the Miller Road/Earll Drive intersection. Preventing back flow through these inlets eliminates the disadvantages of providing a large check valve on the main line. Local flows are able to discharge freely to the wash without building up a large differential head. With check valves at the Miller Road inlets, there is no danger of imported flows causing damage before they are discharged to the wash. Runoff from the wash will still back up to elevation 1233.0 before it overtops the berm, but it is not likely to cause flooding at Civic Center Boulevard (grate elevation 1236.0). Once runoff from the wash has overtopped the berm, discharge from the inlets would be considered inconsequential.

1.6 Study Process

This report is the first of two reports to be submitted. As a draft report, it will be reviewed by the Flood Control District of Maricopa County, the City of Scottsdale and the City of Phoenix. Agency comments will be addressed and the report will be finalized and resubmitted as the Final Alternative Analysis Report.

The calculations contained in the Final Alternative Analysis Report will be preliminary. The calculations will be updated as design progresses on the selected alternative. Design calculations will be submitted with plans for review and comment at 50% and 90% levels of completion of the project.

2.0 HYDROLOGIC MODELING

2.1 Original HEC-1 Models

Hydrologic modeling of the project watersheds was originally performed by Kimley – Horn, Inc. as part of the *STP Papago Regional Flood Control Project Watershed Study, 1997.* Four original models were created using HEC-1, one for each alternative. The models have been reviewed and accepted by the Flood Control District of Maricopa County and were used in the development of this project.

Refinement of the hydrologic models or manipulation of the models to change or calibrate peak flows is beyond the scope of this project. However, it was necessary to make minor revisions to the models to reflect changes in physical conditions that have occurred since the models were completed. The alignment of Alternative D divided subbasin 050130. New hydrograph cards were created to determine the flow from this subbasin at the intersection of Earll Drive and Civic Center Boulevard. Changes are documented in the body of the models. The following is a more detailed discussion of the revisions.

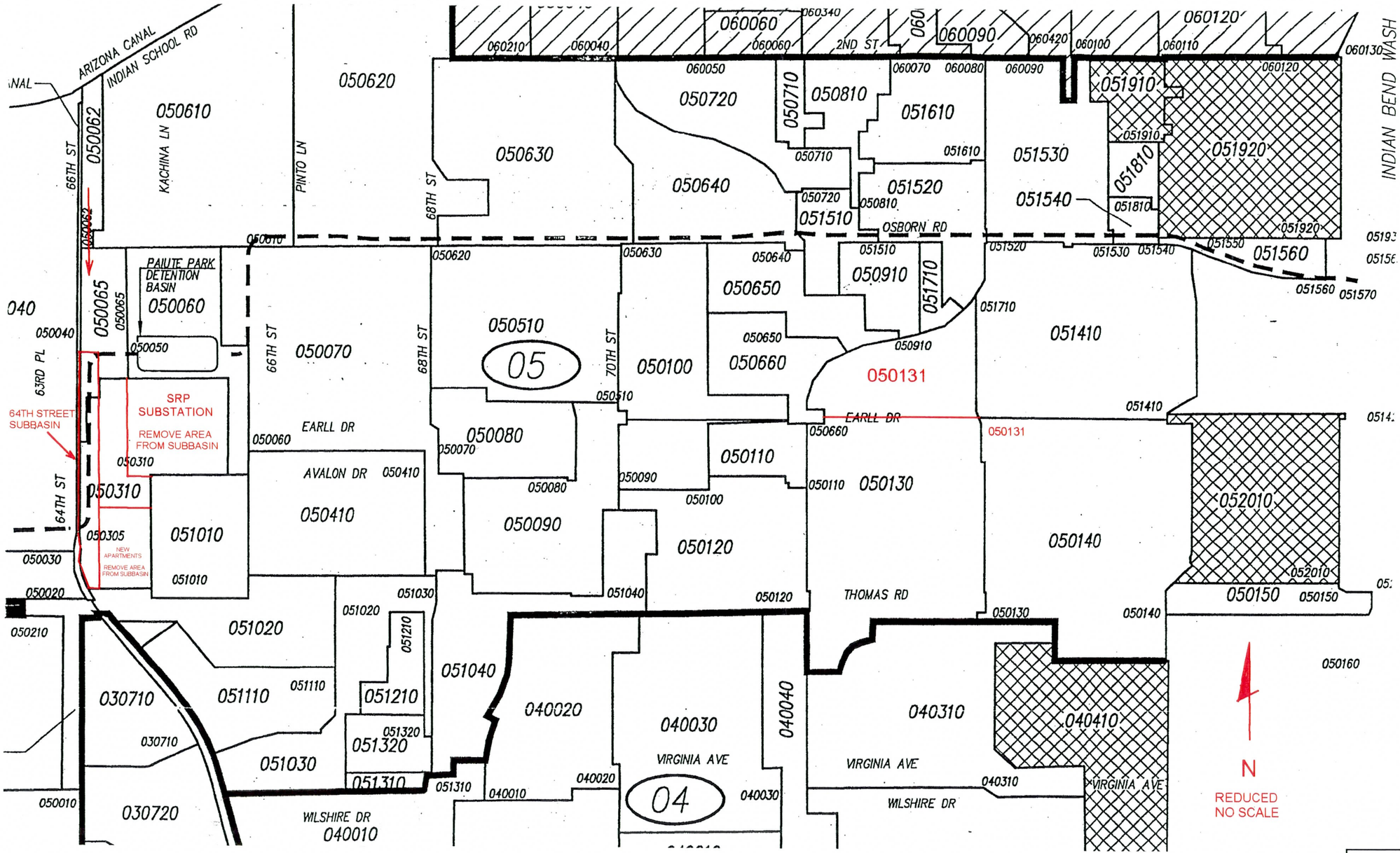
2.2 Modifications to Original HEC-1 Models - Upstream

Upstream from Paiute Park

The majority of the changes to the original models were upstream from the Paiute Park Detention Basin. The original model for Alternative A was revised to reflect the changes discussed below. These changes resulted in lengthy revisions to the model upstream from the four alternative alignments. The changes from the revised model were transferred to the original model for Alternative D. The transfer process proved to be cumbersome with a high potential for error. Due to the complexity of duplicating these revisions in the other two original models, the original model for Alternative A was revised upstream from Paiute Park and copied to be used to model proposed Alternatives B and C. Code from the original models for Alternatives B and C was copied into the revised models to duplicate the differences between the alternatives. The models used by PB in the alternative analysis are named PBAltA.DAT, PBAltB.DAT, PBAltC.DAT and PBAltD.DAT, respectively. Figure 7 is a reproduction of the original drainage area map from the *STP Papago Regional Flood Control Project Watershed Study, 1997.* It has been annotated to reflect revisions to the original modeling. The following revisions were made to the original Alternative A model upstream from Paiute Park:

64th Street, North of Osborn Road

Proposed improvements to 64th Street between Thomas Road and Indian School Road change the drainage patterns with regard to the area contributing to 64th Street north of Osborn Road. The original model by Kimley-Horn routed the runoff from this area (subbasin 050062) to the proposed Osborn Outfall inlets at Pinto Lane. Storm drain designed by PB as part of the 64th Street Improvement plans will collect the flow and



PORTION OF ORIGINAL DRAINAGE MAP FROM
STP PAPAGO WATERSHED STUDY
KIMLEY-HORN, 1997
PARSONS BRINCKERHOFF ANNOTATIONS IN RED

OSBORN OUTFALL ALTERNATIVE ANALYSIS	
DRAINAGE MAP	
PARSONS BRINCKERHOFF	
FIGURE 7	PAGE -15-

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convey it to Paiute Park. The hydrograph location and routing cards were modified to reflect the changed condition.

SRP Substation
The majority of subbasin 050310 is occupied by the SRP substation south and west of Paiute Park. Approximately two thirds of the substation drains east, toward Paiute Park. SRP intends to retain this water on-site. The flows do not and will not impact the 64th Street storm drains. An apartment complex is currently under construction in the south end of the subbasin. The City of Scottsdale has confirmed that the development will provide on-site retention for the 100-year, 2-hour storm. Therefore, the basin area card for this subbasin was revised to remove this portion of the substation and the apartments. The remainder of the subbasin is comprised of the pavement on 64th Street south of Paiute Park, the west side of the substation and a paved area between the substation and the apartments. The pavement on 64th Street will be drained into the 66-inch pipe between Catalina Drive and the park. The pavement was originally included in subbasin 050310. The pavement area was removed from subbasin 050310 and modeled as a separate subbasin (S 64th).

The substation and the paved area north of the apartments drain to an existing concrete lined detention basin near the entrance to the substation. A reservoir route was added to the model to determine if the detention basin is capable of intercepting the 10-year storm from the reduced drainage area. The detention basin will be drained to the 66-inch pipe. Hydrographs were recombined as noted within the HEC-1 model to determine peak flows as needed to design the 66-inch pipe.

Paiute Park Stage/Storage/Discharge Curve
The Paiute Park Stage/storage/discharge curve used in the original model requires revision due to changes anticipated in the proposed storm drain downstream from Paiute Park. Revisions to the curve are discussed in detail in Section 2.4 of this report.

2.3 Modifications to Original HEC-1 Models - Downstream

Downstream from Paiute Park

Changes in design philosophy required changes to the original models for the various alternative alignments. The changes are discussed below:

Alternative A, Osborn Road Alignment
The original model for Alternative A collected flow from the existing 66-inch storm drain in Scottsdale Road, north of Osborn. It is possible to pass the proposed storm drain under the 66-inch pipe. In order to decrease the flows in the proposed storm drain, the flows from the 66-inch pipe will be allowed to continue south in the existing Scottsdale Road storm drain. The hydrographs contributing flow to the 66-inch storm drain were removed from the model.

Alternative B, Civic Center Boulevard Alignment

The original model diverted runoff to the existing storm drain in Osborn Road, east of Civic Center Boulevard and it did not collect runoff from Subbasin 050130 (northwest of the intersection of Civic Center Boulevard and Earll Drive). The area for subbasin 050130 was reduced to represent the portion of the subbasin northwest of the intersection and the routing length revised to reflect the reduced area. The revised subbasin was renamed 050131 to avoid confusion with the original subbasin. See Figure 7. The revised hydrograph was collected into the pipe routing. Flows are routed to the intersection of Miller Road and Earll Drive. Runoff generated north and west of the intersection (subbasin 051410) is combined with the routed flows and the total flow is routed to Indian Bend Wash.

Analysis of the existing storm drain system in Osborn Road from Civic Center Boulevard to Indian Bend Wash reveals additional capacity in the pipe during the 10-year, 6-hour design storm. It is proposed to construct a splitter structure at the intersection of Osborn Road and Civic Center Boulevard to divide the flow between the two systems. Runoff collected at this intersection is conveyed by the Osborn Road system. By taking advantage of the excess capacity in the existing storm drain, pipe sizes in the proposed storm drain can be reduced. Flow splits between the proposed storm drain and the existing Osborn Road storm drain were not modeled in HEC-1. The analysis is a hydraulic analysis, so the work was done using StormCad.

Inflows into the storm drains downstream from Civic Center Boulevard and Osborn Road were determined using the HEC-1 output for Alternatives A and B. Since the flow split between the two storm drains was not modeled in HEC-1, the model output shows the total flow routed along the respective alignments with no flow diverted to the other system. Minor differences in peak flows would be expected if the flow splits and subsequent routings were modeled in HEC-1, but the differences are so slight as to have no effect on the outcome of the analysis. Therefore, inflows at the concentration points of interest were calculated as the difference between the peak flow entering the concentration point and the peak flow of the hydrograph downstream from the concentration point. The difference between the flows was used as the local inflow entering the main storm drain. See Section 3.3 for a detailed discussion of the hydraulic analysis of the flow split between the two systems.

Alternative C, Scottsdale Road Alignment

The original model assumed a 66-inch drain from the intersection of Scottsdale Road and Osborn Road to the intersection of Osborn Road and Civic Center Boulevard. The 66-inch drain would discharge to the existing 72-inch pipe at Civic Center Boulevard. The purpose of the pipe is to drain the junction structure at Osborn Road and Scottsdale Road. It would also convey the runoff collected by the Brown Avenue lateral to the existing storm drain at Civic Center Boulevard. However, the proposed pipe would not effectively drain the proposed junction structure at the intersection of Scottsdale Road and Osborn Road. The invert of the proposed junction structure is near elevation 1225.6. The existing invert of the 72-inch pipe at Civic Center Boulevard and Osborn Road is at approximately 1232.0.

Therefore the design philosophy used to evaluate this alternative was to provide a small diameter drain (approximately 24-inch) from the intersection of Scottsdale Road and Osborn Road to the existing storm drain near Miller Road (existing invert at about 1219.9). The pipe would be nearly flat, but would provide positive drainage for the pipe west of Scottsdale Road. The small pipe would not collect the runoff from the storm drain at Brown Avenue. Brown Avenue flows would continue to discharge to the existing 84-inch pipe in Scottsdale Road. Hydrograph cards in the Alternative C HEC-1 model were rearranged to produce these flow combinations. It was assumed that the 24-inch pipe would act as a drain only. No flow diversion is modeled to the small pipe.

A flow split was modeled at Scottsdale Road and Earll Drive. Flows which are currently conveyed by the existing Scottsdale Road storm drain are to continue south to Thomas Road. The proposed storm drain system east of Scottsdale Road is to be sized to convey the peak flow found in the system just west of Scottsdale Road at Osborn Road. This peak flow is approximately 344 cfs.

Cards for subbasin 050131 (east of Scottsdale Road) were also inserted into the model as discussed in Alternative B, above. The original Alternative C model did not collect flow at Civic Center Boulevard and Earll Drive.

Alternative D, 71st Street
In the original model, runoff was collected from the area west of 71st Street (subbasin 050100) and from the existing storm drain in Scottsdale Road. No flows were collected east of Scottsdale Road. The model was revised to exclude the flow from the Scottsdale Road storm drain and to collect flow on Earll Drive at Civic Center Boulevard and Miller Road.

Note: *Pipe sizes of the proposed storm drain were revised in the routing cards to reflect preliminary design for each alternative. The pipe sizes were revised in the routing cards upon the completion of the preliminary hydraulic design of the four alternative storm drain systems. Revision of the pipe sizes resulted in minor changes in the peak flows at the points of interest. Therefore, there is a slight discrepancy between the peak flows used in the hydraulic analysis and the peak flows shown in the HEC-1 output. The differences are minor (maximum 3 to 4%) and will not effect the design of the storm drains. The hydraulics/hydrology will be updated for the calculations used in the final design of the selected alternative.*

2.4 Paiute Park Stage/Storage/Discharge Curve

As discussed above, changes were made to the hydrology upstream from Paiute Park and revisions were made to the pipe sizes downstream from the park. A check of the storm drain hydraulics downstream from the Paiute Park detention basin showed that the stage/storage/discharge curve used in the original model was no longer accurate. A new curve was developed to more accurately model the performance of the basin.

The curve developed for this submittal is considered preliminary. Due to differences in the hydraulic performance of each alternative, the curve cannot be finalized until an

alternative has been selected. A second variable to be considered is the area available for construction of the detention basin. The City of Scottsdale has a maintenance yard in the west end of the park. The maintenance yard may be relocated, allowing the area to become part of the detention basin. Figure 8 shows the location of the proposed basin and the maintenance yard. The curve will be recalculated once an alternative has been selected and the status of the maintenance yard is known.

Methodology

The revision of the curve is an iterative process. Discharges from the park (calculated by HEC-1 model PBOsb.DAT[1], included in the Technical Appendix) were entered into the StormCad model for the Alternative A alignment. StormCad was then used to calculate a hydraulic grade line elevation in the first storm drain manhole downstream from Paiute Park. The HGL was calculated based on the peak flow in the pipe (as calculated by HEC-1). The calculated HGL elevation was used as a tailwater elevation for the basis of discharge calculations from the park. HY8 was used to calculate a stage/discharge curve for the outlet. The new curve was input into the HEC-1 model and new discharges from the park were calculated with HEC-1. The new discharges were input into the StormCad model and the process was repeated. During the first iterations it was assumed that increased flow from the park would increase the peak flow in the storm drain. Subsequent calculations showed that increased flows from the park did not increase the peak flow in the downstream system. The result is that the Paiute Park outlet is expected to act as a culvert with inlet control. Calculations for the first three iterations of this process are not included in the Technical Appendix. The fourth and final iteration is documented in the Technical Appendix as 4th Iteration Stage/Storage/Discharge Curve Calculations.

Once the stage/storage/discharge curve was revised, design continued on the storm drain downstream from the detention basin. At this point the fourth iteration of the stage/storage/discharge curve calculation was performed to evaluate the effect of the revised pipe on the basin discharge. The StormCad model of the revised storm was used to calculate an HGL elevation in the first manhole downstream from the park. The revised model raises the HGL in the first manhole and causes this segment to go into outlet control. The water surface elevation in the park does not rise fast enough to overcome the outlet control condition. Therefore, the outlet is expected to back up for a period of time.

Previously, the performance of the system was only considered during the peak flow in the outfall pipe. To determine the effect of the back-up in the outlet, the system was considered in time steps. The tabular hydrograph for the park storage route (hydrograph 5Det) was printed as were the tabular hydrographs for the first four inlets downstream from the park. Using the HEC-1, StormCad, HY8 procedure described above, it was determined that the outlet would not be able to discharge flows from the basin for approximately 12 minutes. The water surface in the basin is expected to rise

[1] Preliminary version of PBAltA.DAT

Figure 8

about 0.3 feet as a result of the backup. Since the backwater effect from the downstream pipe is transitory, it cannot be modeled in HEC-1.

From this point, preliminary design proceeded with the various alternative alignments. Upon completion of the preliminary hydraulic models, the HGL at Manhole 97+00 (first manhole downstream from Paiute Park) was compared to the HGL determined in the 4th Iteration calculations. In all cases, the HGL of the alternative models are higher than the HGL in the 4th Iteration. It can be concluded that the system can be expected to back up during the peak of the 10-year, 6-hour design storm. The duration of the back up will be determined for the 50% submittal.

A preliminary calculation was performed to determine the effect of adding the City of Scottsdale maintenance yard to the basin volume. The calculations are included in the Technical Appendix. Adding the additional volume lowers the peak stage in the basin approximately 0.3 feet and reduces the peak outflow by about 10%. The lowering of the peak stage in the basin slightly improves the performance of the upstream storm drain between Marriott Brighton Gardens and Paiute Park.

For the Alternative Analysis Report, the stage/discharge curve will be modeled as a free outfall condition in HEC-1. To keep the model conservative, it is assumed that the maintenance yard will not be available for use as part of the detention basin. The curve calculations will be revised and resubmitted with the 50% Design Calculations. The revised calculations will incorporate the proposed area of the detention basin and the selected alternative alignment. With minor exceptions, the hydraulic design of the proposed storm drain will be complete at the 50% submittal.

3.0 HYDRAULIC MODELING

3.1 Hydraulic Design

The principal hydraulic design software being used for the project is StormCad by Haestad Methods, v1.5. Electronic copies of the models used to design the alternative storm drain systems are included in the Technical Appendix. Limitations in the software required multiple models for Alternatives A, B and C. StormCad is unable to model divisions in flows (parallel pipes) or systems with multiple outlets. The printed copies of the models included in the Technical Appendix show schematic diagrams of the systems being modeled. All printouts have the file name of the model in the lower left corner. At this level of analysis, the models are generally schematic with minor losses such as straight-through manholes combined and added at a downstream inlet. More significant losses such as those encountered at inlets are calculated individually and included at anticipated inlet locations.

Hydraulic design criteria and methodology are performed in accordance with the *Drainage Design Manual for Maricopa County, Arizona, Volume II, Hydraulics, January, 1996.* Head losses at manholes and inlets were calculated in accordance with the *Drainage Design Manual for Maricopa County, Arizona, Volume II, Hydraulics, January, 1996*, Section 4.3.3. Loss calculations are done on a separate spreadsheet and input into the StormCad model. At the alternative analysis stage, it is assumed that it will not be possible to match soffits at changes in pipe size. Therefore, the D_2-D_1 factor of Equation 4.9b is included in the current calculations. During final design, this factor will be considered zero if it is possible to match pipe soffits. Head loss calculations are included in the Technical Appendix.

Inlet design is not considered at this level of analysis. The main trunk line is designed to convey the peak flow from the watershed above the storm drain alignment. Inlet design will be completed during final design of the selected alternative.

Completion of the hydraulic analysis shows Alternatives A, B and D to be feasible. Alternative C is not feasible. High head loss at the intersection of Scottsdale Road and Osborn Road cause the hydraulic grade line to rise above the pavement west of Scottsdale Road for this alternative.

3.2 Transition Structures

Transition structures will be required at crossings of sanitary sewer lines. Box culverts will be used at the point where the storm drain crosses the sewer line. Special transition pieces will be designed to go from the pipe to the box culvert. The transition pieces will be designed so that they are smooth. In their *Handbook of Hydraulics, 1976,* page 8-32, Brater and King define a 'well designed' transition as "one in which all plane surfaces are connected by tangent curves and a straight line connecting flow lines at the two ends does not make an angle greater than 12 and one-half degrees with the axis of the channel". Final design will strive to adhere to a maximum angle of 12 and one-half degree in the transition pieces.

During final design, box culverts will be selected so that the open area of the culvert nearly matches the open area of the pipe. The interior surfaces of the transition piece will be filleted to provide a smooth connection between the pieces of the transition structure. The open area of the pipe and box nearly match, so there is little change in velocity through the transition.

Although the structures are designed to reduce head loss, losses are expected to occur in the transition. There is no applicable equation to calculate head loss in this type of structure. Head loss in the transition pieces is being treated as a gradual enlargement on one side and a contraction on the other side. Based on the physical characteristics of the crossing, head loss coefficients are selected from Tables 4.2 and 4.4 in the *Drainage Design Manual*. Equation 4.8 shows the head loss coefficient being multiplied by the difference in velocity heads of the flow above and below the transition. Due to the uncertainty involved in the calculation, the coefficients selected from the tables will be multiplied by the velocity head of the flow in the pipe. A check of 84-inch, 90-inch and 94-inch pipe with a 10-foot by 4-foot box culvert shows the worst case to yield a total loss coefficient of about 0.3. Therefore, a loss coefficient of 0.3 has been used to calculate losses at the proposed sewer transitions in the preliminary design of the alternatives. The coefficient will be refined in final design calculations.

3.3 Dual Outlets

Dual outlets were modeled for Alternatives A and B. Alternative A divides flow between the existing 84-inch pipe in the new Osborn Road alignment and an existing 48-inch SRP irrigation line in the old Osborn Road alignment. Alternative B splits flow between the existing Osborn Road system east of Civic Center Boulevard and the proposed outfall at Earll Drive. StormCad is unable to model systems with dual outlets. An iterative approach is required to divide the flow between the two systems. The goal of the analysis of the downstream systems is to balance the head loss in the systems so that the HGL of both systems are equal at the point of diversion.

The split analysis for Alternative A is relatively straightforward. Inlets to the system are located upstream from the flow split. There are no additional flows added to the system below the diversion structure. The flow from Miller Road was split between the two systems until the upstream HGLs nearly matched. The flow split is believed to be accurate to within 5 cfs. The tailwater elevation of the upstream system was calculated as 1231.61 (1231.50 calculated by the StormCad model plus 0.11 feet calculated by the spreadsheet as the inlet loss from the addition of flow at Miller Road).

The model for Alternative B is complicated by the addition of flow to both systems downstream from the splitter structure at Civic Center Boulevard/Osborn Road intersection. Since significant head losses are associated with the addition of large flows to the system, the addition of flow to the systems must be accounted for in the hydraulic analysis. As discussed in Section 2.3, *Alternative B, Civic Center Boulevard Alignment,* local inflow rates were determined as the difference between the upstream hydrograph and the downstream hydrograph. Once determined, these inflows were

added to the flow diverted to the respective outfall systems. Head losses were computed for the inlet points and the losses input into the StormCad models. Each iteration of the calculations involved dividing the total flow of 438 cfs in the main line between the two outfalls, adding the split flows to the inflows at downstream nodes, calculating head losses at the inlets, inputting the head loss and flow information into StormCad and running the models. The upstream HGLs for both models were then compared, the flows divided between the two systems to more accurately balance head losses and the process was repeated. The upstream HGL of the lower systems balanced at elevation 1236.31. This was used as the tailwater for the upstream system.

Parallel Pipes

Modeling of Alternative C, Scottsdale Road required use of parallel pipes to include the capacity of the abandoned 45-inch waterline. The model for the portion of the system between Scottsdale Road and Indian Bend Wash was calculated first. The HGL at the upstream end of this system (at Scottsdale Road) was determined to be 1233.67 (1232.19 calculated by the StormCad model plus 1.48 feet calculated by the spreadsheet as the loss in the splitter structure). This elevation was input as the tailwater elevation at the outlet of the models for the upstream reach of Alternative C and the 45-inch waterline. Examination of the model output shows higher tailwater elevations for both systems at Scottsdale Road and Earll Drive. The higher tailwater elevations were calculated by StormCad.

The total flow at Scottsdale Road was split between the waterline and the storm drain. Flows arriving at the existing storm drain at Monterey Way were added to the model of the existing storm drain as described above in the discussion of the dual outlet system for Alternative B. The upstream HGL of the two systems were compared after the models were run. The flows were divided again and the models re-run. The process was repeated until the upstream HGLs at Scottsdale Road and Osborn Road were relatively close. Although the HGLs do not match perfectly, the flow split between the two pipes is believed to be accurate to within 5 cfs.

3.4 Velocity Check

A check was made of the flow velocity with proposed systems flowing at half the peak flow. The proposed storm drains meet the minimum 2 feet per second velocity requirement under these conditions. Since Alternative C is not hydraulically feasible, it was not checked for minimum velocities. Note that the segment of pipe between Paiute Park and Pinto Lane was checked at half the peak flow of 117 cfs or 57 cfs. The StormCad models for the design of the system below Pinto Lane had 44 cfs in this reach. Forty four cfs is the flow out of the park at the time of the peak in the downstream system.

For the purposes of a preliminary velocity check, the head loss coefficients for the half peak flows were not revised from those used in the principal model. Review of the velocity check printouts shows the average velocities are generally 4 to 7 fps.

Velocities below 2 fps are not anticipated, but a more detailed check will be made during final design.

3.5 Slip Lined Pipe

The existing storm drain pipe and existing 45-inch waterline in Scottsdale Road from Osborn Road to Earll Drive do not have enough combined capacity to convey the peak flow during the 10-year storm. In an attempt to provide a feasible alternative, these pipes were modeled with a plastic slip lining to increase their carrying capacity. The Manning's roughness coefficient for the slip lined pipes is modeled as 0.010.

4.0 COST ESTIMATES

Cost estimates were derived for Alternatives A (Osborn Road), B (Civic Center Blvd.) and D (71st Street). These alternatives provide a storm drain system that meet Flood Control District criteria for the 10-year design storm. An estimate was not generated for Alternative C (Scottsdale Road) since it failed to meet the hydraulic requirements for a 10-year system.

In general, unit cost for items were based upon recent bid tabs from similar projects with comparable quantities in the metropolitan area.

4.1 Existing Storm Drain

Existing storm drains were constructed along Osborn Road during two major storm drain improvement projects completed in 1993 and 1994 by the City of Scottsdale. Construction of the proposed storm drain in Alternatives A and B would require the removal or abandonment of portions of the existing pipe. Depreciated costs for the existing pipes were calculated and added to the cost estimates for these alternatives. These are not direct costs which will be paid as part of this project. Rather, they are considered as the price paid for the loss of the use of existing infrastructure.

Both alternatives require abandoning a considerable run of 54" pipe between Brown Avenue and Civic Center Boulevard. A depreciated value was derived based on an estimated unit cost of $120 per linear foot in year 1994. Using a depreciation amount of 4% per year for the last 5 years translates to a present value of $98 per linear foot.

A depreciated value for the 1993 storm drain in Osborn Road that will either be abandoned or removed was determined based on the actual bid tabs obtained from the City of Scottsdale for that project. Items contributing to the price of the pipe installation were taken from bid tab and a composite price was calculated. The calculated prices were depreciated 4% per year for the last 6 years to arrive at a present value.

Costs were assigned to the removal and disposal of the existing pipe. Removal and disposal costs were calculated by assuming a maximum 45,000 lbs. per payload and using $2,000 per payload for trucking and disposal. This translates into $40 per linear foot for 48-inch pipe and $82 per linear foot for 72-inch diameter pipe.

4.1 Traffic Delays

Traffic delay costs associated with construction of the proposed storm drains were estimated to aid in the comparison of alternatives. These costs will not be paid as part of the construction costs. Traffic delays will be incurred by the motorists driving through the construction zone or detouring around the project. The cost of the delay will be borne by the motorist. These are not the costs associated with traffic control.

Delays were calculated at major intersections based on several assumptions. Construction durations were estimated from evaluations of past construction projects. These can vary substantially, depending on the method of construction, and manpower available. The number of lanes closed can also make an impact, especially on Scottsdale Road. All streets were assumed to be closed down to one lane in each direction, except Scottsdale Road which was assumed to have a left turn bay for both approaches at intersections. On Osborn Road and Earll Drive, left turns would not be allowed where construction was underway, except at signalized intersections. Local access would have to be maintained, although delays would be expected at large traffic generators.

Average Daily Traffic (ADT) volumes were obtained from the city of Scottsdale. ADT's for Earll Drive were not available, so volumes on Earll Drive were estimated as two-thirds the volumes on Oak Street (one mile to the south). The peak hour volumes were obtained by using a K factor of 9%. No turning movement counts were available, so left turns were estimated at 15%, and right turns were estimated at 10%. This will be reasonably accurate on the larger streets, and less accurate on the lower volume streets. Since the Highway Capacity Software (HCS) evaluates delay for peak hour only, the average delay for any hour of the day was assumed to be 9% (same as the K factor) of the peak hour delay. Ten dollars per hour was used to estimate the cost of delay time.

The total costs for the alternatives are:

Osborn Outfall Alternative Analysis	
Comparative Cost Estimate Summary	
Alternative A	$5,963,800
Alternative B	$6,858,600
Alternative D	$6,549,200

A detailed breakdown of the cost estimate for the alternatives can be found in the Technical Appendix.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Evaluation Summary

Alternative D, The 71st Street Alignment, is the recommended alternative. Although it was not the least costly alternative, Alternative D provides significant additional benefit for a small incremental cost. The alignment of Alternative D is along less traveled streets, so disruption of traffic is reduced. The alignment of Alternative D also provides storm drain protection to neighborhoods that currently do not have storm drains. The matrix on the next page shows that Alternative D is rated higher than the other feasible alternatives.

The decision matrix was developed using the following criteria:

Provide Additional Storm Drain

5- No additional storm drain provided
4- Up to 1320 lf of additional storm drain
3- Greater than 1320 lf, but less than 2640 lf
2- Greater than 2640 lf, but less than 3960 lf
1- Greater than 3960 lf

Compatibility with Existing Storm Drain

5- Requires removal of over 1000 feet of existing storm drain
4- Requires removal of less 1000 feet of existing storm drain
3- Maintains existing storm drain systems
2- Enhances existing storm drain facilities by providing complementary or parallel systems
1- Enhances overtaxed existing functional storm drain system by diverting flows

Utility Impacts

5- Requires major relocation of large diameter water distribution lines, fiber optic communication lines, or large diameter sanitary sewer lines, large diameter gas distribution lines
3- Requires relocation of medium size (less than 8") waterlines, sanitary sewerlines (less than 8") and gas distribution lines
1- Replacement of service lines only

Public Inconvenience

5- Disruption to public and emergency facilities, commercial and residential areas
3- Disruption to commercial and residential areas
1- Disruption to residential areas only

OSBORN ROAD STORM DRAIN
DECISION MATRIX

71st Street to Indian Bend Wash

	Provide Additional Storm Drain	*Compatibility with Existing Storm Drain*	*Utility Impacts*	*Public Inconvenience*	*Traffic Disruption*	*Cost*	*Alternative Total*
Alternative "A"	5	5	5	5	5	1	**26**
Alternative "B"	1	4	5	5	5	5	**25**
Alternative "C"	*	*	*	*	*	*	*
Alternative "D"	1	3	5	3	3	5	**20**

RANK 1-MOST DESIRABLE TO 5-LEAST DESIRABLE; LOWEST TOTAL SCORE IS MOST DESIRABLE ALTERNATIVE

* Alternative "C" did not meet the project design criteria

Traffic Disruption

5- Disruption along a minor arterial (Osborn Road), couplets (Civic Center Boulevard), minor collectors (Earll Drive and 71st Street) and local streets
3- Disruption along minor collector street and local streets
1- Disruption along local streets only

Cost

5- Over $500,000 higher
4- Within $400,000 of lowest overall cost
3- Within $300,000 of lowest overall cost
2- Within $200,000 of lowest overall cost
1- Within $100, 000 of lowest overall cost

5.2 Alternative A, Osborn Road Alignment

The hydraulic analysis of Alternative A indicates that the alternative is conditionally feasible. The system will work if the 48-inch irrigation pipe in the old Osborn Road alignment is available from SRP. Without the irrigation line, it will be necessary to replace the existing storm drain between Miller Road and Indian Bend Wash.

Advantages

The principal advantages of this route are its length and cost. Of the four proposed routes, this is the shortest and the least expensive. The Osborn Road alignment takes advantage of the existing storm drain and irrigation line in Osborn Road east of Miller Road. The existing pipe saves nearly a quarter-mile of new storm drain. An additional savings is realized by not diverting a quarter-mile south to Earll Drive.

The existing inlets at Brown Avenue, Civic Center Boulevard and Miller Road will be utilized. Addition of inlets at these locations will not be necessary with this alternative.

Disadvantages

Alternative A has several significant disadvantages. This alignment is the least desirable alignment from a maintenance of traffic and ease of construction standpoint. Osborn Road east of Scottsdale Road carries large volumes of traffic. The United States Post Office (at Osborn Road and Brown Avenue), the Scottsdale Memorial Hospital (at Civic Center Boulevard and Osborn Road) and Scottsdale Stadium (at Civic Center Boulevard and Osborn Road) all generate significant volumes of traffic on Osborn Road. Access to these facilities, as well as accommodating through traffic on Osborn Road, must be maintained for the duration of construction. The principal corridor for the proposed storm drain in this section is in the middle of the roadway.

The installation of the proposed pipe will require replacement or abandonment of approximately 2,100 feet of existing large diameter storm drain. The storm drain was installed less than 6 years ago. The installation of new storm drain along Osborn Road east of Scottsdale Road does not provide additional protection for this area. The

existing storm drain system performs adequately in the 10-year storm. Depreciated cost of the existing pipe which will be replaced or abandoned is estimated at approximately $525,800. The cost of the removal and disposal of the existing pipe is estimated at an additional $78,000. This alignment poorly utilizes the existing infrastructure.

5.3 Alternative B, Civic Center Boulevard Alignment

The Civic Center Boulevard alignment is hydraulically feasible, but avoidance of existing sewer lines requires that about one-half mile of pipe be laid at a minimum slope of 0.0010 feet per foot. Construction of pipeline at such a flat slope is inherently difficult. Even with close quality control and inspection, it is likely that sections of the pipe will not drain completely. Water will continually pond in the low spots due to nuisance water from residential irrigation and car washing.

Advantages

Alternative B makes use of existing capacity in the existing storm drain in Osborn Road between Civic Center Boulevard and Indian Bend Wash. This allows a decrease in pipe sizes from Civic Center Boulevard and Earll Drive when compared to Alternative D.

Alternative B provides approximately half a mile of storm drain to the neighborhoods along Earll Drive from Civic Center Boulevard to Indian Bend Wash. There is no existing storm drain in this area.

Disadvantages

Installation of storm drain along Osborn Road requires replacement or abandonment of approximately 460 feet of existing large diameter storm drain. The depreciated cost of these improvements is $136,900.

As in Alternative A, construction of this alignment will cause major traffic disruptions in the busiest sections of Osborn Road. Although this alignment disrupts a shorter section of Osborn Road, it impacts the busy intersection of Osborn Road and Civic Center Boulevard.

Alternative B is approximately one-half mile longer than the Alternative A. The replacement of the storm drain along Osborn Road and the additional length combine to make this the most costly alternative.

5.4 Alternative C, Scottsdale Road Alignment

Analysis shows that Alternative C is not hydraulically feasible. The existing pipe in Scottsdale Road is simply not deep enough to tie into the proposed system efficiently. The head loss at the junction structure at the intersection of Scottsdale Road and Osborn Road is estimated at 6.5 feet. The hydraulic grade line rises above the pavement grade west of the intersection.

This alternative could conceivably be feasible if the existing pipe in Scottsdale Road were lowered or a second large diameter pipe was added along Osborn Road from Scottsdale Road to connect to the existing storm drain at Miller Road. However, lowering the storm drain in Scottsdale Road nullifies the advantage of utilizing the existing pipe and shifts construction to the busiest street in the area. Adding a large diameter storm drain along Osborn Road is being considered as Alternative A.

5.5 Alternative D, 71st Street Alignment

The 71st Street Alignment is the recommended alternative. The routing is hydraulically feasible, but utility conflicts result in a pipe slope of 0.0015 feet per foot from Scottsdale Road to Indian Bend Wash. Although this is flatter than the desired minimum slope of 0.0020 feet per foot, it is an improvement over the absolute minimum of 0.0010 feet per foot found in Alternative B.

Advantages

The principal advantage of this alignment is the construction of one mile of storm drain from the Osborn Road/71st Street intersection to Earll Drive and Indian Bend Wash through neighborhoods which do not currently have storm drain protection. For the incremental comparative cost of 10% over the cost of Alternative A, this alternative provides a second storm drain system between Paiute Park and Indian Bend Wash. This alternative takes full advantage of existing storm drain systems by leaving them intact.

Alternative D causes the least disruption of traffic to all the alternatives, thereby having the least potential for changes during construction due to access and maintenance of traffic issues. Construction on the heavily traveled area of Osborn Road east of Scottsdale Road is avoided altogether.

Disadvantages

As with Alternative B, the route is approximately one-half mile longer than Alignment A. Consequently, the comparative cost of Alternative D is $585,400 more than Alternative A.

Contract No. FCD 98-30

OSBORN ROAD STORM DRAIN

FINAL

ALTERNATIVE ANALYSIS REPORT

TECHNICAL APPENDIX

JUNE 30, 1999

Submitted to:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Submitted by:

PARSONS BRINCKERHOFF

PCN No. 027 04 30

Technical Appendix Contents

HEC-1 Models
- Alternative A, Osborn Road- PBAltA.DAT
- Alternative B, Civic Center Boulevard- PBAltB.DAT
- Alternative C, Scottsdale Road- PBAltC.DAT
- Alternative D, 71st Street- PBAltD.DAT

Paiute Park Stage/Storage/Discharge Curve Calculations
- HEC-1 Model-PBOsb.DAT
- Fourth Iteration
- Scottsdale Maintenance Yard

StormCad Models
- Alternative A
  - brownin.stm
  - brownin2.stm
  - srpbrown.stm
- Alternative B
  - pbaltb1.stm
  - pbaltb2.stm
  - exstosb.stm
- Alternative C
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Head Loss Calculations
- Inlet Loss Spreadsheet
- Transition Loss Calculations

Cost Calculations
- Alternative A
- Alternative B
- Alternative D
- Traffic Delay Costs
  - Highway Capacity Software Output

HEC-1 Models

Alternative A, Osborn Road-

PBAltA.DAT

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1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *               MAY   1991              *
 *            VERSION 4.0.1E             *
 *     Lahey F77L-EM/32 version 5.01     *
 *       Dodson & Associates, Inc.       *
 *  RUN DATE  05/05/99  TIME  07:15:29   *
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*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 551-1748              *
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X     X  X        X     X         X
X     X  XXXXXXX   XXXXX          XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

              * ************************************************************************
              * This is ALTERNATIVE A hydrology for Change Order #2
              *
              * - This model is based on the Recommended Plan - Part A for the Osborn Road
              *     Outfall with the following changes:
              *        Osborn Road Outfall has been modified to include a junction structure
              *        at Miller Road.  The junction conveys excess runoff across Osborn Road
```

```
*        into Osborn Park located between old Osborn Road and new Osborn Road.
*        The outfall structure(s) for the park have been augmented to handle the
*        excess runoff.  The primary runoff continues east along Osborn Road and
*        outfalls to Indian Bend Wash.
*
ID    ********************************************************************************
ID    STP-PAPAGO REGIONAL FLOOD CONTROL PROJECT
ID    SCOTTSDALE - TEMPE - PHOENIX
ID    ********************************************************************************
ID
ID    Kimley-Horn and Associates, Inc.
ID    KVL Consultants, Inc.
ID
ID    10-Year, 6-Hour Storm Event
ID    10/97
ID
ID    PARSONS BRINCKERHOFF MODIFICATIONS TO ORIGINAL KIMLEY HORN MODEL
ID    PARSONS BRINCKERHOFF FILE NAME: PBALTA.DAT
ID    ALTERNATIVE A- OSBORN TO INDIAN BEND WASH
ID
ID    FILE MODIFIED BY PARSONS BRINCKERHOFF TO BE USED IN DESIGN OF OSBORN OUTFALL
ID    MODIFICATIONS:
ID    1) SUBBASIN 050062 REROUTED DIRECTLY TO PAIUTE PARK- IMPROVEMENTS TO 64TH ST
ID       CONVEY FLOW TO DETENTION BASIN. AREA REDUCED TO 3.9 ACRES (0.0061 SM)
ID    2) PAIUTE PARK STAGE/DISCHARGE CURVE ADJUSTED
ID    3) SUBBASINS CONTRIBUTING TO 66" ADOT PIPE ROUTED OUT OF PROPOSED PIPE
ID       (SUBBASINS 050710 AND 050720).
ID    4) REVISE AREA OF SUBBASIN 050310 FROM 0.041 SM TO 0.0063 SM.AND ROUTE TO
ID       EXISTING DETENTION BASIN. REMAINING AREA IS SRP PROPERTY WHICH DRAINS
ID       WEST.
ID       AREA REDUCTION DUE TO:
ID       REMOVE APARTMENTS AT THOMAS AND 64TH ST DUE TO ON-SITE RETENTION.
ID       REMOVE PORTION OF SRP SUBSTATION WHICH DRAINS EAST.
ID       COLLECT PAVEMENT FLOWS FROM 64TH ST (THOMAS TO PAIUTE PARK) IN LARGE PIPE
ID       COLLECT FLOWS FROM PAVED AREA BETWEEN SUBSTATION AND APARTMENTS IN LARGE
ID       PIPE
ID    5) REVISE PIPE SIZES IN ROUTE CARDS TO REFLECT PB PRELIMINARY DESIGN
ID
ID    Parsons Brinckerhoff
ID    Alan Humphrey
ID    5/5/99
*
*DIAGRAM
IT       2                    300
IO       5
```

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   39         KK  070808   BASIN
   40         BA   0.017
   41         PH       0       0    0.50    0.97    1.61    1.76    1.86    2.05
   42         LS       0      88       0       0      98       0
   43         UK     300  0.0100    0.20      99
   44         UK     100  0.0100    0.10       1
   45         RK    1600   0.214    0.03            TRAP       2     3.5
              *
              * The 10 year flows are diverted into a proposed storm drain along Oak Street.
              * In storm events greater than the 10 yr, the remaining flow will follow its
              * natural course across and sheet flow across Oak Street to the north.
              *
   46         KK   808PP  Divert 10-year flows into storm drain
   47         DT  808OUT
   48         DI       0      12      13      15      50     100
   49         DQ       0    0.01       1       3      38      88

   50         KK  070610 FROM  070808
   51         RK     240  0.0066   0.013            CIRC    3.00

   52         KK  070610   BASIN
   53         BA   0.007
   54         LS       0      88       0       0      98       0
   55         UK     300  0.0100    0.20      99
   56         UK     100  0.0100    0.10       1
   57         RK     500   0.054    0.03            TRAP       2     3.5

   58         KK   610PP  Divert 10-year flows into storm drain
   59         DT  610OUT
   60         DI       0       5       6      10      50     100
   61         DQ       0     .01       1       5      45      95

   62         KK  070610 COMBINE
   63         HC       2

   64         KK  070508    FROM  070610
   65         RK     420  0.0066   0.013            CIRC    3.00

   66         KK  070508   BASIN
```

```
     67          BA   0.008
     68          LS       0      85       0       0      98       0
     69          UK     300  0.0100    0.20      99
     70          UK     100  0.0100    0.10       1
     71          RK     600   0.048    0.03            TRAP       9     1.0

     72          KK   508PP  Divert 10-year flows into storm drain
     73          DT   508OUT
     74          DI       0       4       5      15      50     100
     75          DQ       0     .01       1      11      46      96
1                                          HEC-1 INPUT                                                    PAGE  3

  LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

     76          KK   070508 COMBINE
     77          HC       2

     78          KK   070010    FROM  070508
     79          RK      270  0.0066   0.013            CIRC    3.00

     80          KK   070010   BASIN
     81          BA    0.009
     82          LS       0      88       0       0      98       0
     83          UK     300  0.0100    0.20      99
     84          UK     100  0.0100    0.10       1
     85          RK    1200   0.042    0.03            TRAP       2     3.5

     86          KK    010PP  Divert 10-year flows into storm drain
     87          DT   010OUT
     88          DI       0       7      10      15      50     100
     89          DQ       0     .01       3       8      43      93

     90          KK   070010 COMBINE
     91          HC       2

     92          KK   070210    FROM  070010
     93          RK      120  0.0033   0.013            CIRC    3.00

     94          KK   070209   BASIN
     95          BA    0.018
     96          LS       0      87       0       0      98       0
     97          UK     300  0.0100    0.20      99
     98          UK     100  0.0100    0.10       1
     99          RK    1200   0.252    0.03            TRAP       2     3.5
```

```
100          KK  070210    FROM  070209
101          RK     750   0.252   0.013           TRAP      10       1

102          KK  070210   BASIN
103          BA   0.008
104          LS       0      87       0       0      98       0
105          UK     300  0.0100    0.20      99
106          UK     100  0.0100    0.10       1
107          RK     600   0.043    0.03           TRAP       2     3.5

108          KK  070210 COMBINE
109          HC       2

110          KK   210PP  Divert 10-year flows into storm drain
111          DT  210OUT
112          DI       0      17      20      30      50     100
113          DQ       0     .01       3      13      33      83
1                                      HEC-1 INPUT                                                    PAGE  4

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

114          KK  070210 COMBINE
115          HC       2

116          KK  050005   FROM 070210
117          RK     950   0.008   0.013           CIRC    3.00

118          KK  050005   BASIN
119          BA   0.038
120          LS       0      85       0       0      98       0
121          UK     300  0.0100    0.20      99
122          UK     100  0.0100    0.10       1
123          RK    1650    0.09    0.03           TRAP      30     1.0

124          KK   005PP  Divert 10-year flows into storm drain
125          DT  005OUT
126          DI       0      21      22     100     150     200
127          DQ       0     .01       1      79     129     179
             *
             * The start of the Osborn Road outfall hydrology
             *

128          KK  070010
```

```
 129          KM    Retrieve overland flows at CP 070010
 130          DR  010OUT

 131          KK  070020    FROM  070010
 132          RK     178  0.0131   0.013            CIRC     1.0

 133          KK  070030    FROM  070020
 134          RK     520  0.0146   0.025            TRAP     9.0       1

 135          KK  070030   BASIN
 136          BA   0.004
 137          LS       0      85       0       0      98       0
 138          UK     150  0.0100    0.30      65
 139          UK      50  0.0100    0.10      35
 140          RK     522  0.0146    0.03            TRAP       2     3.5

 141          KK  070030 COMBINE
 142          HC       2

 143          KK  070040    FROM  070030
 144          RK     177  0.0146   0.017            TRAP    54.8       1

 145          KK  070210
 146          KM    Retrieve overland flows at CP 070210
 147          DR  210OUT

 148          KK  070220    FROM  070210
 149          RK     164  0.0131   0.013            CIRC     1.0
1                                        HEC-1 INPUT                                        PAGE  5

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 150          KK  070040    FROM  070220
 151          RK     723  0.0146   0.017            TRAP    54.8       1

 152          KK  070040   BASIN
 153          BA   0.006
 154          LS       0      86       0       0      98       0
 155          UK     181  0.0100    0.28      72
 156          UK      60  0.0100    0.10      28
 157          RK    1946  0.0146    0.02            TRAP      30     1.0

 158          KK  070040 COMBINE
 159          HC       3
```

```
160          KK  070050    FROM  070040
161          RK     878  0.0146   0.025           TRAP    20.0     1.0

162          KK  070050   BASIN
163          BA   0.018
164          LS       0      86       0       0     98       0
165          UK     150  0.0100    0.30      65
166          UK      50  0.0100    0.10      35
167          RK     290  0.0058    0.02           TRAP      11     1.0
168          RK     981  0.0146    0.02           TRAP      11     1.0

169          KK  070050 COMBINE
170          HC       2

171          KK  070060    FROM  070050
172          RK     872  0.0058   0.025           TRAP     1.0     1.0

173          KK  070310   BASIN
174          BA   0.023
175          LS       0      86       0       0     98       0
176          UK     150  0.0100    0.30      65
177          UK      50  0.0100    0.10      35
178          RK     278  0.0058    0.02           TRAP      11     1.0
179          RK     986  0.0146    0.02           TRAP      11     1.0

180          KK  070060    FROM  070310
181          RK     745  0.0058   0.025           TRAP     1.0     1.0

182          KK  070060   BASIN
183          BA   0.020
184          LS       0      86       0       0     98       0
185          UK     150  0.0100    0.30      65
186          UK      50  0.0100    0.10      35
187          RK    1096  0.0058    0.03           TRAP       2     1.0

188          KK  070060 COMBINE
189          HC       3
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

190          KK  070070    FROM  070060
191          RK     726  0.0146   0.025           TRAP    30.0     1.0
```

```
192          KK  070070   BASIN
193          BA   0.032
194          LS       0      86       0       0      98       0
195          UK     150  0.0100    0.30      65
196          UK      50  0.0100    0.10      35
197          RK    1209  0.0146    0.03            TRAP       2     1.0

198          KK  070080   BASIN
199          BA   0.021
200          LS       0      83       0       0      98       0
201          UK      29  0.0100    0.39       9
202          UK     189  0.0100    0.10      91
203          RK    1257  0.0058    0.02            TRAP      30     1.0

204          KK  070080 COMBINE
205          HC       3

206          KK   07Det   Detention basin at Marriott's Brighton Gardens
207          RS       1    STOR
208          SV       0    0.78    1.64    2.65    3.84    5.21    6.77    6.77
209          SE      66      67      68      69      70      71      72      73
210          SQ       0      12      36      42      46      48      52     355
             *
             * Marriott's Brighton Gardens outfall - 07Qpip is the outflow in the storm drain
             * 07Qspl is the flow overtopping the basin
             *

211          KK  07Qpip
212          DT  07Qspl
213          DI       0      71     112     172     245     329     420     518     623
214          DQ       0     0.1      26      72     132     204     285     374     471

215          KK  070420   FROM 07Qpip
216          RK    1000   0.005   0.013            CIRC     3.0

217          KK  070410   BASIN
218          BA   0.011
219          LS       0      84       0       0      98       0
220          UK     144  0.0100    0.32      44
221          UK     121  0.0100    0.10      56
222          RK    1816  0.0146    0.02            TRAP      23     1.0

223          KK  070420    FROM  070410
224          RK     183  0.0058   0.017            TRAP    52.5       1
```

```
225          KK  070420   BASIN
226          BA   0.003
227          LS       0      79       0       0      98       0
228          UK     177  0.0100    0.31      25
229          UK     200  0.0100    0.10      75
230          RK    1046  0.0058    0.02            TRAP      49     1.0
1                                        HEC-1 INPUT                                        PAGE  7

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

231          KK  070420 COMBINE
232          HC       3

233          KK  210005  FROM 070420
234          RK     450   0.005   0.013            CIRC     3.5

235          KK  210005   BASIN
236          BA   0.008
237          LS       0      79       0       0      98       0
238          UK      94  0.0100    0.34      26
239          UK     116  0.0100    0.10      74
240          RK     523  0.0032    0.02            TRAP      38     1.0
241          RK    1250  0.0020    0.02            TRAP      45     1.0

242          KK  210005 COMBINE
243          HC       2

244          KK  050030   FROM 210005
245          RK    1600   0.005   0.013            CIRC       4

246          KK  050005
247          KM    Retrieve overland flows at CP 050005
248          DR  005OUT

249          KK  050010   FROM 050005
250          RK    1300   0.015    0.02            TRAP      35       1

251          KK  050010   BASIN
252          BA   0.066
253          LS       0      81       0       0      98       0
254          UK     144  0.0100    0.30      52
255          UK      57  0.0100    0.10      48
256          RK    1189  0.0033    0.02            TRAP      30     1.0
```

```
257          RK    1197  0.0038    0.02           TRAP      60     1.0

258          KK  050010   COMBINE
259          HC       2

260          KK  050020    FROM  050010
261          RK    1370  0.0038   0.017           TRAP    37.5       1

262          KK  050210   BASIN
263          BA   0.054
264          LS       0      79       0       0      98       0
265          UK     200  0.0100    0.30      28
266          UK     200  0.0100    0.10      72
267          RK     564  0.0038    0.02           TRAP      23     1.0
268          RK    1199  0.0033    0.02           TRAP      23     1.0
1                                          HEC-1 INPUT                                    PAGE  8

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

269          KK   210ST STORAGE
270          RS       1    STOR
271          SV    0.00    7.72    7.72
272          SE    0.00    1.00    2.00
273          SQ    0.00    0.01    0.01
274          ST     1.0     500     3.0     1.5

275          KK  050020    FROM  050210
276          RK     278  0.0033   0.017           TRAP    60.0       1

277          KK  050020   BASIN
278          BA   0.009
279          LS       0      79       0       0      98       0
280          UK     166  0.0100    0.30      39
281          UK      98  0.0100    0.10      61
282          RK    1304  0.0038    0.02           TRAP      60     1.0

283          KK  050020 COMBINE
284          HC       3

285          KK  050030    FROM  050020
286          RK     347  0.0038   0.017           TRAP    37.5       1

287          KK  050030   BASIN
288          BA   0.020
```

```
289          LS       0      79       0       0      98       0
290          UK     150  0.0100    0.30      15
291          UK      50  0.0100    0.10      85
292          RK     278  0.0038    0.02            TRAP       9     1.0
293          RK    1468  0.0033    0.02            TRAP       9     1.0
             *
             * Scottsdale Executive Villas natural storage in parking lot
             *

294          KK   030ST STORAGE
295          RS       1    STOR
296          SV       0    0.01    0.06    0.62    2.72    2.72
297          SE      65      66      67      68      69      70
298          SQ    0.00    0.01    0.01    0.01    0.01    0.01
299          ST      68     150     3.0     1.5

300          KK  050030 COMBINE
301          HC       3

302          KK  050305   FROM 050030
303          RK     150   0.002   0.013            CIRC     5.5

304          KK  050050   FROM 050305
305          RK    1500   0.001   0.013            TRAP       9     1.0
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

306          KK  050040   BASIN
307          BA   0.102
308          LS       0      79       0       0      98       0
309          UK     150  0.0100    0.30      57
310          UK      50  0.0100    0.10      43
311          RK    2230  0.0038    0.02            TRAP      38     1.0
312          RK    2654  0.0038    0.02            TRAP      38     1.0

313          KK  40STOR  Storage on west side of cross-cut canal
314          RS       1
315          SV       0       0       0       0     2.6    13.5    13.5
316          SE      58      59      60      61      62      63      64
317          SQ       0      10      22      32      40      50      55

318          KK  050050    FROM  050040
319          RK     491  0.0334   0.013            CIRC     2.5
```

```
                * ********************************************************************
                * PB Modification:
                * Reduce Area of Subbasin 050310 to 4.0 Acres (0.0063 SM)
                * Remaining area is west side of SRP substation
                * Remove one routing card for internal flows- this reduces route
                * length.
                * Add storage route through existing detention basin
                * Flows from other areas of original subbasin retained on-site or
                * collected by large pipe in 64th St.
                * ********************************************************************

  320           KK  050310   BASIN
                * BA 0.041
  321           BA   0.0063
  322           LS       0      79       0       0      98       0
  323           UK     200  0.0100    0.30      28
  324           UK     200  0.0100    0.10      72
  325           RK     816  0.0033    0.02            TRAP      30     1.0
                * RK   848  0.0038    0.02            TRAP      30     1.0

  326           KK  SRPDet
  327           RS       1    STOR
  328           SA   0.152   0.207   0.207
  329           SE    53.4      56      57
  330           SQ       0       2       4       5       8      10      20      40
  331           SE    53.4    54.0    54.3    54.5    54.9    55.1   53.48      57
                * ********************************************************************
                * PB Modification:
                * Add subbasin to represent flows from pavement of 64th St south
                * of Paiute Park and paved area between SRP substation and new
                * apartments. Area to be collected by large pipe in 64th St.

  332           KK  S 64th   BASIN
  333           BA   0.011
  334           LS       0      79       0       0      83       0
  335           UK     100   0.004     0.1      53
  336           UK     100   0.008     0.1      47
  337           RK    1430   0.004   0.015            TRAP      35       1
1                                        HEC-1 INPUT                                  PAGE 10

 LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


  338           KK  050065   BASIN
  339           BA   0.014
```

```
340         LS       0      79       0       0      98       0
341         UK     100    0.01     0.1      15
342         UK     100    0.01     0.1      85
343         RK     500   0.005   0.012            TRAP      60       1
            *
            * ****************************************************************
            * PB Modification
            * Relocate hydrograph and subsequent route for Basin 050060
            * Combine separately to get peak flow in main pipe
            * KK050060   BASIN
            * BA 0.029
            * LS      0      79       0       0      98       0
            * UK    105    0.01     0.3      20
            * UK    160    0.01     0.1      80
            * RK   1300  0.0038    0.03            TRAP     100     1.0
            *
            * ****************************************************************
            * PB Modification
            * Relocate hydrograph and subsequent route for Basin 050062
            * Modify pipe length to reflect storm drain route on 64th St
            * Insert hydrographs at this location
            * Revise basin area to 3.9 acres (0.0061 square miles)
            * ****************************************************************

344         KK  050062   BASIN
345         BA   0.0061
            * Original KH model had 2 BA cards. The 0.006 card was first, leaving
            * the 0.014 card to be used in the model.
            * BA 0.006
            * BA 0.014
346         LS       0      79       0       0      98       0
347         UK     100    0.01     0.3      15
348         UK      50    0.01     0.1      85
349         RK     900   0.005   0.012            TRAP      60       1

350         KK  050050   FROM 050062
351         RK    1000   0.002   0.013            CIRC     2.5       1
            *
            * Flows combined from 050040, 050305, revised 050310 and 050065
            * into main pipe above Paiute Park. PB- Add 050062 and S 64th
            *

352         KK  050050 COMBINE
353         KM   Peak flow in main pipe above Paiute Park
354         HC       6
```

```
                * Revise Hydrograph combine count from 5 to 6
                * Move Subbasin 050060 (Paiute Park) to combine here.
1                                       HEC-1 INPUT                                    PAGE 11

LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  355           KK  050060   BASIN
  356           BA   0.029
  357           LS       0      79       0       0      98       0
  358           UK     105    0.01     0.3      20
  359           UK     160    0.01     0.1      80
  360           RK    1300  0.0038    0.03            TRAP     100     1.0

  361           KK  050050 COMBINE
  362           KM   Paiute Park inflow
  363           HC       2
                * ********************************************************************
                * PB Modification:
                * Revise Kimley-Horn stage/storage/discharge curve
                * Revisions based on iterative calculations which included effect of
                * Paiute Park discharges on downstream pipe system.
                * ********************************************************************

  364           KK   05Det
  365           KO       2
                * Original KH Curve
                * RS      1    STOR
                * SV      0    0.64    2.37    5.14    8.40    11.7    15.1    18.5    22.1
                *    22.1S
                * SE     49      50      51      52      53      54      55      56      57
                *       58
                * SQ    4.5      22      37      47      56      65      73      81      88
                *      156
                * Revised PB Curve
  366           RS       1    STOR
  367           SA    1.20    1.84    3.17    3.21    3.31    3.35    3.42    3.49
  368           SE      50      51      52      53      54      55      56      57
  369           SQ       0      20      40      60      80     100     120     140
  370           SE      50    50.8   51.18   51.78   52.39   52.94   53.48   54.04
                *
                * Paiute Park outfall - 05Qpip is the outflow in the storm drain
                * 05Qspl is the flow overtopping the basin
                *
                *
```

```
                * Overflows to CP 050060
                *
  371           KK  05Qpip
  372           DT  05Qspl
  373           DI       0     160     382     780    1292    1897
  374           DQ       0    0.01     212     600    1102    1697
                *
                * Begin storm drain system in Osborn Road
                *
                * ***************************************************************
                * PB Modification
                * Relocate hydrograph and subsequent route for Basin 050062
                * Remove hydrographs from this location
                * ***************************************************************
                * KK050062   BASIN
                * BA 0.006
                * BA 0.014
                * LS      0      79       0       0      98       0
                * UK    100    0.01     0.3      15
                * UK     50    0.01     0.1      85
                * RK    900   0.005   0.012            TRAP      60       1
                * KK050610   FROM 050062
                * RK   1500   0.003   0.013            TRAP      60       1
1                                       HEC-1 INPUT                                 PAGE 12

 LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  375           KK  050610   BASIN
  376           BA   0.081
  377           LS       0      79       0       0      98       0
  378           UK     130  0.0100    0.32      56
  379           UK      70  0.0100    0.10      44
  380           RK    1450  0.0038    0.02            TRAP      45     1.0
  381           RK    1240  0.0033    0.02            TRAP      60     1.0
                * ***************************************************************
                * PB Modification
                * Revise combine operation from 3 to 2 hydrographs due to hydrograph
                * relocation.
                * ***************************************************************

  382           KK  050610    COMBINE
  383           KM   OSBORN & PINTO
  384           HC       2
```

```
385          KK  050620    FROM  050610
             * ***************************************************************
             * PB Modification
             * Revise pipe size in routing card to reflect PB preliminary design.
             * ***************************************************************
386          RK    1050  0.0037   0.013            CIRC       5
             * RK  1050  0.0037   0.013            CIRC       6

387          KK  050620   BASIN
388          BA   0.099
389          LS       0      79       0       0      98       0
390          UK     147  0.0100    0.30      56
391          UK      53  0.0100    0.10      44
392          RK     940  0.0033    0.02            TRAP      41     1.0
393          RK    2545  0.0038    0.02            TRAP      60     1.0

394          KK  050620 COMBINE
395          KM   OSBORN & 68TH ST
396          HC       2

397          KK  050630    FROM  050620
398          RK    1440  0.0028   0.013            CIRC       7

399          KK  050630   BASIN
400          BA   0.062
401          LS       0      79       0       0      98       0
402          UK     138  0.0100    0.31      33
403          UK      64  0.0100    0.10      67
404          RK    1205  0.0038    0.02            TRAP      41     1.0
405          RK    1348  0.0033    0.02            TRAP      60     1.0

406          KK  050630 COMBINE
407          KM   OSBORN & 70TH ST
408          HC       2
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


409          KK  050640    FROM  050630
410          RK    1150  0.0024   0.013            CIRC       8
             * ***************************************************************
             * PB Modification:
             * ADOT 66" pipe- Flows to exit model via Scottsdale Road storm drain
```

```
* Remove hydrograph and subsequent routes for Basins 050710 and 050720
* Flows do not reenter model. Adjust by removing basins and revising HC card.
* Remove hydrographs from this location
* ********************************************************************
* KK050710   BASIN
* BA 0.005
* LS      0      79       0       0      98       0
* UK     21  0.0100    0.40      15
* UK    200  0.0100    0.10      85
* RK    610  0.0038    0.02            TRAP      55     1.0
* KK050720    FROM  050710
* RK    316  0.0045   0.013            CIRC     5.5
* KK050720   BASIN
* BA 0.028
* LS      0      79       0       0      98       0
* UK     57  0.0100    0.38      17
* UK    188  0.0100    0.10      83
* RK    580  0.0038    0.02            TRAP      45     1.0
* RK   1594  0.0033    0.02            TRAP      55     1.0
* KK050720   COMBINE
* HC      2
* KK050640    FROM  050720
* RK    422  0.0045   0.013            CIRC     5.5

411     KK  050640   BASIN
412     BA   0.032
413     LS       0      79       0       0      98       0
414     UK      64  0.0100    0.37      15
415     UK     149  0.0100    0.10      85
416     RK    1605  0.0038    0.02            TRAP      41     1.0
417     RK    1168  0.0033    0.02            TRAP      60     1.0
        * ********************************************************************
        * PB Modification
        * Revise combine operation from 3 to 2 hydrographs due to hydrograph
        * deletion.
        * ********************************************************************

418     KK  050640 COMBINE
419     KM   OSBORN & SCOTTSDALE
420     HC       2

421     KK  051510   FROM 050640
        * ********************************************************************
        * PB Modification
        * Revise pipe size in routing card to reflect PB preliminary design.
```

```
                * ********************************************************************
  422           RK      700  0.0044   0.013            CIRC       8
                * RK    700  0.0044   0.013            CIRC     9.5
1                                        HEC-1 INPUT                                PAGE 14

 LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  423           KK  050810    BASIN
  424           BA    0.013
  425           LS        0       79        0       0       98        0
  426           UK       88  0.0100     0.36      20
  427           UK      200  0.0100     0.10      80
  428           RK      164  0.0033     0.02            TRAP       28     1.0
  429           RK     1031  0.0038     0.02            TRAP       55     1.0

  430           KK  051510     FROM  050810
  431           RK      705  0.0025   0.013            CIRC      4.0

  432           KK  051510    BASIN
  433           BA    0.010
  434           LS        0       79        0       0       98        0
  435           UK       59  0.0100     0.38      18
  436           UK      200  0.0100     0.10      82
  437           RK      139  0.0038     0.02            TRAP       41     1.0
  438           RK      521  0.0033     0.02            TRAP       71     1.0

  439           KK  051510     COMBINE
  440           HC        3

  441           KK  051520     FROM  051510
                * ********************************************************************
                * PB Modification
                * Revise pipe size in routing card to reflect PB preliminary design.
                * ********************************************************************
  442           RK      680  0.0028   0.013            CIRC       8
                * RK    680  0.0028   0.013            CIRC     9.5

  443           KK  051610    BASIN
  444           BA    0.021
  445           LS        0       79        0       0       98        0
  446           UK      165  0.0100     0.32      25
  447           UK      200  0.0100     0.10      75
  448           RK      624  0.0038     0.02            TRAP       41     1.0
  449           RK      792  0.0033     0.02            TRAP       60     1.0
```

```
450          KK  051520    FROM  051610
451          RK     601  0.0047   0.013           CIRC     5.0

452          KK  051710   BASIN
453          BA   0.004
454          LS       0      79       0       0      98       0
455          UK     146  0.0100    0.33      24
456          UK     200  0.0100    0.10      76
457          RK     515  0.0038    0.02           TRAP      30     1.0
458          RK     287  0.0033    0.02           TRAP      30     1.0
1                                          HEC-1 INPUT                                          PAGE 15

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

459          KK  051520    FROM  051710
460          RK     567  0.0032   0.013           CIRC     4.0

461          KK  051520   BASIN
462          BA   0.023
463          LS       0      79       0       0      98       0
464          UK     179  0.0100    0.31      26
465          UK     198  0.0100    0.10      74
466          RK     473  0.0038    0.02           TRAP      60     1.0
467          RK     704  0.0033    0.02           TRAP      71     1.0

468          KK  051520 COMBINE
469          HC       4

470          KK  051530    FROM  051520
             * ************************************************************************
             * PB Modification
             * Revise pipe size in routing card to reflect PB preliminary design.
             * ************************************************************************
471          RK     926  0.001    0.013           CIRC       8
             * RK   926   0.001   0.013           CIRC     9.5

472          KK  051530   BASIN
473          BA   0.041
474          LS       0      79       0       0      98       0
475          UK      26  0.0100    0.40      15
476          UK     193  0.0100    0.10      85
477          RK     889  0.0038    0.02           TRAP      38     1.0
478          RK     860  0.0033    0.02           TRAP      60     1.0
```

```
479          KK  051530 COMBINE
480          HC       2

481          KK  051540    FROM  051530
             * ****************************************************************
             * PB Modification
             * Revise pipe size in routing card to reflect PB preliminary design.
             * ****************************************************************
482          RK     360  0.001   0.013            CIRC       8
             * RK   360   0.001   0.013            CIRC     9.5

483          KK  051810   BASIN
484          BA   0.005
485          LS       0      79       0       0      98       0
486          UK      23  0.0100    0.40      16
487          UK     196  0.0100    0.10      84
488          RK     272  0.0033    0.02            TRAP      19     1.0
489          RK     272  0.0038    0.02            TRAP      30     1.0
1                                    HEC-1 INPUT                                 PAGE 16

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

490          KK  051540    FROM  051810
491          RK     218  0.0045   0.013            CIRC     4.5

492          KK  051540   BASIN
493          BA   0.004
494          LS       0      79       0       0      98       0
495          UK      44  0.0100    0.38      16
496          UK     172  0.0100    0.10      84
497          RK     233  0.0038    0.02            TRAP      12     1.0
498          RK     265  0.0033    0.02            TRAP      60     1.0

499          KK  051540 COMBINE
500          HC       3
             * ****************************************************************
             * PB Modification
             * Remove subsequent portions of model. Hydraulic modeling of existing
             * storm drain from Miller to IBW done with StormCad. Park is not
             * connected to existing storm drain.
             * ****************************************************************
             * KK051550    FROM  051540
             * RK   273   0.001   0.013            TRAP     8.0     1.0
```

```
* KK  05EX
* DT 05PRK
* DI     0   246.1    1000
* DQ     0     246     246
* KK051560    FROM  051550
* RK   800  0.0038   0.013            CIRC     7.0
*
* Osborn Rd outfall to Indian Bend Wash
*
* KK051570    FROM  051560
* RK   228   0.003   0.013            CIRC     7.0
*
* Osborn Park Storage and Outflow to IBW
*
* KK051550
* DR 05PRK
* KK051560   BASIN
* BA 0.008
* LS     0      79       0       0      98       0
* UK   116  0.0100    0.33      47
* UK    89  0.0100    0.10      53
* RK  1126  0.0033    0.02            TRAP      60     1.0
* KK   PRK
* HC     2
* KK05PKST   STORAGE
* RS     1    STOR
* SV     0    0.08    0.31    0.69    1.20    1.92    3.01    3.01
* SE  1224    1225    1226    1227    1228    1229    1230    1231
* SQ     0    0.01      62     111     167     218     262     600
*
* New CP 051565 located at the outfall from Osborn Park to IBW
*
* KK051565    FROM   05PRK
* RK   130   0.003   0.013            TRAP       7
*
* Notice:
* This document, together with the concepts and designs presented herein, as an
* instrument of service, is intended for the specific purpose and client for
* which it was prepared.  Reuse of and improper reliance on this document
* without written authorization and adaptation by Kimley-Horn and Associates,
* Inc. shall be without liability to Kimley-Horn and Associates, Inc.
*
```

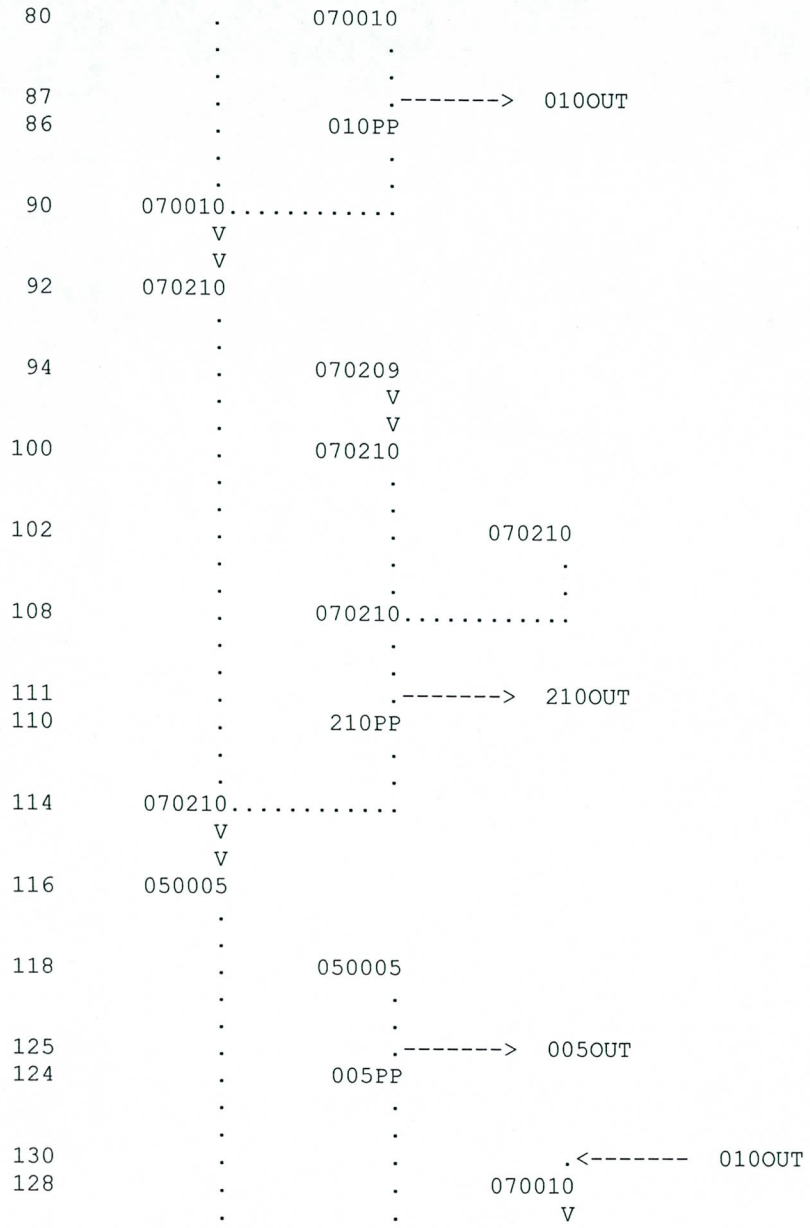


```
     LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
```

```
          501           ZZ
1
               SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    39      070808
              .
              .
    47        .-------->  808OUT
    46       808PP
             V
             V
    50      070610
              .
              .
    52        .       070610
              .             .
              .             .
    59        .             .-------->  610OUT
    58        .        610PP
              .             .
              .             .
    62      070610............
             V
             V
    64      070508
              .
              .
    66        .       070508
              .             .
              .             .
    73        .             .-------->  508OUT
    72        .        508PP
              .             .
              .             .
    76      070508............
             V
             V
    78      070010
              .
              .
```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87
010OUT
86
010PP
90
070010
92
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94
070209
100
070210
102
070210
108
070210
111
210OUT
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114
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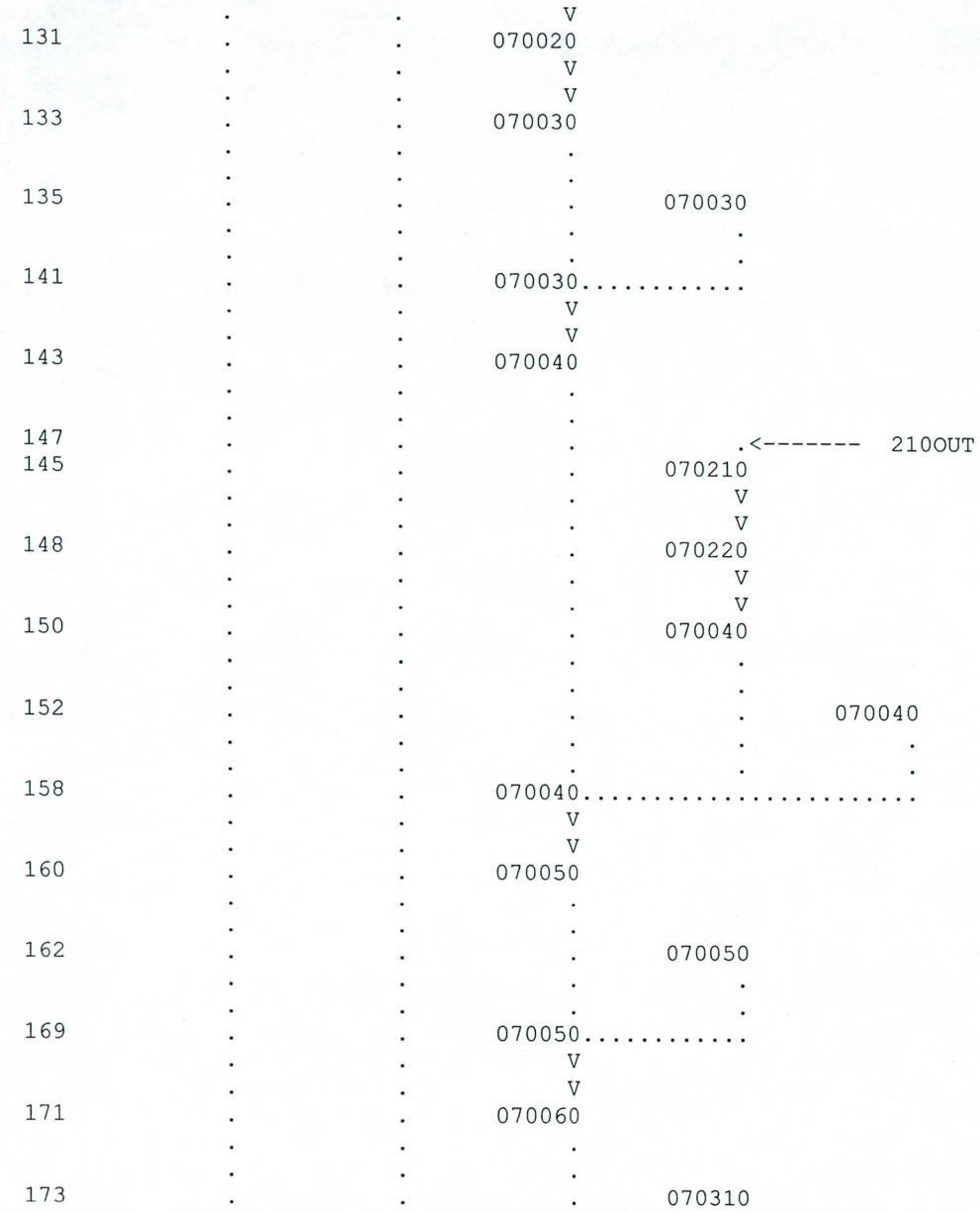
116
050005
118
050005
125
005OUT
124
005PP
130
010OUT
128
070010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070030
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070030
141
070030
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070040
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210OUT
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070210
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070050
162
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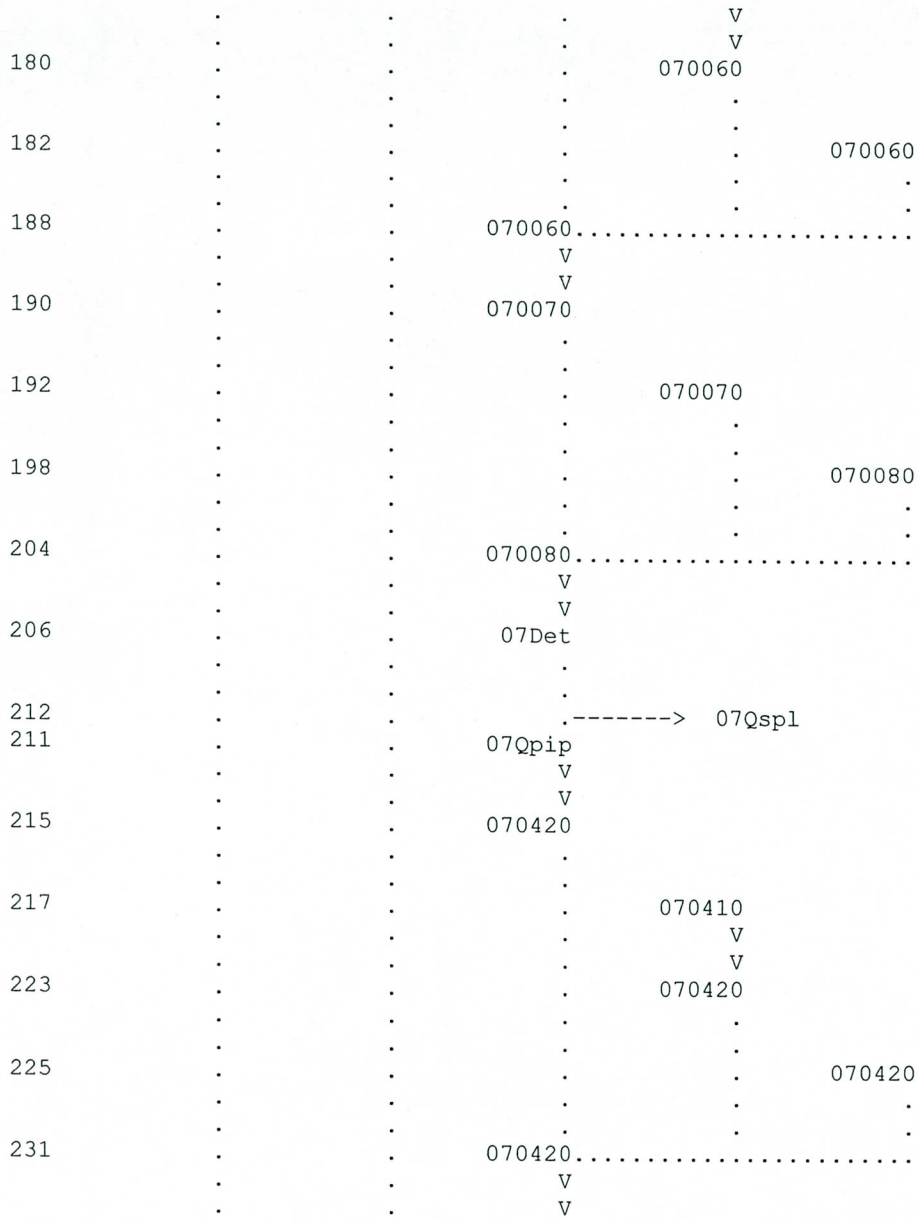
171
070060
173
070310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070080
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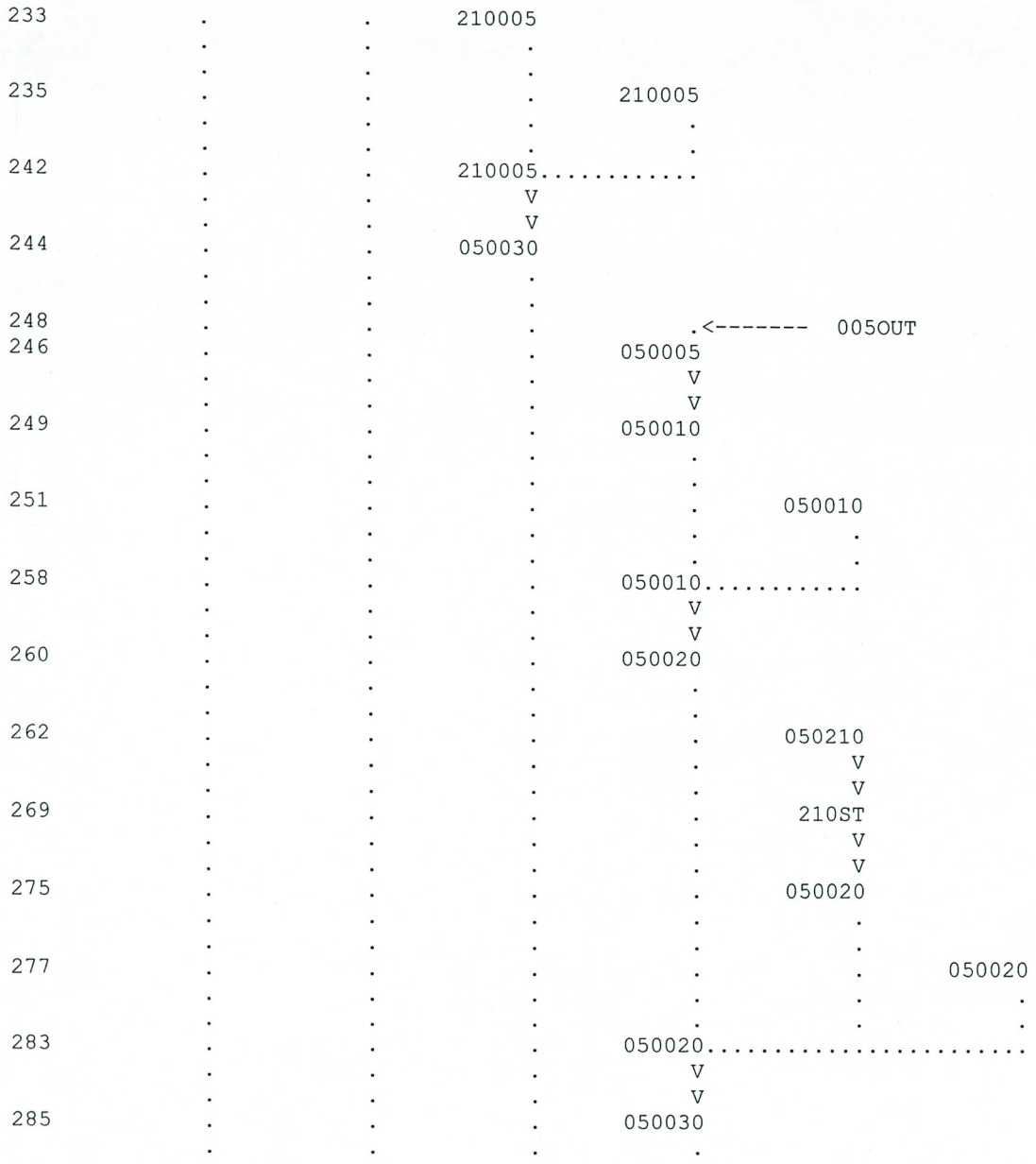
07Qspl
211
07Qpip
215
070420
217
070410
223
070420
225
070420
231
070420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262
050210
269
210ST
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050020
277
050020
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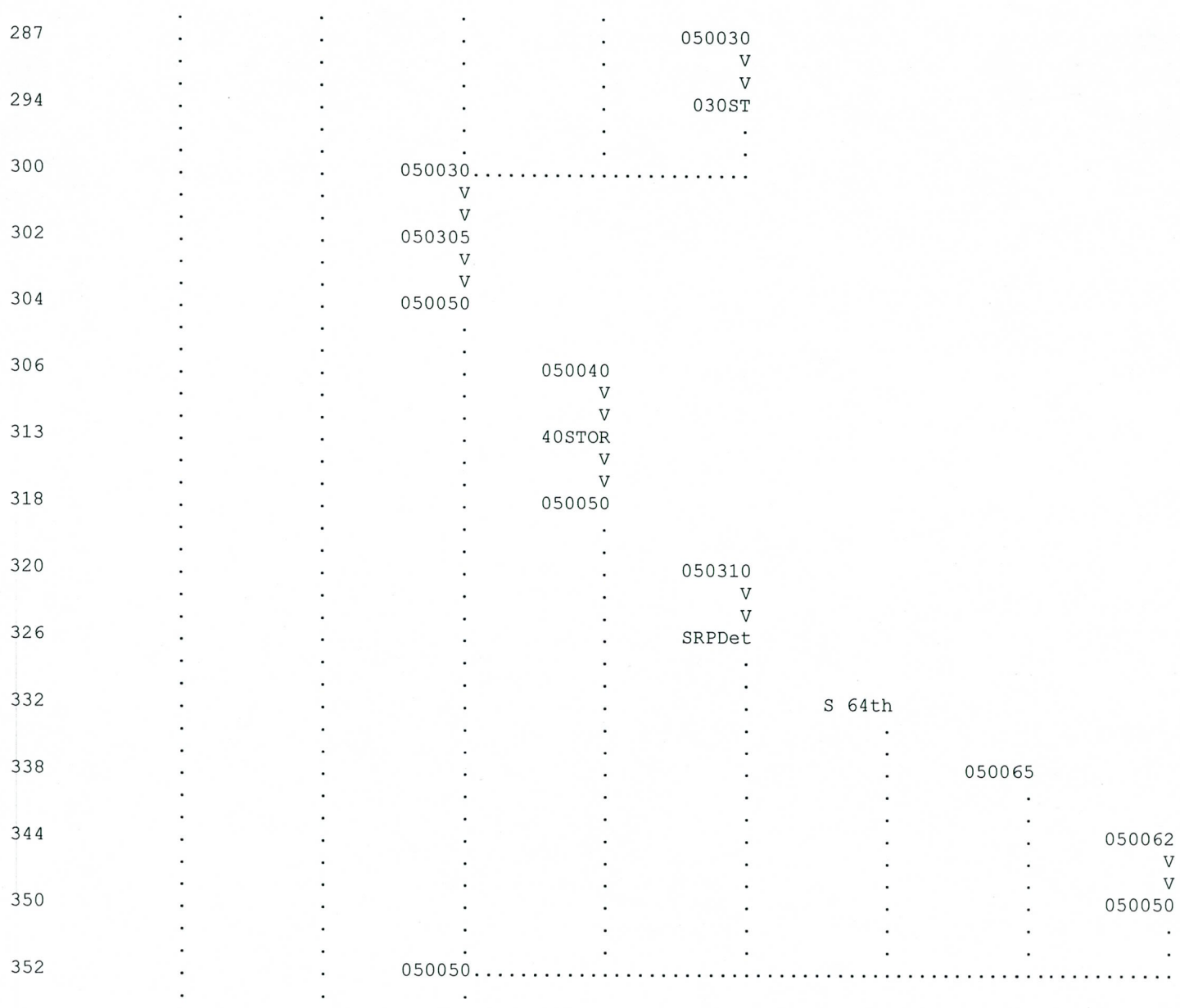
050020
285
050030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V
V
050305
V
V
050050
050040
V
V
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V
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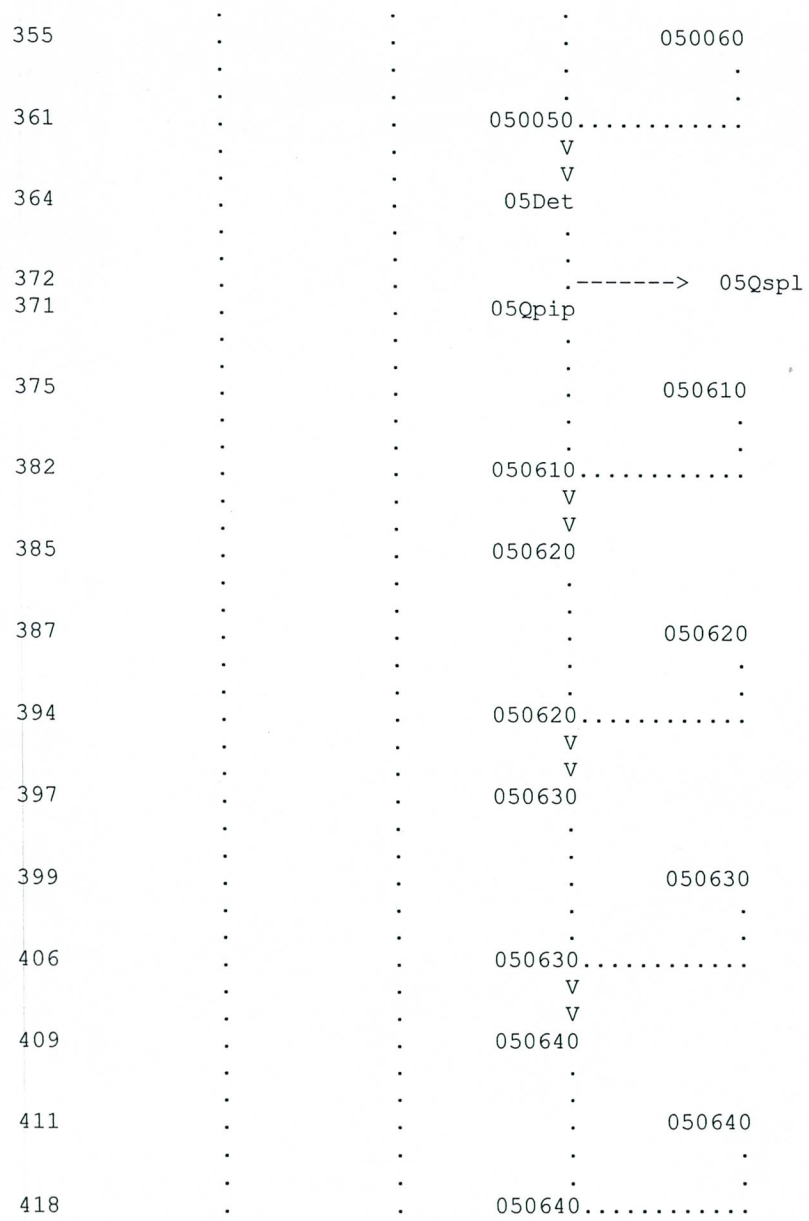
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399
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406
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409
050640
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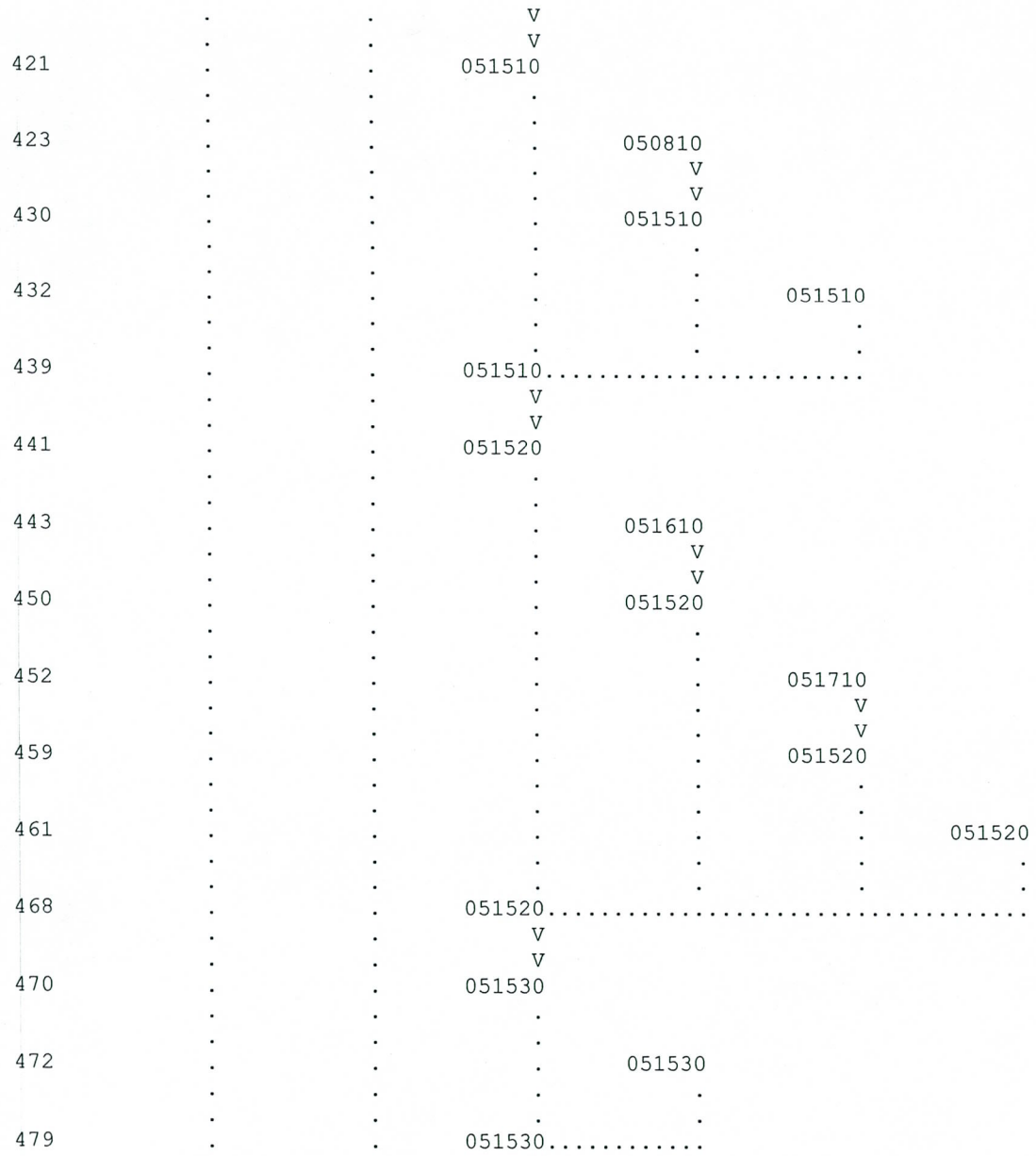
050640
418
050640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452
051710
459
051520
461
051520
468
051520
470
051530
472
051530
479
051530

```
                .          .          V
                .          .          V
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                .          .          .
                .          .          .
  483           .          .          .      051810
                .          .          .           V
                .          .          .           V
  490           .          .          .      051540
                .          .          .           .
                .          .          .           .
  492           .          .          .           .      051540
                .          .          .           .           .
                .          .          .           .           .
  499           .          .     051540.....................
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *               MAY   1991              *
 *            VERSION 4.0.1E             *
 *     Lahey F77L-EM/32 version 5.01     *
 *       Dodson & Associates, Inc.       *
 *  RUN DATE  05/05/99  TIME  07:15:29   *
 *****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 551-1748              *
*                                       *
*****************************************
```

```
*****************************************************************************
STP-PAPAGO REGIONAL FLOOD CONTROL PROJECT
SCOTTSDALE - TEMPE - PHOENIX
*****************************************************************************

Kimley-Horn and Associates, Inc.
KVL Consultants, Inc.

10-Year, 6-Hour Storm Event
10/97

PARSONS BRINCKERHOFF MODIFICATIONS TO ORIGINAL KIMLEY HORN MODEL
PARSONS BRINCKERHOFF FILE NAME: PBALTA.DAT
ALTERNATIVE A- OSBORN TO INDIAN BEND WASH
```

FILE MODIFIED BY PARSONS BRINCKERHOFF TO BE USED IN DESIGN OF OSBORN OUTFALL
MODIFICATIONS:
1) SUBBASIN 050062 REROUTED DIRECTLY TO PAIUTE PARK- IMPROVEMENTS TO 64TH ST CONVEY FLOW TO DETENTION BASIN. AREA REDUCED TO 3.9 ACRES (0.0061 SM)
2) PAIUTE PARK STAGE/DISCHARGE CURVE ADJUSTED
3) SUBBASINS CONTRIBUTING TO 66" ADOT PIPE ROUTED OUT OF PROPOSED PIPE (SUBBASINS 050710 AND 050720).
4) REVISE AREA OF SUBBASIN 050310 FROM 0.041 SM TO 0.0063 SM.AND ROUTE TO EXISTING DETENTION BASIN. REMAINING AREA IS SRP PROPERTY WHICH DRAINS WEST.
   AREA REDUCTION DUE TO:
   REMOVE APARTMENTS AT THOMAS AND 64TH ST DUE TO ON-SITE RETENTION.
   REMOVE PORTION OF SRP SUBSTATION WHICH DRAINS EAST.
   COLLECT PAVEMENT FLOWS FROM 64TH ST (THOMAS TO PAIUTE PARK) IN LARGE PIPE
   COLLECT FLOWS FROM PAVED AREA BETWEEN SUBSTATION AND APARTMENTS IN LARGE PIPE
5) REVISE PIPE SIZES IN ROUTE CARDS TO REFLECT PB PRELIMINARY DESIGN

Parsons Brinckerhoff
Alan Humphrey
5/5/99

38 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	2	MINUTES IN COMPUTATION INTERVAL
IDATE	1 0	STARTING DATE
ITIME	0000	STARTING TIME
NQ	300	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	1 0	ENDING DATE
NDTIME	0958	ENDING TIME
ICENT	19	CENTURY MARK

COMPUTATION INTERVAL 0.03 HOURS
TOTAL TIME BASE 9.97 HOURS

ENGLISH UNITS

DRAINAGE AREA	SQUARE MILES
PRECIPITATION DEPTH	INCHES
LENGTH, ELEVATION	FEET
FLOW	CUBIC FEET PER SECOND

STORAGE VOLUME ACRE-FEET
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

*** ***

```
          **************
          *            *
364 KK    *     05Det  *
          *            *
          **************
```

365 KO OUTPUT CONTROL VARIABLES

IPRNT	2	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

366 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	STOR	TYPE OF INITIAL CONDITION
RSVRIC	0.00	INITIAL CONDITION
X	0.00	WORKING R AND D COEFFICIENT

367 SA	AREA	1.2	1.8	3.2	3.2	3.3	3.3	3.4	3.5
368 SE	ELEVATION	50.00	51.00	52.00	53.00	54.00	55.00	56.00	57.00
369 SQ	DISCHARGE	0.	20.	40.	60.	80.	100.	120.	140.
370 SE	ELEVATION	50.00	50.80	51.18	51.78	52.39	52.94	53.48	54.04

***

COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	1.51	3.98	7.17	10.43	13.76	17.15	20.60
ELEVATION	50.00	51.00	52.00	53.00	54.00	55.00	56.00	57.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	1.15	1.51	1.86	3.32	3.98	5.22	6.98	7.17	8.73
OUTFLOW	0.00	20.00	30.53	40.00	60.00	67.21	80.00	100.00	102.22	120.00
ELEVATION	50.00	50.80	51.00	51.18	51.78	52.00	52.39	52.94	53.00	53.48

STORAGE	10.43	10.57	13.76	17.15	20.60
OUTFLOW	138.57	140.00	174.29	210.00	245.71
ELEVATION	54.00	54.04	55.00	56.00	57.00

HYDROGRAPH AT STATION 05Det

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	0.0	50.0	1		0320	101	79.	5.2	52.4	1		0640	201	28.	1.4	50.9
1		0002	2	1.	0.1	50.0	1		0322	102	84.	5.6	52.5	1		0642	202	27.	1.4	50.9
1		0004	3	1.	0.1	50.0	1		0324	103	89.	6.0	52.6	1		0644	203	25.	1.3	50.9
1		0006	4	1.	0.1	50.0	1		0326	104	93.	6.4	52.7	1		0646	204	24.	1.3	50.9
1		0008	5	1.	0.1	50.0	1		0328	105	96.	6.7	52.8	1		0648	205	23.	1.3	50.9
1		0010	6	1.	0.0	50.0	1		0330	106	100.	6.9	52.9	1		0650	206	22.	1.2	50.8
1		0012	7	1.	0.0	50.0	1		0332	107	102.	7.2	53.0	1		0652	207	21.	1.2	50.8
1		0014	8	1.	0.0	50.0	1		0334	108	105.	7.4	53.1	1		0654	208	21.	1.2	50.8
1		0016	9	1.	0.0	50.0	1		0336	109	107.	7.6	53.1	1		0656	209	20.	1.1	50.8
1		0018	10	1.	0.0	50.0	1		0338	110	109.	7.8	53.2	1		0658	210	19.	1.1	50.8
1		0020	11	1.	0.0	50.0	1		0340	111	111.	7.9	53.2	1		0700	211	19.	1.1	50.8
1		0022	12	1.	0.0	50.0	1		0342	112	112.	8.0	53.3	1		0702	212	18.	1.1	50.7
1		0024	13	1.	0.0	50.0	1		0344	113	113.	8.1	53.3	1		0704	213	18.	1.0	50.7
1		0026	14	1.	0.0	50.0	1		0346	114	114.	8.2	53.3	1		0706	214	18.	1.0	50.7
1		0028	15	1.	0.0	50.0	1		0348	115	115.	8.3	53.4	1		0708	215	17.	1.0	50.7
1		0030	16	1.	0.0	50.0	1		0350	116	116.	8.4	53.4	1		0710	216	17.	1.0	50.7
1		0032	17	1.	0.0	50.0	1		0352	117	116.	8.4	53.4	1		0712	217	16.	0.9	50.7
1		0034	18	0.	0.0	50.0	1		0354	118	117.	8.4	53.4	1		0714	218	16.	0.9	50.6
1		0036	19	0.	0.0	50.0	1		0356	119	117.	8.5	53.4	1		0716	219	16.	0.9	50.6
1		0038	20	0.	0.0	50.0	1		0358	120	117.	8.5	53.4	1		0718	220	15.	0.9	50.6
1		0040	21	0.	0.0	50.0	1		0400	121	117.	8.5	53.4	1		0720	221	15.	0.9	50.6
1		0042	22	0.	0.0	50.0	1		0402	122	117.	8.5	53.4	1		0722	222	14.	0.8	50.6
1		0044	23	0.	0.0	50.0	1		0404	123	117.	8.5	53.4	1		0724	223	14.	0.8	50.6
1		0046	24	0.	0.0	50.0	1		0406	124	117.	8.5	53.4	1		0726	224	14.	0.8	50.5
1		0048	25	0.	0.0	50.0	1		0408	125	117.	8.4	53.4	1		0728	225	13.	0.8	50.5
1		0050	26	0.	0.0	50.0	1		0410	126	116.	8.4	53.4	1		0730	226	13.	0.7	50.5
1		0052	27	0.	0.0	50.0	1		0412	127	116.	8.4	53.4	1		0732	227	13.	0.7	50.5
1		0054	28	0.	0.0	50.0	1		0414	128	116.	8.3	53.4	1		0734	228	12.	0.7	50.5
1		0056	29	0.	0.0	50.0	1		0416	129	115.	8.3	53.3	1		0736	229	12.	0.7	50.5

1	0058	30	0.	0.0	50.0 *	1	0418	130	115.	8.3	53.3 *	1	0738	230	12.	0.7	50.5
1	0100	31	0.	0.0	50.0 *	1	0420	131	114.	8.2	53.3 *	1	0740	231	11.	0.7	50.5
1	0102	32	0.	0.0	50.0 *	1	0422	132	114.	8.2	53.3 *	1	0742	232	11.	0.6	50.4
1	0104	33	0.	0.0	50.0 *	1	0424	133	113.	8.1	53.3 *	1	0744	233	11.	0.6	50.4
1	0106	34	0.	0.0	50.0 *	1	0426	134	112.	8.1	53.3 *	1	0746	234	11.	0.6	50.4
1	0108	35	0.	0.0	50.0 *	1	0428	135	112.	8.0	53.3 *	1	0748	235	10.	0.6	50.4
1	0110	36	0.	0.0	50.0 *	1	0430	136	111.	8.0	53.2 *	1	0750	236	10.	0.6	50.4
1	0112	37	0.	0.0	50.0 *	1	0432	137	111.	7.9	53.2 *	1	0752	237	10.	0.6	50.4
1	0114	38	0.	0.0	50.0 *	1	0434	138	110.	7.8	53.2 *	1	0754	238	9.	0.5	50.4
1	0116	39	0.	0.0	50.0 *	1	0436	139	109.	7.8	53.2 *	1	0756	239	9.	0.5	50.4
1	0118	40	0.	0.0	50.0 *	1	0438	140	108.	7.7	53.2 *	1	0758	240	9.	0.5	50.4
1	0120	41	0.	0.0	50.0 *	1	0440	141	108.	7.7	53.2 *	1	0800	241	9.	0.5	50.4
1	0122	42	0.	0.0	50.0 *	1	0442	142	107.	7.6	53.1 *	1	0802	242	9.	0.5	50.3
1	0124	43	0.	0.0	50.0 *	1	0444	143	105.	7.4	53.1 *	1	0804	243	8.	0.5	50.3
1	0126	44	0.	0.0	50.0 *	1	0446	144	104.	7.3	53.0 *	1	0806	244	8.	0.5	50.3
1	0128	45	0.	0.0	50.0 *	1	0448	145	102.	7.2	53.0 *	1	0808	245	8.	0.5	50.3
1	0130	46	0.	0.0	50.0 *	1	0450	146	101.	7.1	53.0 *	1	0810	246	8.	0.4	50.3
1	0132	47	0.	0.0	50.0 *	1	0452	147	99.	6.9	52.9 *	1	0812	247	7.	0.4	50.3
1	0134	48	0.	0.0	50.0 *	1	0454	148	98.	6.8	52.9 *	1	0814	248	7.	0.4	50.3
1	0136	49	0.	0.0	50.0 *	1	0456	149	97.	6.7	52.8 *	1	0816	249	7.	0.4	50.3
1	0138	50	0.	0.0	50.0 *	1	0458	150	95.	6.5	52.8 *	1	0818	250	7.	0.4	50.3
1	0140	51	0.	0.0	50.0 *	1	0500	151	93.	6.4	52.8 *	1	0820	251	7.	0.4	50.3
1	0142	52	0.	0.0	50.0 *	1	0502	152	92.	6.3	52.7 *	1	0822	252	7.	0.4	50.3
1	0144	53	0.	0.0	50.0 *	1	0504	153	90.	6.1	52.7 *	1	0824	253	6.	0.4	50.3
1	0146	54	0.	0.0	50.0 *	1	0506	154	89.	6.0	52.6 *	1	0826	254	6.	0.4	50.2
1	0148	55	0.	0.0	50.0 *	1	0508	155	87.	5.9	52.6 *	1	0828	255	6.	0.4	50.2
1	0150	56	0.	0.0	50.0 *	1	0510	156	86.	5.7	52.5 *	1	0830	256	6.	0.3	50.2
1	0152	57	0.	0.0	50.0 *	1	0512	157	84.	5.6	52.5 *	1	0832	257	6.	0.3	50.2
1	0154	58	0.	0.0	50.0 *	1	0514	158	83.	5.5	52.5 *	1	0834	258	6.	0.3	50.2
1	0156	59	0.	0.0	50.0 *	1	0516	159	81.	5.3	52.4 *	1	0836	259	5.	0.3	50.2
1	0158	60	0.	0.0	50.0 *	1	0518	160	80.	5.2	52.4 *	1	0838	260	5.	0.3	50.2
1	0200	61	0.	0.0	50.0 *	1	0520	161	78.	5.1	52.3 *	1	0840	261	5.	0.3	50.2
1	0202	62	0.	0.0	50.0 *	1	0522	162	77.	4.9	52.3 *	1	0842	262	5.	0.3	50.2
1	0204	63	0.	0.0	50.0 *	1	0524	163	76.	4.8	52.3 *	1	0844	263	5.	0.3	50.2
1	0206	64	0.	0.0	50.0 *	1	0526	164	74.	4.7	52.2 *	1	0846	264	5.	0.3	50.2
1	0208	65	0.	0.0	50.0 *	1	0528	165	73.	4.5	52.2 *	1	0848	265	5.	0.3	50.2
1	0210	66	0.	0.0	50.0 *	1	0530	166	72.	4.4	52.1 *	1	0850	266	5.	0.3	50.2
1	0212	67	0.	0.0	50.0 *	1	0532	167	70.	4.3	52.1 *	1	0852	267	4.	0.3	50.2
1	0214	68	0.	0.0	50.0 *	1	0534	168	69.	4.2	52.1 *	1	0854	268	4.	0.2	50.2
1	0216	69	0.	0.0	50.0 *	1	0536	169	68.	4.0	52.0 *	1	0856	269	4.	0.2	50.2
1	0218	70	0.	0.0	50.0 *	1	0538	170	67.	3.9	52.0 *	1	0858	270	4.	0.2	50.2
1	0220	71	0.	0.0	50.0 *	1	0540	171	65.	3.8	51.9 *	1	0900	271	4.	0.2	50.2
1	0222	72	0.	0.0	50.0 *	1	0542	172	64.	3.7	51.9 *	1	0902	272	4.	0.2	50.2
1	0224	73	0.	0.0	50.0 *	1	0544	173	63.	3.6	51.9 *	1	0904	273	4.	0.2	50.2
1	0226	74	0.	0.0	50.0 *	1	0546	174	62.	3.5	51.8 *	1	0906	274	4.	0.2	50.1

1	0228	75	0.	0.0	50.0	*	1	0548	175	60.	3.4	51.8	*	1	0908	275	4.	0.2	50.1
1	0230	76	1.	0.0	50.0	*	1	0550	176	59.	3.3	51.8	*	1	0910	276	4.	0.2	50.1
1	0232	77	1.	0.0	50.0	*	1	0552	177	58.	3.2	51.7	*	1	0912	277	3.	0.2	50.1
1	0234	78	1.	0.0	50.0	*	1	0554	178	56.	3.1	51.7	*	1	0914	278	3.	0.2	50.1
1	0236	79	1.	0.0	50.0	*	1	0556	179	55.	3.0	51.6	*	1	0916	279	3.	0.2	50.1
1	0238	80	1.	0.0	50.0	*	1	0558	180	54.	2.9	51.6	*	1	0918	280	3.	0.2	50.1
1	0240	81	1.	0.1	50.0	*	1	0600	181	52.	2.8	51.6	*	1	0920	281	3.	0.2	50.1
1	0242	82	1.	0.1	50.0	*	1	0602	182	51.	2.7	51.5	*	1	0922	282	3.	0.2	50.1
1	0244	83	1.	0.1	50.1	*	1	0604	183	50.	2.6	51.5	*	1	0924	283	3.	0.2	50.1
1	0246	84	2.	0.1	50.1	*	1	0606	184	49.	2.5	51.4	*	1	0926	284	3.	0.2	50.1
1	0248	85	2.	0.1	50.1	*	1	0608	185	48.	2.4	51.4	*	1	0928	285	3.	0.2	50.1
1	0250	86	3.	0.1	50.1	*	1	0610	186	47.	2.3	51.4	*	1	0930	286	3.	0.2	50.1
1	0252	87	3.	0.2	50.1	*	1	0612	187	46.	2.3	51.3	*	1	0932	287	3.	0.2	50.1
1	0254	88	4.	0.2	50.2	*	1	0614	188	45.	2.2	51.3	*	1	0934	288	3.	0.2	50.1
1	0256	89	5.	0.3	50.2	*	1	0616	189	44.	2.1	51.3	*	1	0936	289	3.	0.1	50.1
1	0258	90	6.	0.4	50.3	*	1	0618	190	43.	2.0	51.3	*	1	0938	290	2.	0.1	50.1
1	0300	91	8.	0.5	50.3	*	1	0620	191	42.	2.0	51.2	*	1	0940	291	2.	0.1	50.1
1	0302	92	11.	0.7	50.5	*	1	0622	192	41.	1.9	51.2	*	1	0942	292	2.	0.1	50.1
1	0304	93	16.	0.9	50.6	*	1	0624	193	39.	1.8	51.2	*	1	0944	293	2.	0.1	50.1
1	0306	94	23.	1.3	50.9	*	1	0626	194	38.	1.8	51.1	*	1	0946	294	2.	0.1	50.1
1	0308	95	34.	1.7	51.1	*	1	0628	195	36.	1.7	51.1	*	1	0948	295	2.	0.1	50.1
1	0310	96	44.	2.1	51.3	*	1	0630	196	34.	1.7	51.1	*	1	0950	296	2.	0.1	50.1
1	0312	97	52.	2.7	51.5	*	1	0632	197	33.	1.6	51.0	*	1	0952	297	2.	0.1	50.1
1	0314	98	61.	3.4	51.8	*	1	0634	198	32.	1.6	51.0	*	1	0954	298	2.	0.1	50.1
1	0316	99	68.	4.0	52.0	*	1	0636	199	30.	1.5	51.0	*	1	0956	299	2.	0.1	50.1
1	0318	100	74.	4.6	52.2	*	1	0638	200	29.	1.5	51.0	*	1	0958	300	2.	0.1	50.1
						*							*						

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
+ (CFS)	(HR)					
		(CFS)				
+ 117.	4.00		54.	33.	33.	33.
		(INCHES)	1.075	1.090	1.090	1.090
		(AC-FT)	27.	27.	27.	27.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	9.97-HR
+ (AC-FT)	(HR)				
8.	4.00	3.	2.	2.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	9.97-HR
+ (FEET)	(HR)				

53.41 4.00 51.62 51.00 51.00 51.00

CUMULATIVE AREA = 0.46 SQ MI

*** FDKRUT - NEWTON RAPHSON FAILEDFIXED POINT ITERATION USED - ITERATION= 1

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

+	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	070808	12.	3.43	2.	1.	1.	0.02		
+	DIVERSION TO	808OUT	0.	3.43	0.	0.	0.	0.02		
+	HYDROGRAPH AT	808PP	12.	3.43	2.	1.	1.	0.02		
+	ROUTED TO	070610	12.	3.43	2.	1.	1.	0.02		
+	HYDROGRAPH AT	070610	5.	3.43	1.	0.	0.	0.01		
+	DIVERSION TO	610OUT	0.	3.40	0.	0.	0.	0.01		
+	HYDROGRAPH AT	610PP	5.	3.40	1.	0.	0.	0.01		
+	2 COMBINED AT	070610	17.	3.43	3.	2.	2.	0.02		
+	ROUTED TO	070508	17.	3.43	3.	2.	2.	0.02		

	HYDROGRAPH AT						
+	070508	4.	3.50	1.	0.	0.	0.01
	DIVERSION TO						
+	508OUT	0.	3.50	0.	0.	0.	0.01
	HYDROGRAPH AT						
+	508PP	4.	3.50	1.	0.	0.	0.01
	2 COMBINED AT						
+	070508	21.	3.47	3.	2.	2.	0.03
	ROUTED TO						
+	070010	21.	3.47	3.	2.	2.	0.03
	HYDROGRAPH AT						
+	070010	7.	3.43	1.	1.	1.	0.01
	DIVERSION TO						
+	010OUT	0.	3.43	0.	0.	0.	0.01
	HYDROGRAPH AT						
+	010PP	6.	3.43	1.	1.	1.	0.01
	2 COMBINED AT						
+	070010	27.	3.47	4.	3.	3.	0.04
	ROUTED TO						
+	070210	27.	3.47	4.	3.	3.	0.04
	HYDROGRAPH AT						
+	070209	12.	3.47	2.	1.	1.	0.02
	ROUTED TO						
+	070210	12.	3.47	2.	1.	1.	0.02
	HYDROGRAPH AT						
+	070210	5.	3.47	1.	0.	0.	0.01
	2 COMBINED AT						
+	070210	17.	3.47	3.	2.	2.	0.03
	DIVERSION TO						
+	210OUT	0.	3.43	0.	0.	0.	0.03

	HYDROGRAPH AT						
+	210PP	17.	3.43	3.	2.	2.	0.03
	2 COMBINED AT						
+	070210	44.	3.47	7.	4.	4.	0.07
	ROUTED TO						
+	050005	44.	3.47	7.	4.	4.	0.07
	HYDROGRAPH AT						
+	050005	21.	3.53	3.	2.	2.	0.04
	DIVERSION TO						
+	005OUT	0.	3.53	0.	0.	0.	0.04
	HYDROGRAPH AT						
+	005PP	21.	3.53	3.	2.	2.	0.04
	HYDROGRAPH AT						
+	070010	0.	3.37	0.	0.	0.	0.00
	ROUTED TO						
+	070020	0.	3.47	0.	0.	0.	0.00
	ROUTED TO						
+	070030	0.	3.67	0.	0.	0.	0.00
	HYDROGRAPH AT						
+	070030	5.	3.07	1.	0.	0.	0.00
	2 COMBINED AT						
+	070030	5.	3.07	1.	0.	0.	0.00
	ROUTED TO						
+	070040	5.	3.10	1.	0.	0.	0.00
	HYDROGRAPH AT						
+	070210	0.	3.47	0.	0.	0.	0.00
	ROUTED TO						
+	070220	0.	3.47	0.	0.	0.	0.00
	ROUTED TO						
+	070040	0.	3.77	0.	0.	0.	0.00

	HYDROGRAPH AT								
+		070040	5.	3.20	1.	0.	0.	0.01	
	3 COMBINED AT								
+		070040	9.	3.13	1.	1.	1.	0.01	
	ROUTED TO								
+		070050	9.	3.17	1.	1.	1.	0.01	
	HYDROGRAPH AT								
+		070050	23.	3.07	2.	1.	1.	0.02	
	2 COMBINED AT								
+		070050	30.	3.10	4.	2.	2.	0.03	
	ROUTED TO								
+		070060	30.	3.13	4.	2.	2.	0.03	
	HYDROGRAPH AT								
+		070310	30.	3.07	3.	2.	2.	0.02	
	ROUTED TO								
+		070060	30.	3.10	3.	2.	2.	0.02	
	HYDROGRAPH AT								
+		070060	26.	3.10	3.	2.	2.	0.02	
	3 COMBINED AT								
+		070060	83.	3.10	9.	6.	6.	0.07	
	ROUTED TO								
+		070070	82.	3.13	9.	6.	6.	0.07	
	HYDROGRAPH AT								
+		070070	43.	3.07	4.	3.	3.	0.03	
	HYDROGRAPH AT								
+		070080	52.	3.13	4.	2.	2.	0.02	
	3 COMBINED AT								
+		070080	168.	3.13	17.	10.	10.	0.12	
	ROUTED TO								
+		07Det	46.	3.67	17.	10.	10.	0.12	
+									69.95 3.67

	DIVERSION TO						
+		07Qspl	0.	3.67	0.	0.	0.	0.12
	HYDROGRAPH AT						
+		07Qpip	46.	3.67	17.	10.	10.	0.12
	ROUTED TO						
+		070420	46.	3.67	17.	10.	10.	0.12
	HYDROGRAPH AT						
+		070410	17.	3.13	2.	1.	1.	0.01
	ROUTED TO						
+		070420	17.	3.13	2.	1.	1.	0.01
	HYDROGRAPH AT						
+		070420	5.	3.20	0.	0.	0.	0.00
	3 COMBINED AT						
+		070420	59.	3.20	19.	12.	12.	0.14
	ROUTED TO						
+		210005	59.	3.20	19.	12.	12.	0.14
	HYDROGRAPH AT						
+		210005	13.	3.23	1.	1.	1.	0.01
	2 COMBINED AT						
+		210005	72.	3.23	20.	12.	12.	0.15
	ROUTED TO						
+		050030	72.	3.23	20.	12.	12.	0.15
	HYDROGRAPH AT						
+		050005	0.	3.40	0.	0.	0.	0.00
	ROUTED TO						
+		050010	0.	4.63	0.	0.	0.	0.00
	HYDROGRAPH AT						
+		050010	96.	3.13	8.	5.	5.	0.07
	2 COMBINED AT						
+		050010	96.	3.13	8.	5.	5.	0.07

	ROUTED TO								
+		050020	93.	3.17	8.	5.	5.	0.07	
	HYDROGRAPH AT								
+		050210	100.	3.13	8.	5.	5.	0.05	
	ROUTED TO								
+		210ST	0.	5.53	0.	0.	0.	0.05	
+									0.55 9.97
	ROUTED TO								
+		050020	0.	4.73	0.	0.	0.	0.05	
	HYDROGRAPH AT								
+		050020	13.	3.17	1.	1.	1.	0.01	
	3 COMBINED AT								
+		050020	105.	3.17	10.	6.	6.	0.13	
	ROUTED TO								
+		050030	103.	3.20	10.	6.	6.	0.13	
	HYDROGRAPH AT								
+		050030	54.	3.10	3.	2.	2.	0.02	
	ROUTED TO								
+		030ST	20.	3.27	2.	1.	1.	0.02	
+									68.13 3.27
	3 COMBINED AT								
+		050030	190.	3.20	32.	20.	20.	0.30	
	ROUTED TO								
+		050305	188.	3.20	32.	20.	20.	0.30	
	ROUTED TO								
+		050050	186.	3.27	32.	20.	20.	0.30	
	HYDROGRAPH AT								
+		050040	105.	3.20	12.	7.	7.	0.10	
	ROUTED TO								
+		40STOR	37.	3.67	12.	7.	7.	0.10	
+									61.58 3.67

	ROUTED TO								
+		050050	37.	3.67	12.	7.	7.	0.10	
	HYDROGRAPH AT								
+		050310	11.	3.13	1.	1.	1.	0.01	
	ROUTED TO								
+		SRPDet	5.	3.37	1.	1.	1.	0.01	
+									54.43 3.37
	HYDROGRAPH AT								
+		S 64th	7.	3.30	1.	0.	0.	0.01	
	HYDROGRAPH AT								
+		050065	38.	3.07	2.	1.	1.	0.01	
	HYDROGRAPH AT								
+		050062	16.	3.10	1.	1.	1.	0.01	
	ROUTED TO								
+		050050	15.	3.13	1.	1.	1.	0.01	
	6 COMBINED AT								
+		050050	254.	3.23	49.	30.	30.	0.43	
	HYDROGRAPH AT								
+		050060	53.	3.17	5.	3.	3.	0.03	
	2 COMBINED AT								
+		050050	303.	3.23	54.	33.	33.	0.46	
	ROUTED TO								
+		05Det	117.	4.00	54.	33.	33.	0.46	
+									53.41 4.00
	DIVERSION TO								
+		05Qspl	0.	4.00	0.	0.	0.	0.46	
	HYDROGRAPH AT								
+		05Qpip	117.	4.00	54.	33.	33.	0.46	
	HYDROGRAPH AT								
+		050610	99.	3.17	10.	6.	6.	0.08	

	2 COMBINED AT						
+		050610	143.	3.17	63.	38.	38.	0.54
	ROUTED TO						
+		050620	142.	3.20	63.	38.	38.	0.54
	HYDROGRAPH AT						
+		050620	110.	3.17	12.	7.	7.	0.10
	2 COMBINED AT						
+		050620	249.	3.20	75.	45.	45.	0.64
	ROUTED TO						
+		050630	249.	3.20	75.	45.	45.	0.64
	HYDROGRAPH AT						
+		050630	120.	3.13	9.	6.	6.	0.06
	2 COMBINED AT						
+		050630	343.	3.20	84.	51.	51.	0.70
	ROUTED TO						
+		050640	342.	3.20	84.	51.	51.	0.70
	HYDROGRAPH AT						
+		050640	65.	3.20	6.	3.	3.	0.03
	2 COMBINED AT						
+		050640	407.	3.20	89.	54.	54.	0.74
	ROUTED TO						
+		051510	402.	3.20	89.	54.	54.	0.74
	HYDROGRAPH AT						
+		050810	25.	3.17	2.	1.	1.	0.01
	ROUTED TO						
+		051510	25.	3.20	2.	1.	1.	0.01
	HYDROGRAPH AT						
+		051510	21.	3.13	2.	1.	1.	0.01
	3 COMBINED AT						
+		051510	445.	3.20	93.	57.	57.	0.76

	ROUTED TO						
+		051520	438.	3.23	93.	57.	57.	0.76
	HYDROGRAPH AT						
+		051610	39.	3.17	3.	2.	2.	0.02
	ROUTED TO						
+		051520	39.	3.17	3.	2.	2.	0.02
	HYDROGRAPH AT						
+		051710	8.	3.17	1.	0.	0.	0.00
	ROUTED TO						
+		051520	8.	3.17	1.	0.	0.	0.00
	HYDROGRAPH AT						
+		051520	43.	3.17	4.	2.	2.	0.02
	4 COMBINED AT						
+		051520	521.	3.20	101.	61.	61.	0.81
	ROUTED TO						
+		051530	517.	3.23	101.	61.	61.	0.81
	HYDROGRAPH AT						
+		051530	92.	3.17	7.	4.	4.	0.04
	2 COMBINED AT						
+		051530	589.	3.23	108.	66.	66.	0.85
	ROUTED TO						
+		051540	588.	3.23	108.	66.	66.	0.85
	HYDROGRAPH AT						
+		051810	12.	3.13	1.	1.	1.	0.00
	ROUTED TO						
+		051540	12.	3.13	1.	1.	1.	0.00
	HYDROGRAPH AT						
+		051540	9.	3.13	1.	0.	0.	0.00
	3 COMBINED AT						
+		051540	602.	3.23	109.	67.	67.	0.86

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING

SUMMARIES REMOVED FOR PRINTOUT- SEE ELECTRONIC FILE

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 210ST
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	0.00	1.00	1.00
STORAGE	0.	8.	8.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	0.55	0.00	4.	0.	0.00	9.97	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 030ST
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	65.00	68.00	68.00
STORAGE	0.	1.	1.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	68.13	0.13	1.	20.	6.87	3.27	0.00

*** NORMAL END OF HEC-1 ***

Alternative B, Civic Center Boulevard-

PBAltB.DAT

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              MAY   1991              *
*           VERSION 4.0.1E             *
*     Lahey F77L-EM/32 version 5.01    *
*       Dodson & Associates, Inc.      *
*  RUN DATE  05/05/99  TIME  06:28:37  *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 551-1748             *
*                                      *
****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

              * ************************************************************************
              * This is ALTERNATIVE A hydrology for Change Order #2
              *
              * - This model is based on the Recommended Plan - Part A for the Osborn Road
              *     Outfall with the following changes:
              *        Osborn Road Outfall has been modified to include a junction structure
              *        at Miller Road.  The junction conveys excess runoff across Osborn Road
```

```
*        into Osborn Park located between old Osborn Road and new Osborn Road.
*        The outfall structure(s) for the park have been augmented to handle the
*        excess runoff.  The primary runoff continues east along Osborn Road and
*        outfalls to Indian Bend Wash.
*
ID    ********************************************************************************
ID    STP-PAPAGO REGIONAL FLOOD CONTROL PROJECT
ID    SCOTTSDALE - TEMPE - PHOENIX
ID    ********************************************************************************
ID
ID    Kimley-Horn and Associates, Inc.
ID    KVL Consultants, Inc.
ID
ID    10-Year, 6-Hour Storm Event
ID    10/97
ID
ID    PARSONS BRINCKERHOFF MODIFICATIONS TO ORIGINAL KIMLEY HORN MODEL
ID    PARSONS BRINCKERHOFF FILE NAME: PBALTB.DAT
ID    ALTERNATIVE B- OSBORN TO CIVIC CENTER TO EARLL TO INDIAN BEND WASH
ID
ID    FILE MODIFIED BY PARSONS BRINCKERHOFF TO BE USED IN DESIGN OF OSBORN OUTFALL
ID    MODIFICATIONS:
ID    1) SUBBASIN 050062 REROUTED DIRECTLY TO PAIUTE PARK- IMPROVEMENTS TO 64TH ST
ID       CONVEY FLOW TO DETENTION BASIN. AREA REDUCED TO 3.9 ACRES (0.0061 SM)
ID    2) PAIUTE PARK STAGE/DISCHARGE CURVE ADJUSTED
ID    3) SUBBASINS CONTRIBUTING TO 66" ADOT PIPE ROUTED OUT OF PROPOSED PIPE
ID       (SUBBASINS 050710 AND 050720).
ID    4) REVISE AREA OF SUBBASIN 050310 FROM 0.041 SM TO 0.0063 SM.AND ROUTE TO
ID       EXISTING DETENTION BASIN. REMAINING AREA IS SRP PROPERTY WHICH DRAINS
ID       WEST.
ID       AREA REDUCTION DUE TO:
ID       REMOVE APARTMENTS AT THOMAS AND 64TH ST DUE TO ON-SITE RETENTION.
ID       REMOVE PORTION OF SRP SUBSTATION WHICH DRAINS EAST.
ID       COLLECT PAVEMENT FLOWS FROM 64TH ST (THOMAS TO PAIUTE PARK) IN LARGE PIPE
ID       COLLECT FLOWS FROM PAVED AREA BETWEEN SUBSTATION AND APARTMENTS IN LARGE
ID       PIPE
ID    5) REVISE HYDROGRAPH CARDS FOR SUBBASIN 050130.  INSERT CONCENTRATION
ID       POINT AT EARLL AND CIVIC CENTER.
ID    6) ADD HYDROGRAPH CARDS FOR SUBBASIN 051410.  CONCENTRATION POINT AT EARLL
ID       AND MILLER. USE ORIGINAL K-H CARDS FROM FILE ALTB610.DAT.
ID    7) PROVIDE REQUIRED ROUTING CARDS FROM OSBORN TO EARLL TO INDIAN BEND WASH.
ID    8) REVISE PIPE SIZES IN ROUTE CARDS TO REFLECT PB PRELIMINARY DESIGN
ID
ID    Parsons Brinckerhoff
ID    Alan Humphrey
```

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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   41     ID    5/5/99
          *
          *DIAGRAM
   42     IT       2                    300
   43     IO       5

   44     KK  070808   BASIN
   45     BA   0.017
   46     PH       0       0    0.50    0.97    1.61    1.76    1.86    2.05
   47     LS       0      88       0       0      98       0
   48     UK     300  0.0100    0.20      99
   49     UK     100  0.0100    0.10       1
   50     RK    1600   0.214    0.03            TRAP       2     3.5
          *
          * The 10 year flows are diverted into a proposed storm drain along Oak Street.
          * In storm events greater than the 10 yr, the remaining flow will follow its
          * natural course across and sheet flow across Oak Street to the north.
          *
   51     KK   808PP  Divert 10-year flows into storm drain
   52     DT  808OUT
   53     DI       0      12      13      15      50     100
   54     DQ       0    0.01       1       3      38      88

   55     KK  070610 FROM  070808
   56     RK     240  0.0066   0.013            CIRC    3.00

   57     KK  070610   BASIN
   58     BA   0.007
   59     LS       0      88       0       0      98       0
   60     UK     300  0.0100    0.20      99
   61     UK     100  0.0100    0.10       1
   62     RK     500   0.054    0.03            TRAP       2     3.5

   63     KK   610PP  Divert 10-year flows into storm drain
   64     DT  610OUT
   65     DI       0       5       6      10      50     100
   66     DQ       0     .01       1       5      45      95

   67     KK  070610 COMBINE
   68     HC       2
```

```
 69          KK  070508    FROM  070610
 70          RK     420  0.0066   0.013            CIRC    3.00

 71          KK  070508   BASIN
 72          BA   0.008
 73          LS       0      85       0       0      98       0
 74          UK     300  0.0100    0.20      99
 75          UK     100  0.0100    0.10       1
 76          RK     600   0.048    0.03            TRAP       9     1.0

 77          KK   508PP  Divert 10-year flows into storm drain
 78          DT  508OUT
 79          DI       0       4       5      15      50     100
 80          DQ       0     .01       1      11      46      96
1                                        HEC-1 INPUT                                        PAGE  3

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 81          KK  070508 COMBINE
 82          HC       2

 83          KK  070010    FROM  070508
 84          RK     270  0.0066   0.013            CIRC    3.00

 85          KK  070010   BASIN
 86          BA   0.009
 87          LS       0      88       0       0      98       0
 88          UK     300  0.0100    0.20      99
 89          UK     100  0.0100    0.10       1
 90          RK    1200   0.042    0.03            TRAP       2     3.5

 91          KK   010PP  Divert 10-year flows into storm drain
 92          DT  010OUT
 93          DI       0       7      10      15      50     100
 94          DQ       0     .01       3       8      43      93

 95          KK  070010 COMBINE
 96          HC       2

 97          KK  070210    FROM  070010
 98          RK     120  0.0033   0.013            CIRC    3.00

 99          KK  070209   BASIN
```

```
100          BA   0.018
101          LS       0      87       0       0      98       0
102          UK     300  0.0100    0.20      99
103          UK     100  0.0100    0.10       1
104          RK    1200   0.252    0.03            TRAP       2     3.5

105          KK  070210    FROM  070209
106          RK     750   0.252   0.013            TRAP      10       1

107          KK  070210   BASIN
108          BA   0.008
109          LS       0      87       0       0      98       0
110          UK     300  0.0100    0.20      99
111          UK     100  0.0100    0.10       1
112          RK     600   0.043    0.03            TRAP       2     3.5

113          KK  070210 COMBINE
114          HC       2

115          KK   210PP  Divert 10-year flows into storm drain
116          DT  210OUT
117          DI       0      17      20      30      50     100
118          DQ       0     .01       3      13      33      83
1                                        HEC-1 INPUT                                    PAGE  4

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


119          KK  070210 COMBINE
120          HC       2

121          KK  050005   FROM 070210
122          RK     950   0.008   0.013            CIRC    3.00

123          KK  050005   BASIN
124          BA   0.038
125          LS       0      85       0       0      98       0
126          UK     300  0.0100    0.20      99
127          UK     100  0.0100    0.10       1
128          RK    1650    0.09    0.03            TRAP      30     1.0

129          KK   005PP  Divert 10-year flows into storm drain
130          DT  005OUT
131          DI       0      21      22     100     150     200
132          DQ       0     .01       1      79     129     179
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                *
                * The start of the Osborn Road outfall hydrology
                *

 133            KK  070010
 134            KM    Retrieve overland flows at CP 070010
 135            DR  010OUT

 136            KK  070020    FROM  070010
 137            RK     178  0.0131   0.013           CIRC     1.0

 138            KK  070030    FROM  070020
 139            RK     520  0.0146   0.025           TRAP     9.0       1

 140            KK  070030   BASIN
 141            BA   0.004
 142            LS       0      85       0       0      98       0
 143            UK     150  0.0100    0.30      65
 144            UK      50  0.0100    0.10      35
 145            RK     522  0.0146    0.03           TRAP       2     3.5

 146            KK  070030 COMBINE
 147            HC       2

 148            KK  070040    FROM  070030
 149            RK     177  0.0146   0.017           TRAP    54.8       1

 150            KK  070210
 151            KM    Retrieve overland flows at CP 070210
 152            DR  210OUT

 153            KK  070220    FROM  070210
 154            RK     164  0.0131   0.013           CIRC     1.0
1                                          HEC-1 INPUT                                                  PAGE  5

LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 155            KK  070040    FROM  070220
 156            RK     723  0.0146   0.017           TRAP    54.8       1

 157            KK  070040   BASIN
 158            BA   0.006
 159            LS       0      86       0       0      98       0
 160            UK     181  0.0100    0.28      72
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```
161          UK      60  0.0100    0.10      28
162          RK    1946  0.0146    0.02            TRAP      30     1.0

163          KK  070040 COMBINE
164          HC       3

165          KK  070050    FROM  070040
166          RK     878  0.0146   0.025            TRAP    20.0     1.0

167          KK  070050   BASIN
168          BA   0.018
169          LS       0      86       0       0      98       0
170          UK     150  0.0100    0.30      65
171          UK      50  0.0100    0.10      35
172          RK     290  0.0058    0.02            TRAP      11     1.0
173          RK     981  0.0146    0.02            TRAP      11     1.0

174          KK  070050 COMBINE
175          HC       2

176          KK  070060    FROM  070050
177          RK     872  0.0058   0.025            TRAP     1.0     1.0

178          KK  070310   BASIN
179          BA   0.023
180          LS       0      86       0       0      98       0
181          UK     150  0.0100    0.30      65
182          UK      50  0.0100    0.10      35
183          RK     278  0.0058    0.02            TRAP      11     1.0
184          RK     986  0.0146    0.02            TRAP      11     1.0

185          KK  070060    FROM  070310
186          RK     745  0.0058   0.025            TRAP     1.0     1.0

187          KK  070060   BASIN
188          BA   0.020
189          LS       0      86       0       0      98       0
190          UK     150  0.0100    0.30      65
191          UK      50  0.0100    0.10      35
192          RK    1096  0.0058    0.03            TRAP       2     1.0

193          KK  070060 COMBINE
194          HC       3
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 195          KK  070070    FROM  070060
 196          RK     726  0.0146   0.025            TRAP    30.0     1.0

 197          KK  070070   BASIN
 198          BA   0.032
 199          LS       0      86       0       0      98       0
 200          UK     150  0.0100    0.30      65
 201          UK      50  0.0100    0.10      35
 202          RK    1209  0.0146    0.03            TRAP       2     1.0

 203          KK  070080   BASIN
 204          BA   0.021
 205          LS       0      83       0       0      98       0
 206          UK      29  0.0100    0.39       9
 207          UK     189  0.0100    0.10      91
 208          RK    1257  0.0058    0.02            TRAP      30     1.0

 209          KK  070080 COMBINE
 210          HC       3

 211          KK   07Det   Detention basin at Marriott's Brighton Gardens
 212          RS       1    STOR
 213          SV       0    0.78    1.64    2.65    3.84    5.21    6.77    6.77
 214          SE      66      67      68      69      70      71      72      73
 215          SQ       0      12      36      42      46      48      52     355
              *
              * Marriott's Brighton Gardens outfall - 07Qpip is the outflow in the storm drain
              * 07Qspl is the flow overtopping the basin
              *

 216          KK  07Qpip
 217          DT  07Qspl
 218          DI       0      71     112     172     245     329     420     518     623
 219          DQ       0     0.1      26      72     132     204     285     374     471

 220          KK  070420   FROM 07Qpip
 221          RK    1000   0.005   0.013            CIRC     3.0

 222          KK  070410   BASIN
 223          BA   0.011
 224          LS       0      84       0       0      98       0
 225          UK     144  0.0100    0.32      44
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```
226          UK     121  0.0100     0.10      56
227          RK    1816  0.0146     0.02            TRAP      23     1.0

228          KK  070420     FROM  070410
229          RK     183  0.0058    0.017            TRAP    52.5       1

230          KK  070420    BASIN
231          BA   0.003
232          LS       0       79        0       0      98        0
233          UK     177  0.0100     0.31      25
234          UK     200  0.0100     0.10      75
235          RK    1046  0.0058     0.02            TRAP      49     1.0
1                                          HEC-1 INPUT                                                    PAGE  7

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

236          KK  070420 COMBINE
237          HC       3

238          KK  210005  FROM 070420
239          RK     450   0.005   0.013            CIRC     3.5

240          KK  210005    BASIN
241          BA   0.008
242          LS       0       79        0       0      98        0
243          UK      94  0.0100     0.34      26
244          UK     116  0.0100     0.10      74
245          RK     523  0.0032     0.02            TRAP      38     1.0
246          RK    1250  0.0020     0.02            TRAP      45     1.0

247          KK  210005 COMBINE
248          HC       2

249          KK  050030    FROM 210005
250          RK    1600    0.005   0.013            CIRC       4

251          KK  050005
252          KM    Retrieve overland flows at CP 050005
253          DR  005OUT

254          KK  050010    FROM 050005
255          RK    1300    0.015    0.02            TRAP      35       1

256          KK  050010    BASIN
```

```
257          BA   0.066
258          LS       0      81       0       0      98       0
259          UK     144  0.0100    0.30      52
260          UK      57  0.0100    0.10      48
261          RK    1189  0.0033    0.02            TRAP      30     1.0
262          RK    1197  0.0038    0.02            TRAP      60     1.0

263          KK  050010   COMBINE
264          HC       2

265          KK  050020    FROM  050010
266          RK    1370  0.0038   0.017            TRAP    37.5       1

267          KK  050210   BASIN
268          BA   0.054
269          LS       0      79       0       0      98       0
270          UK     200  0.0100    0.30      28
271          UK     200  0.0100    0.10      72
272          RK     564  0.0038    0.02            TRAP      23     1.0
273          RK    1199  0.0033    0.02            TRAP      23     1.0
1                                          HEC-1 INPUT                                    PAGE  8

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10


274          KK   210ST STORAGE
275          RS       1    STOR
276          SV    0.00    7.72    7.72
277          SE    0.00    1.00    2.00
278          SQ    0.00    0.01    0.01
279          ST     1.0     500     3.0     1.5

280          KK  050020    FROM  050210
281          RK     278  0.0033   0.017            TRAP    60.0       1

282          KK  050020   BASIN
283          BA   0.009
284          LS       0      79       0       0      98       0
285          UK     166  0.0100    0.30      39
286          UK      98  0.0100    0.10      61
287          RK    1304  0.0038    0.02            TRAP      60     1.0

288          KK  050020 COMBINE
289          HC       3
```

```
290          KK  050030    FROM  050020
291          RK     347  0.0038   0.017            TRAP    37.5       1

292          KK  050030   BASIN
293          BA   0.020
294          LS       0      79       0       0      98       0
295          UK     150  0.0100    0.30      15
296          UK      50  0.0100    0.10      85
297          RK     278  0.0038    0.02            TRAP       9     1.0
298          RK    1468  0.0033    0.02            TRAP       9     1.0
             *
             * Scottsdale Executive Villas natural storage in parking lot
             *

299          KK   030ST STORAGE
300          RS       1    STOR
301          SV       0    0.01    0.06    0.62    2.72    2.72
302          SE      65      66      67      68      69      70
303          SQ    0.00    0.01    0.01    0.01    0.01    0.01
304          ST      68     150     3.0     1.5

305          KK  050030 COMBINE
306          HC       3

307          KK  050305   FROM 050030
308          RK     150   0.002   0.013            CIRC     5.5

309          KK  050050   FROM 050305
310          RK    1500   0.001   0.013            TRAP       9     1.0
1                                        HEC-1 INPUT                                        PAGE  9

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


311          KK  050040   BASIN
312          BA   0.102
313          LS       0      79       0       0      98       0
314          UK     150  0.0100    0.30      57
315          UK      50  0.0100    0.10      43
316          RK    2230  0.0038    0.02            TRAP      38     1.0
317          RK    2654  0.0038    0.02            TRAP      38     1.0

318          KK  40STOR  Storage on west side of cross-cut canal
319          RS       1
320          SV       0       0       0       0     2.6    13.5    13.5
```

```
321          SE      58      59      60      61      62      63      64
322          SQ       0      10      22      32      40      50      55

323          KK  050050    FROM  050040
324          RK     491  0.0334   0.013            CIRC     2.5
             * ****************************************************************
             * PB Modification:
             * Reduce Area of Subbasin 050310 to 4.0 Acres (0.0063 SM)
             * Remaining area is west side of SRP substation
             * Remove one routing card for internal flows- this reduces route
             * length.
             * Add storage route through existing detention basin
             * Flows from other areas of original subbasin retained on-site or
             * collected by large pipe in 64th St.
             * ****************************************************************

325          KK  050310   BASIN
             * BA 0.041
326          BA   0.0063
327          LS       0      79       0       0      98       0
328          UK     200  0.0100    0.30      28
329          UK     200  0.0100    0.10      72
330          RK     816  0.0033    0.02            TRAP      30     1.0
             * RK   848  0.0038    0.02            TRAP      30     1.0

331          KK  SRPDet
332          RS       1    STOR
333          SA   0.152   0.207   0.207
334          SE    53.4      56      57
335          SQ       0       2       4       5       8      10      20      40
336          SE    53.4    54.0    54.3    54.5    54.9    55.1   53.48      57
             * ****************************************************************
             * PB Modification:
             * Add subbasin to represent flows from pavement of 64th St south
             * of Paiute Park and paved area between SRP substation and new
             * apartments. Area to be collected by large pipe in 64th St.

337          KK  S 64th   BASIN
338          BA   0.011
339          LS       0      79       0       0      83       0
340          UK     100   0.004     0.1      53
341          UK     100   0.008     0.1      47
342          RK    1430   0.004   0.015            TRAP      35       1
```

```
LINE        ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 343        KK  050065   BASIN
 344        BA   0.014
 345        LS       0      79       0       0      98       0
 346        UK     100    0.01     0.1      15
 347        UK     100    0.01     0.1      85
 348        RK     500   0.005   0.012            TRAP      60       1
            *
            * ********************************************************************
            * PB Modification
            * Relocate hydrograph and subsequent route for Basin 050060
            * Combine separately to get peak flow in main pipe
            * KK050060   BASIN
            * BA 0.029
            * LS      0      79       0       0      98       0
            * UK    105    0.01     0.3      20
            * UK    160    0.01     0.1      80
            * RK   1300  0.0038    0.03            TRAP     100     1.0
            *
            * ********************************************************************
            * PB Modification
            * Relocate hydrograph and subsequent route for Basin 050062
            * Modify pipe length to reflect storm drain route on 64th St
            * Insert hydrographs at this location
            * Revise basin area to 3.9 acres (0.0061 square miles)
            * ********************************************************************

 349        KK  050062   BASIN
 350        BA   0.0061
            * Original KH model had 2 BA cards. The 0.006 card was first, leaving
            * the 0.014 card to be used in the model.
            * BA 0.006
            * BA 0.014
 351        LS       0      79       0       0      98       0
 352        UK     100    0.01     0.3      15
 353        UK      50    0.01     0.1      85
 354        RK     900   0.005   0.012            TRAP      60       1

 355        KK  050050   FROM 050062
 356        RK    1000   0.002   0.013            CIRC     2.5       1
            *
            * Flows combined from 050040, 050305, revised 050310 and 050065
            * into main pipe above Paiute Park. PB- Add 050062 and S 64th
```

```
                *
357             KK  050050 COMBINE
358             KM   Peak flow in main pipe above Paiute Park
359             HC       6
                * Revise Hydrograph combine count from 5 to 6
                * Move Subbasin 050060 (Paiute Park) to combine here.
1                                        HEC-1 INPUT                                        PAGE 11

LINE            ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

360             KK  050060   BASIN
361             BA   0.029
362             LS       0      79       0       0      98       0
363             UK     105    0.01     0.3      20
364             UK     160    0.01     0.1      80
365             RK    1300  0.0038    0.03            TRAP     100     1.0

366             KK  050050 COMBINE
367             KM   Paiute Park inflow
368             HC       2
                * ********************************************************************
                * PB Modification:
                * Revise Kimley-Horn stage/storage/discharge curve
                * Revisions based on iterative calculations which included effect of
                * Paiute Park discharges on downstream pipe system.
                * ********************************************************************

369             KK   05Det
370             KO       2
                * Original KH Curve
                * RS      1    STOR
                * SV      0    0.64    2.37    5.14    8.40    11.7    15.1    18.5    22.1
                *    22.1S
                * SE     49      50      51      52      53      54      55      56      57
                *        58
                * SQ    4.5      22      37      47      56      65      73      81      88
                *      156
                * Revised PB Curve
371             RS       1    STOR
372             SA    1.20    1.84    3.17    3.21    3.31    3.35    3.42    3.49
373             SE      50      51      52      53      54      55      56      57
374             SQ       0      20      40      60      80     100     120     140
375             SE      50    50.8   51.18   51.78   52.39   52.94   53.48   54.04
```

```
                *
                * Paiute Park outfall - 05Qpip is the outflow in the storm drain
                * 05Qspl is the flow overtopping the basin
                *
                *
                * Overflows to CP 050060
                *

 376            KK  05Qpip
 377            DT  05Qspl
 378            DI       0     160     382     780    1292    1897
 379            DQ       0    0.01     212     600    1102    1697
                *
                * Begin storm drain system in Osborn Road
                *
                * ***************************************************************
                * PB Modification
                * Relocate hydrograph and subsequent route for Basin 050062
                * Remove hydrographs from this location
                * ***************************************************************
                * KK050062   BASIN
                * BA 0.006
                * BA 0.014
                * LS     0      79       0       0      98       0
                * UK   100    0.01     0.3      15
                * UK    50    0.01     0.1      85
                * RK   900   0.005   0.012            TRAP      60       1
                * KK050610   FROM 050062
                * RK  1500   0.003   0.013            TRAP      60       1
1                                     HEC-1 INPUT                                PAGE 12

 LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 380            KK  050610   BASIN
 381            BA   0.081
 382            LS       0      79       0       0      98       0
 383            UK     130  0.0100    0.32      56
 384            UK      70  0.0100    0.10      44
 385            RK    1450  0.0038    0.02            TRAP      45     1.0
 386            RK    1240  0.0033    0.02            TRAP      60     1.0
                * ***************************************************************
                * PB Modification
                * Revise combine operation from 3 to 2 hydrographs due to hydrograph
                * relocation.
```

```
                * ***************************************************************
387             KK  050610    COMBINE
388             KM   OSBORN & PINTO
389             HC       2

390             KK  050620    FROM  050610
                * ***************************************************************
                * PB Modification
                * Revise pipe size in routing card to reflect PB preliminary design.
                * ***************************************************************
391             RK    1050  0.0037   0.013            CIRC       5
                * RK  1050  0.0037   0.013            CIRC       6

392             KK  050620   BASIN
393             BA   0.099
394             LS       0      79       0       0      98       0
395             UK     147  0.0100    0.30      56
396             UK      53  0.0100    0.10      44
397             RK     940  0.0033    0.02            TRAP      41     1.0
398             RK    2545  0.0038    0.02            TRAP      60     1.0

399             KK  050620 COMBINE
400             KM   OSBORN & 68TH ST
401             HC       2

402             KK  050630    FROM  050620
                * ***************************************************************
                * PB Modification
                * Revise pipe size in routing card to reflect PB preliminary design.
                * ***************************************************************
403             RK    1440  0.0028   0.013            CIRC     6.5
                * RK  1440  0.0028   0.013            CIRC       7

404             KK  050630   BASIN
405             BA   0.062
406             LS       0      79       0       0      98       0
407             UK     138  0.0100    0.31      33
408             UK      64  0.0100    0.10      67
409             RK    1205  0.0038    0.02            TRAP      41     1.0
410             RK    1348  0.0033    0.02            TRAP      60     1.0
1                                        HEC-1 INPUT                                    PAGE 13

LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
411          KK  050630 COMBINE
412          KM   OSBORN & 70TH ST
413          HC       2

414          KK  050640    FROM  050630
             * ************************************************************************
             * PB Modification
             * Revise pipe size in routing card to reflect PB preliminary design.
             * ************************************************************************
415          RK    1150  0.0024   0.013            CIRC       7
             * RK  1150  0.0024   0.013            CIRC       8
             * ************************************************************************
             * PB Modification:
             * ADOT 66" pipe- Flows to exit model via Scottsdale Road storm drain
             * Remove hydrograph and subsequent routes for Basins 050710 and 050720
             * Flows do not reenter model. Adjust by removing basins and revising HC card.
             * Remove hydrographs from this location
             * ************************************************************************
             * KK050710   BASIN
             * BA 0.005
             * LS     0      79       0       0      98       0
             * UK    21  0.0100    0.40      15
             * UK   200  0.0100    0.10      85
             * RK   610  0.0038    0.02            TRAP      55     1.0
             * KK050720    FROM  050710
             * RK   316  0.0045   0.013            CIRC     5.5
             * KK050720   BASIN
             * BA 0.028
             * LS     0      79       0       0      98       0
             * UK    57  0.0100    0.38      17
             * UK   188  0.0100    0.10      83
             * RK   580  0.0038    0.02            TRAP      45     1.0
             * RK  1594  0.0033    0.02            TRAP      55     1.0
             * KK050720   COMBINE
             * HC     2
             * KK050640    FROM  050720
             * RK   422  0.0045   0.013            CIRC     5.5

416          KK  050640   BASIN
417          BA   0.032
418          LS       0      79       0       0      98       0
419          UK      64  0.0100    0.37      15
420          UK     149  0.0100    0.10      85
421          RK    1605  0.0038    0.02            TRAP      41     1.0
```

```
422          RK    1168  0.0033    0.02            TRAP      60     1.0
             * ****************************************************************
             * PB Modification
             * Revise combine operation from 3 to 2 hydrographs due to hydrograph
             * deletion.
             * ****************************************************************
1                                      HEC-1 INPUT                                    PAGE 14

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

423          KK  050640 COMBINE
424          KM   OSBORN & SCOTTSDALE
425          HC       2

426          KK  051510   FROM 050640
             * ****************************************************************
             * PB Modification
             * Revise pipe size in routing card to reflect PB preliminary design.
             * ****************************************************************
427          RK     700  0.0044   0.013           CIRC       7
             * RK   700  0.0044   0.013           CIRC     9.5

428          KK  050810   BASIN
429          BA   0.013
430          LS       0      79       0       0      98       0
431          UK      88  0.0100    0.36      20
432          UK     200  0.0100    0.10      80
433          RK     164  0.0033    0.02           TRAP      28     1.0
434          RK    1031  0.0038    0.02           TRAP      55     1.0

435          KK  051510    FROM  050810
436          RK     705  0.0025   0.013           CIRC     4.0

437          KK  051510   BASIN
438          BA   0.010
439          LS       0      79       0       0      98       0
440          UK      59  0.0100    0.38      18
441          UK     200  0.0100    0.10      82
442          RK     139  0.0038    0.02           TRAP      41     1.0
443          RK     521  0.0033    0.02           TRAP      71     1.0

444          KK  051510    COMBINE
445          HC       3
```

```
446          KK  051520    FROM  051510
             * ***************************************************************
             * PB Modification
             * Revise pipe size in routing card to reflect PB preliminary design.
             * ***************************************************************
447          RK     680  0.0028   0.013            CIRC     7.5
             * RK    680  0.0028   0.013            CIRC     9.5
             * ***************************************************************
             * PB Modification:
             * Route flow from Osborn and Civic Center to Civic Center and Earll
             * ***************************************************************

448          KK  050131    FROM  051520
449          RK    1300  0.0010   0.013            CIRC      7
             * ***************************************************************
             * PB Modification:
             * Collect flows east of Scottsdale Road into large pipe. Earll Drive
             * divides subbasin 50130.  Runoff generated northwest of Earll Drive
             * and Civic Center be collected at Earll Drive and Civic Center.
             * New subbasin north of Earll to be 050131. Add required hydrograph
             * and combine cards.
             * ***************************************************************
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

450          KK  050131
             * BA 0.096
451          BA   0.024
452          LS       0      79       0       0      98       0
453          UK      45  0.0100    0.38      15
454          UK     171  0.0100    0.10      85
             * RK  1905  0.0038    0.02            TRAP      71     1.0
             * RK  1212  0.0033    0.02            TRAP      71     1.0
455          RK    1000   0.004    0.02            TRAP      71     1.0

456          KK  050131   COMBINE
457          HC       2

458          KK  051410   FROM 050131
459          KM   ROUTE FROM CIVIC CENTER TO MILLER
460          RK    1300  0.001   0.013            CIRC      7.5
             * ***************************************************************
```

```
* PB Modification:
* Add subbasin 051410 to model. Generates flow north and west of Miller
* and Earll. Concentration point is at Miller and Earll. Use original
* KH cards (from model altb610.dat) for subbasin. Route to Indian Bend
* Wash.
* ************************************************************************

461         KK  051410   BASIN
462         BA   0.072
463         LS       0      79       0       0      98       0
464         UK      64  0.0100    0.37       9
465         UK     150  0.0100    0.10      91
466         RK    1170  0.0033    0.02            TRAP      38     1.0
467         RK    1180  0.0038    0.02            TRAP      55     1.0

468         KK  051410    COMBINE
469         HC       2
            * ************************************************************************
            * PB Modification:
            * Route flow from Miller and Earll to Indian Bend Wash.
            * Remove subsequent hydrographs from model.
            * ************************************************************************

470         KK  IBW      FROM 051410
471         KM   ROUTE FROM MILLER TO IBW
472         RK    1300  0.0015   0.013            CIRC       8
            * KK051610   BASIN
            * BA 0.021
            * LS      0      79       0       0      98       0
            * UK    165  0.0100    0.32      25
            * UK    200  0.0100    0.10      75
            * RK    624  0.0038    0.02            TRAP      41     1.0
            * RK    792  0.0033    0.02            TRAP      60     1.0
            * KK051520    FROM  051610
            * RK    601  0.0047   0.013            CIRC     5.0
            * KK051710   BASIN
            * BA 0.004
            * LS      0      79       0       0      98       0
            * UK    146  0.0100    0.33      24
            * UK    200  0.0100    0.10      76
            * RK    515  0.0038    0.02            TRAP      30     1.0
            * RK    287  0.0033    0.02            TRAP      30     1.0
            * KK051520    FROM  051710
            * RK    567  0.0032   0.013            CIRC     4.0
            * KK051520   BASIN
```

```
* BA 0.023
* LS      0       79        0        0       98        0
* UK    179   0.0100     0.31       26
* UK    198   0.0100     0.10       74
* RK    473   0.0038     0.02             TRAP       60      1.0
* RK    704   0.0033     0.02             TRAP       71      1.0
* KK051520 COMBINE
* HC      4
* KK051530     FROM   051520
* RK    926    0.001    0.013             CIRC      9.5
* KK051530    BASIN
* BA 0.041
* LS      0       79        0        0       98        0
* UK     26   0.0100     0.40       15
* UK    193   0.0100     0.10       85
* RK    889   0.0038     0.02             TRAP       38      1.0
* RK    860   0.0033     0.02             TRAP       60      1.0
* KK051530 COMBINE
* HC      2
* KK051540     FROM   051530
* RK    360    0.001    0.013             CIRC      9.5
* KK051810    BASIN
* BA 0.005
* LS      0       79        0        0       98        0
* UK     23   0.0100     0.40       16
* UK    196   0.0100     0.10       84
* RK    272   0.0033     0.02             TRAP       19      1.0
* RK    272   0.0038     0.02             TRAP       30      1.0
* KK051540     FROM   051810
* RK    218   0.0045    0.013             CIRC      4.5
* KK051540    BASIN
* BA 0.004
* LS      0       79        0        0       98        0
* UK     44   0.0100     0.38       16
* UK    172   0.0100     0.10       84
* RK    233   0.0038     0.02             TRAP       12      1.0
* RK    265   0.0033     0.02             TRAP       60      1.0
* KK051540 COMBINE
* HC      3
* KK051550     FROM   051540
* RK    273    0.001    0.013             TRAP      8.0      1.0
* KK  05EX
* DT 05PRK
* DI      0   246.1     1000
* DQ      0     246      246
```

```
* KK051560    FROM  051550
* RK   800  0.0038   0.013            CIRC     7.0
*
* Osborn Rd outfall to Indian Bend Wash
*
* KK051570    FROM  051560
* RK   228   0.003   0.013            CIRC     7.0
*
* Osborn Park Storage and Outflow to IBW
*
* KK051550
* DR 05PRK
* KK051560   BASIN
* BA 0.008
* LS     0      79       0       0      98       0
* UK   116  0.0100    0.33      47
* UK    89  0.0100    0.10      53
* RK  1126  0.0033    0.02            TRAP      60     1.0
* KK    PRK
* HC     2
* KK05PKST   STORAGE
* RS     1    STOR
* SV     0    0.08    0.31    0.69    1.20    1.92    3.01    3.01
* SE  1224    1225    1226    1227    1228    1229    1230    1231
* SQ     0    0.01      62     111     167     218     262     600
*
* New CP 051565 located at the outfall from Osborn Park to IBW
*
* KK051565    FROM   05PRK
* RK   130   0.003   0.013            TRAP      7
*
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    LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

     473          ZZ
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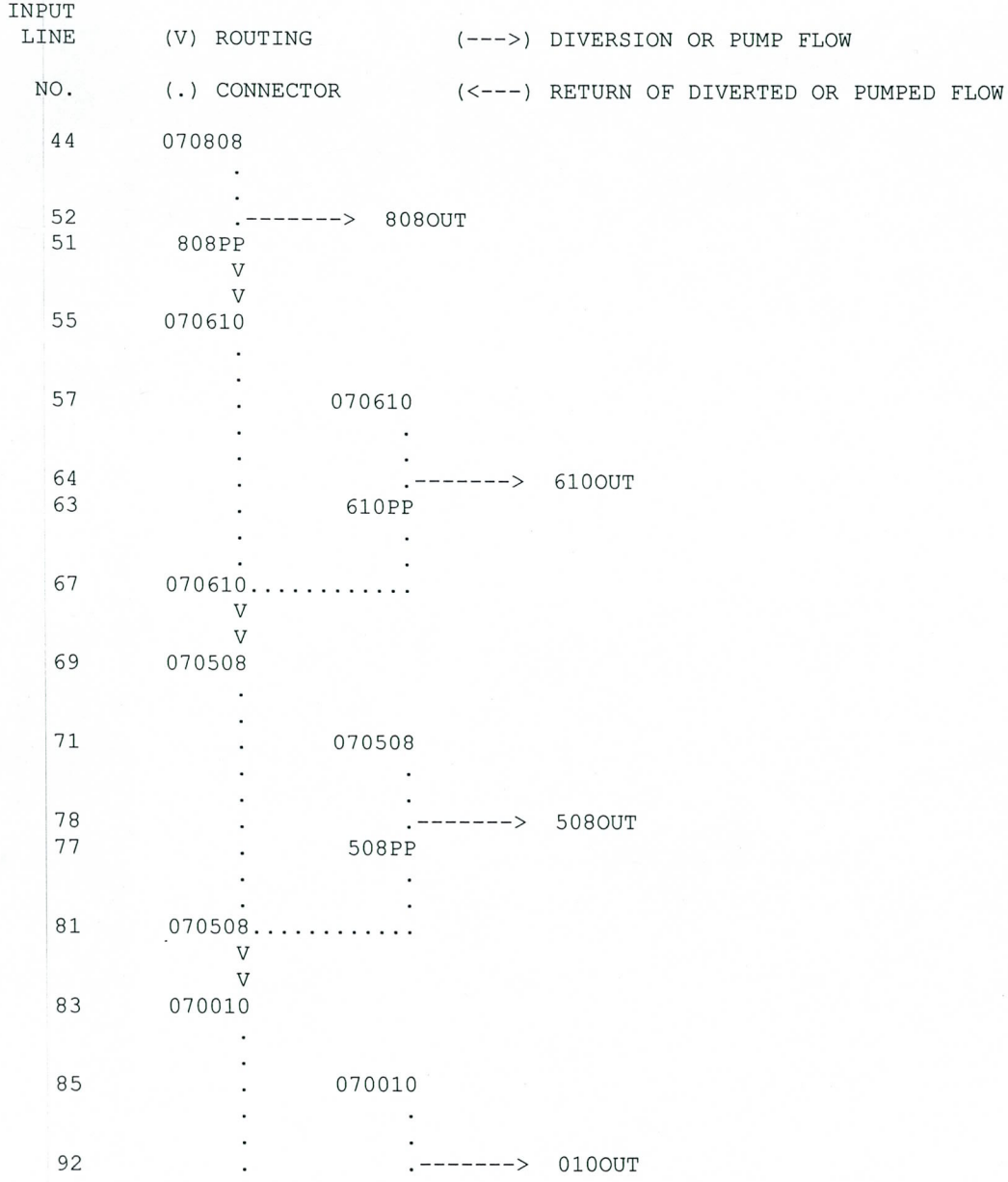
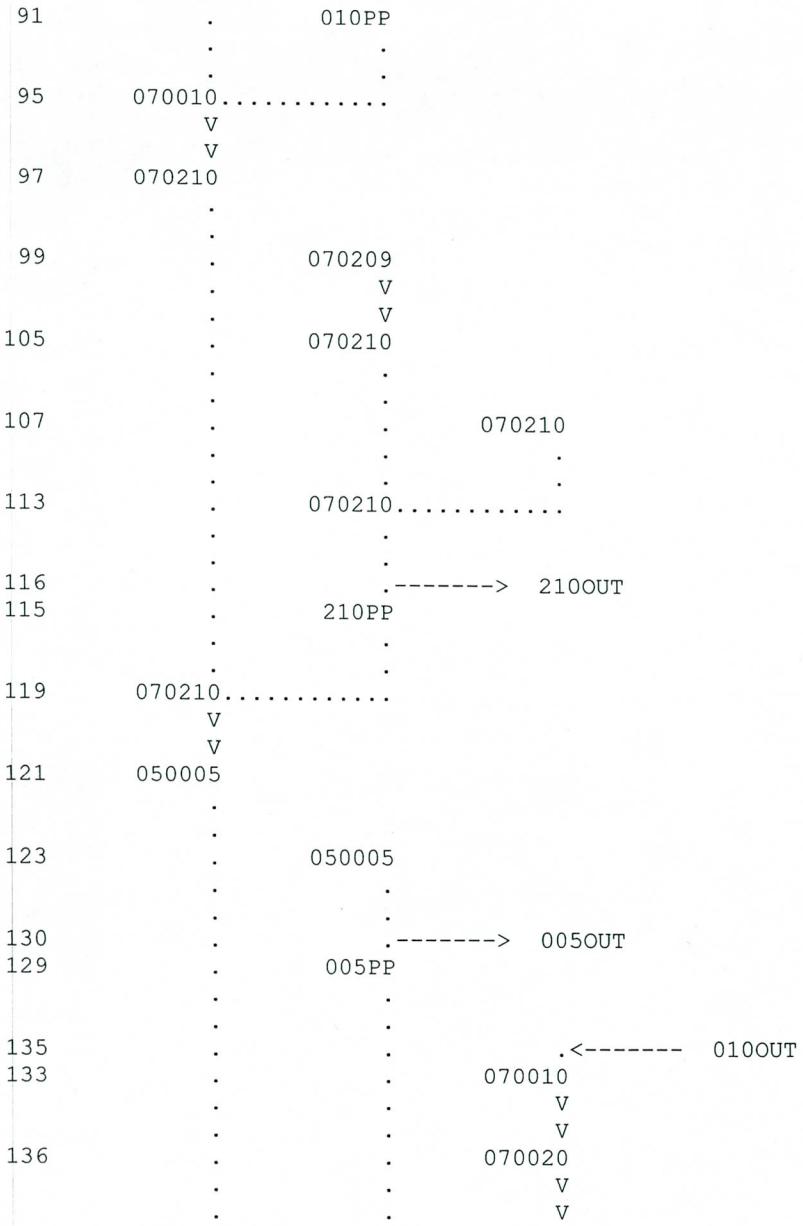
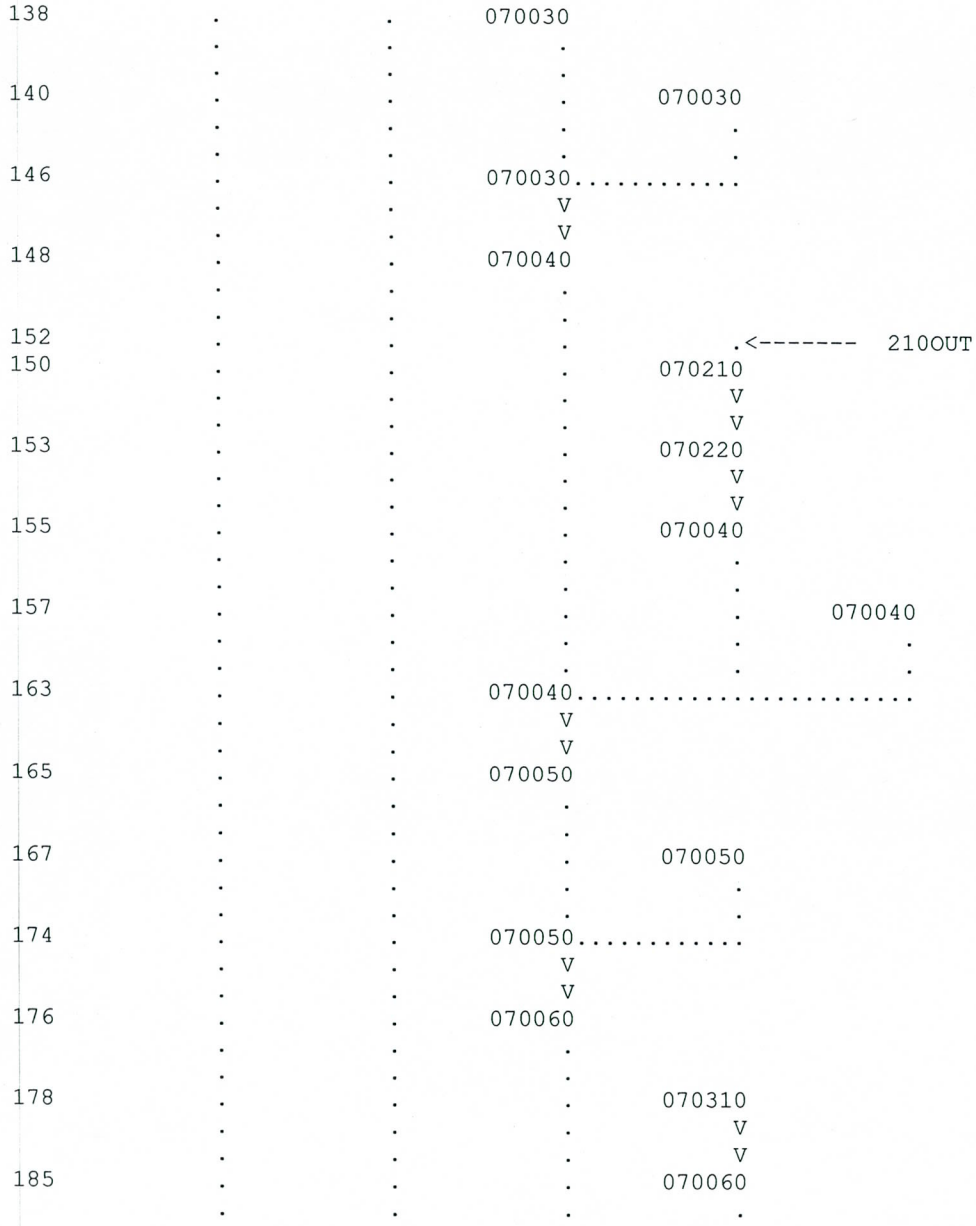
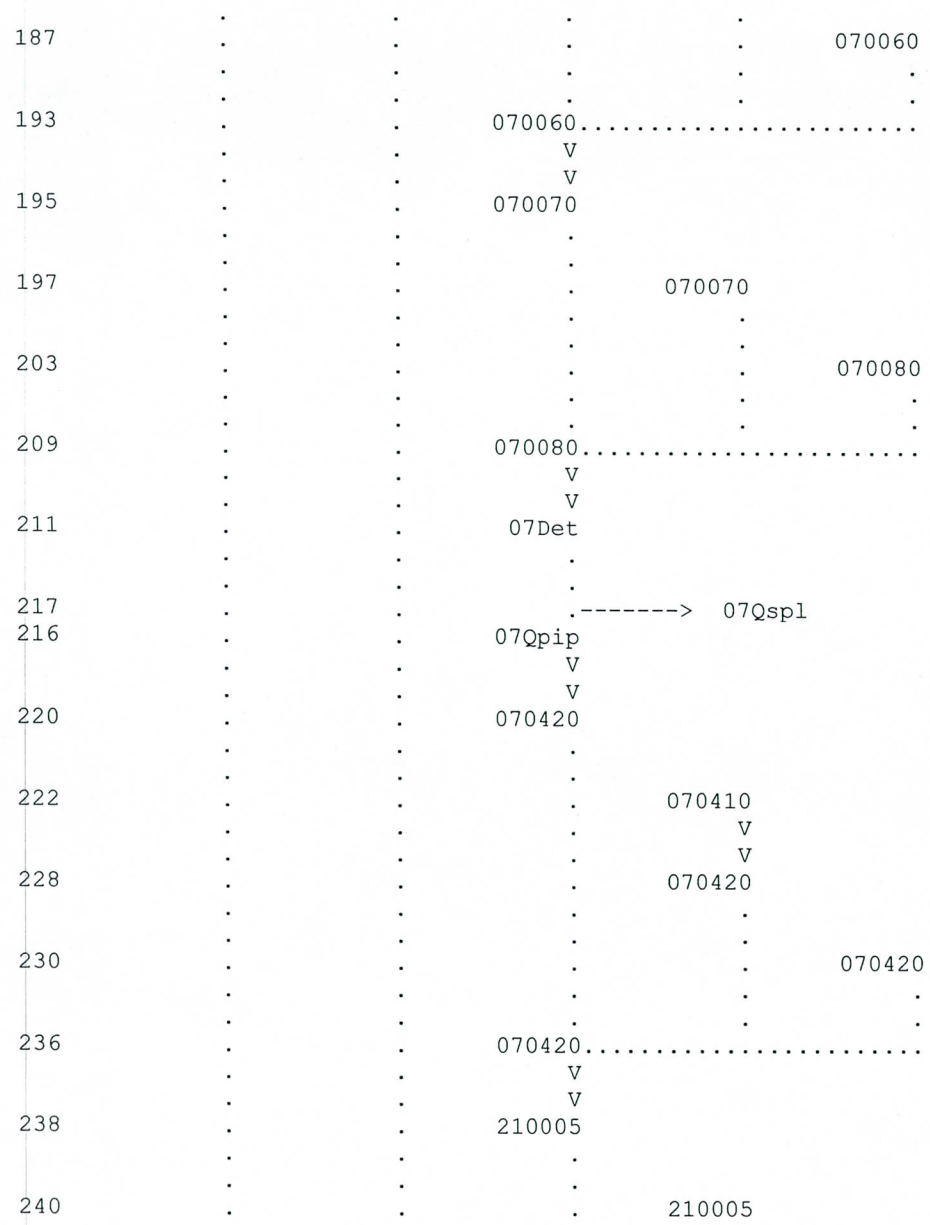
1

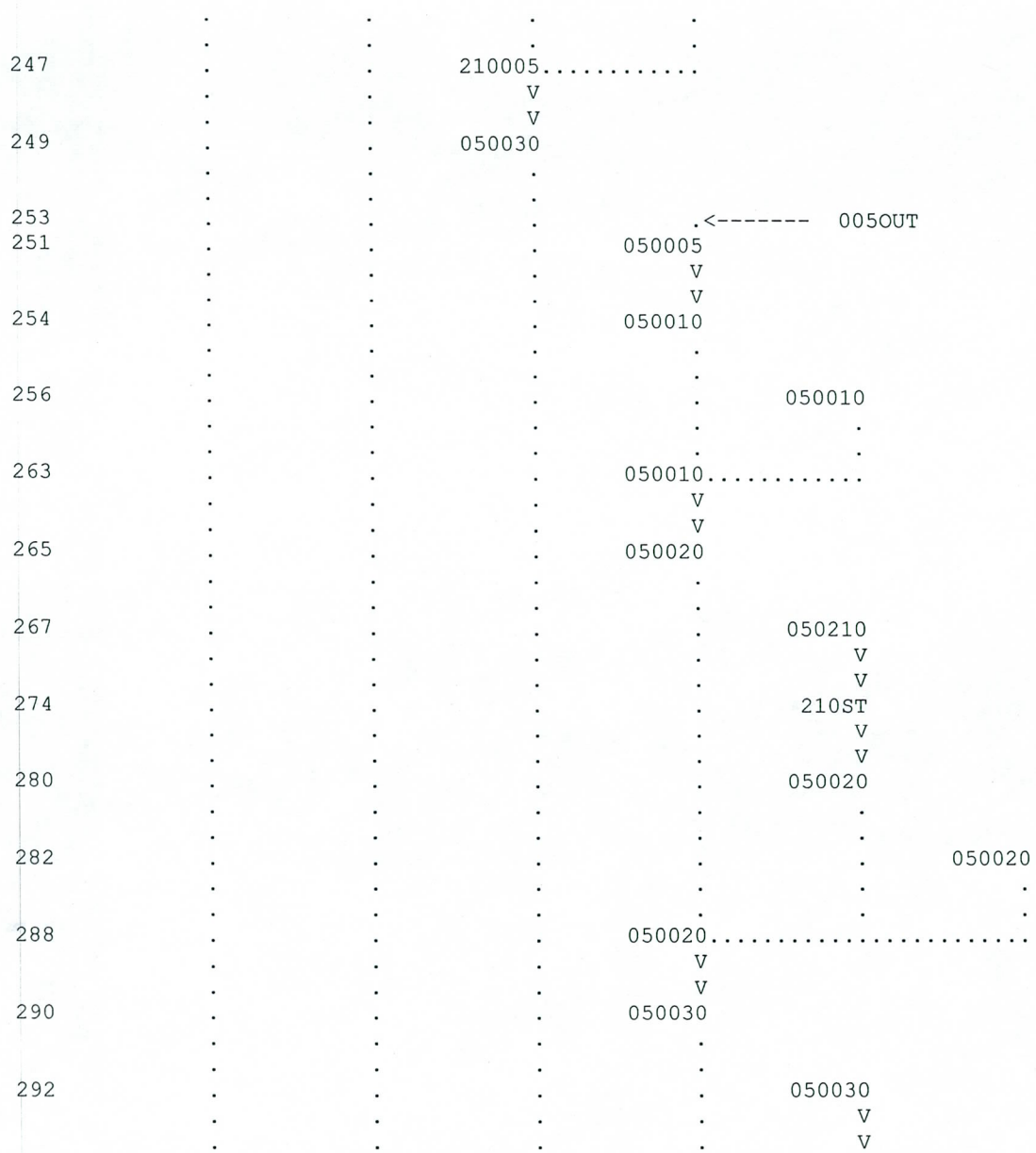
SCHEMATIC DIAGRAM OF STREAM NETWORK

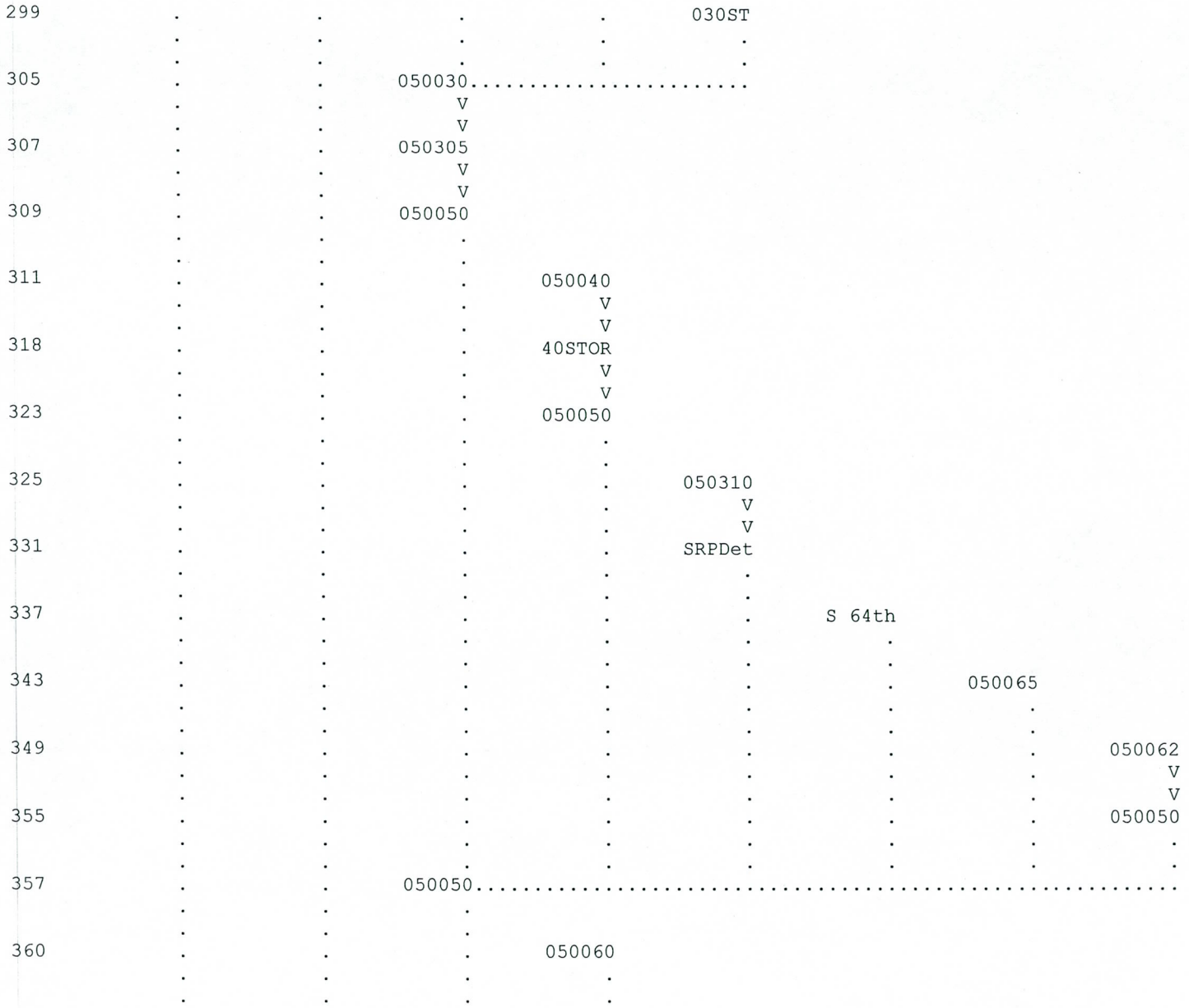

INPUT
LINE (V) ROUTING (---->) DIVERSION OR PUMP FLOW
NO. (.) CONNECTOR (<----) RETURN OF DIVERTED OR PUMPED FLOW
44 070808
52 808OUT
51 808PP
55 070610
57 070610
64 610OUT
63 610PP
67 070610
69 070508
71 070508
78 508OUT
77 508PP
81 070508
83 070010
85 070010
92 010OUT

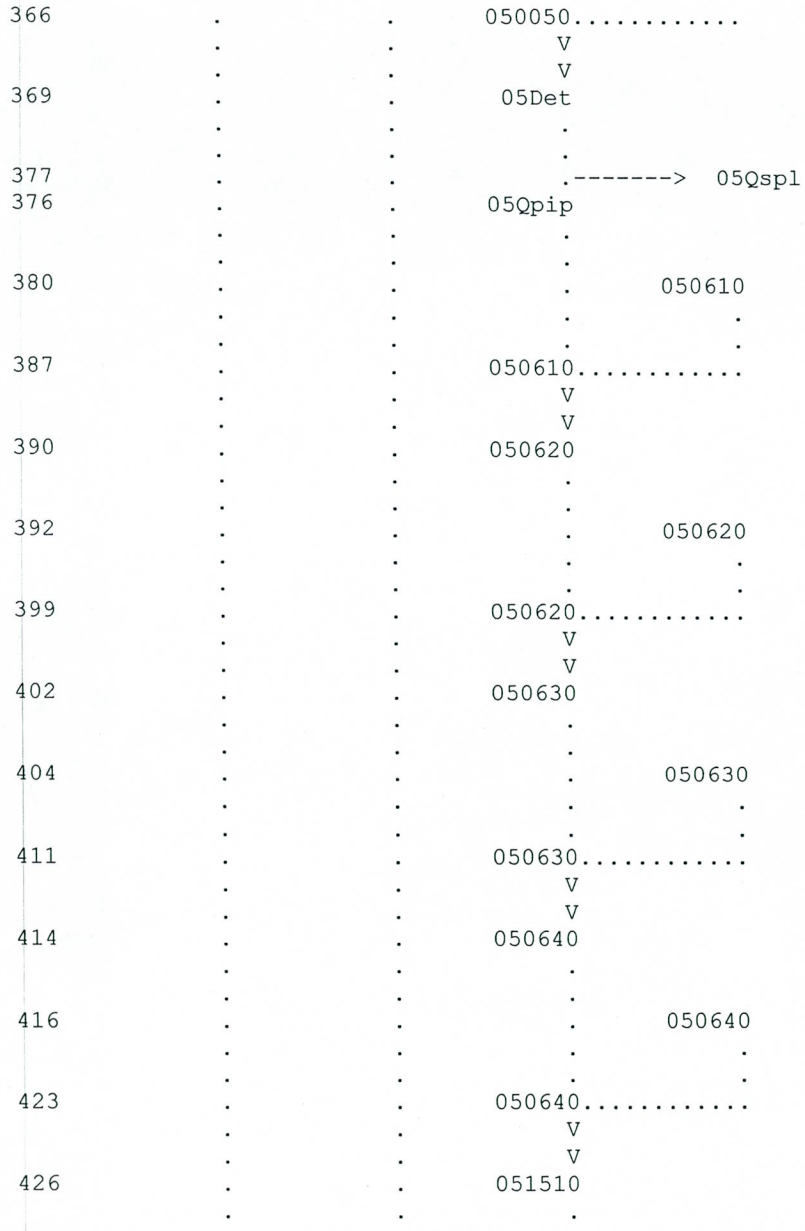

91
010PP
95
070010
97
070210
99
070209
105
070210
107
070210
113
070210
116
210OUT
115
210PP
119
070210
121
050005
123
050005
130
005OUT
129
005PP
135
010OUT
133
070010
136
070020

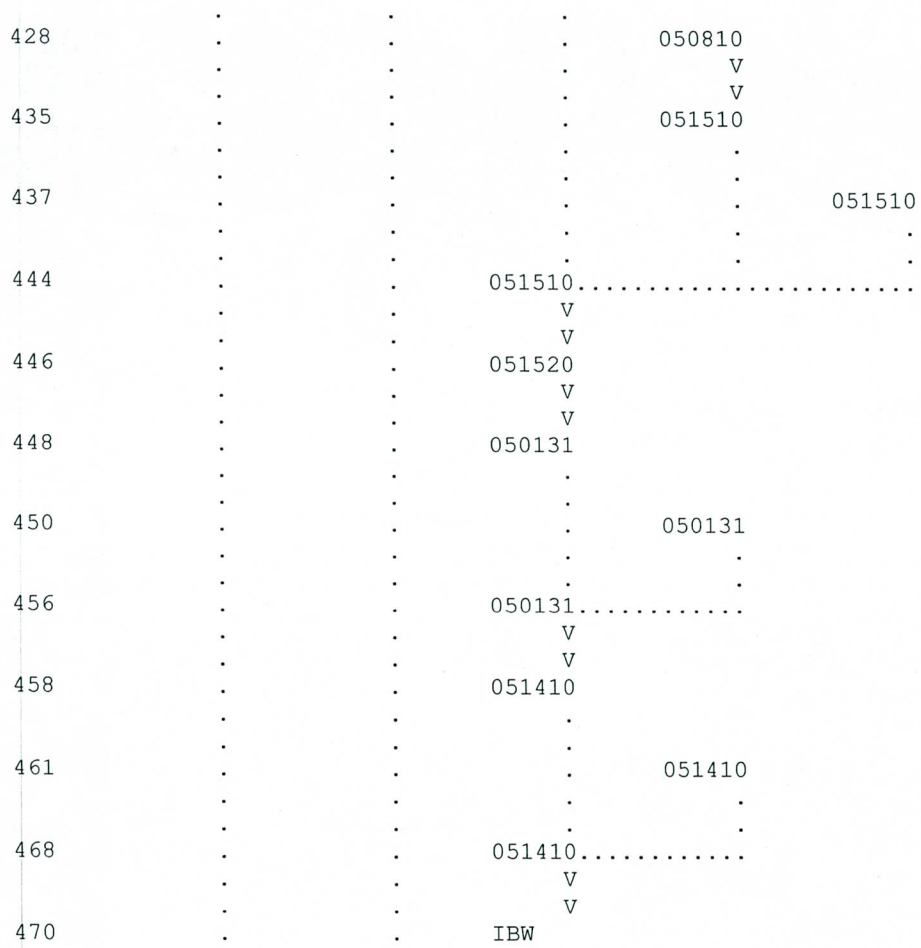

138
070030
140
070030
146
070030
148
070040
152
210OUT
150
070210
153
070220
155
070040
157
070040
163
070040
165
070050
167
070050
174
070050
176
070060
178
070310
185
070060


187
070060
193
070060
195
070070
197
070070
203
070080
209
070080
211
07Det
217
07Qspl
216
07Qpip
220
070420
222
070410
228
070420
230
070420
236
070420
238
210005
240
210005


247
210005
249
050030
253
005OUT
251
050005
254
050010
256
050010
263
050010
265
050020
267
050210
274
210ST
280
050020
282
050020
288
050020
290
050030
292
050030


299
030ST
305
050030
307
050305
309
050050
311
050040
318
40STOR
323
050050
325
050310
331
SRPDet
337
S 64th
343
050065
349
050062
355
050050
357
050050
360
050060


366
050050
369
05Det
377
05Qspl
376
05Qpip
380
050610
387
050610
390
050620
392
050620
399
050620
402
050630
404
050630
411
050630
414
050640
416
050640
423
050640
426
051510



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *              MAY   1991               *
 *           VERSION 4.0.1E              *
 *     Lahey F77L-EM/32 version 5.01     *
 *       Dodson & Associates, Inc.       *
 *  RUN DATE  05/05/99  TIME  06:28:37   *
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 551-1748              *
*                                       *
```

Parsons Brinckerhoff
Osborn Outfall Alternative Analysis

Alternative B, Civic Center Boulevard

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*****************************************                    ****************************************

*******************************************************************************
STP-PAPAGO REGIONAL FLOOD CONTROL PROJECT
SCOTTSDALE - TEMPE - PHOENIX
*******************************************************************************

Kimley-Horn and Associates, Inc.
KVL Consultants, Inc.

10-Year, 6-Hour Storm Event
10/97

PARSONS BRINCKERHOFF MODIFICATIONS TO ORIGINAL KIMLEY HORN MODEL
PARSONS BRINCKERHOFF FILE NAME: PBALTB.DAT
ALTERNATIVE B- OSBORN TO CIVIC CENTER TO EARLL TO INDIAN BEND WASH

FILE MODIFIED BY PARSONS BRINCKERHOFF TO BE USED IN DESIGN OF OSBORN OUTFALL
MODIFICATIONS:
1) SUBBASIN 050062 REROUTED DIRECTLY TO PAIUTE PARK- IMPROVEMENTS TO 64TH ST
   CONVEY FLOW TO DETENTION BASIN. AREA REDUCED TO 3.9 ACRES (0.0061 SM)
2) PAIUTE PARK STAGE/DISCHARGE CURVE ADJUSTED
3) SUBBASINS CONTRIBUTING TO 66" ADOT PIPE ROUTED OUT OF PROPOSED PIPE
   (SUBBASINS 050710 AND 050720).
4) REVISE AREA OF SUBBASIN 050310 FROM 0.041 SM TO 0.0063 SM.AND ROUTE TO
   EXISTING DETENTION BASIN. REMAINING AREA IS SRP PROPERTY WHICH DRAINS
   WEST.
   AREA REDUCTION DUE TO:
   REMOVE APARTMENTS AT THOMAS AND 64TH ST DUE TO ON-SITE RETENTION.
   REMOVE PORTION OF SRP SUBSTATION WHICH DRAINS EAST.
   COLLECT PAVEMENT FLOWS FROM 64TH ST (THOMAS TO PAIUTE PARK) IN LARGE PIPE
   COLLECT FLOWS FROM PAVED AREA BETWEEN SUBSTATION AND APARTMENTS IN LARGE
   PIPE
5) REVISE HYDROGRAPH CARDS FOR SUBBASIN 050130.  INSERT CONCENTRATION
   POINT AT EARLL AND CIVIC CENTER.
6) ADD HYDROGRAPH CARDS FOR SUBBASIN 051410.  CONCENTRATION POINT AT EARLL
   AND MILLER. USE ORIGINAL K-H CARDS FROM FILE ALTB610.DAT.
7) PROVIDE REQUIRED ROUTING CARDS FROM OSBORN TO EARLL TO INDIAN BEND WASH.
8) REVISE PIPE SIZES IN ROUTE CARDS TO REFLECT PB PRELIMINARY DESIGN

Parsons Brinckerhoff
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                        Alan Humphrey
                        5/5/99

 43 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           2  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1    0  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      1    0  ENDING DATE
                     NDTIME        0958  ENDING TIME
                     ICENT           19  CENTURY MARK

                  COMPUTATION INTERVAL     0.03 HOURS
                       TOTAL TIME BASE     9.97 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


             **************
             *            *
 369 KK      *     05Det  *
             *            *
             **************

 370 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           2  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
```

HYDROGRAPH ROUTING DATA

```
371 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       STOR  TYPE OF INITIAL CONDITION
                     RSVRIC       0.00  INITIAL CONDITION
                          X       0.00 WORKING R AND D COEFFICIENT

372 SA               AREA        1.2       1.8       3.2       3.2       3.3       3.3       3.4       3.5

373 SE           ELEVATION      50.00     51.00     52.00     53.00     54.00     55.00     56.00     57.00

374 SQ           DISCHARGE       0.        20.       40.       60.       80.       100.      120.      140.

375 SE           ELEVATION      50.00     50.80     51.18     51.78     52.39     52.94     53.48     54.04
```

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COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	1.51	3.98	7.17	10.43	13.76	17.15	20.60
ELEVATION	50.00	51.00	52.00	53.00	54.00	55.00	56.00	57.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	1.15	1.51	1.86	3.32	3.98	5.22	6.98	7.17	8.73
OUTFLOW	0.00	20.00	30.53	40.00	60.00	67.21	80.00	100.00	102.22	120.00
ELEVATION	50.00	50.80	51.00	51.18	51.78	52.00	52.39	52.94	53.00	53.48

STORAGE	10.43	10.57	13.76	17.15	20.60
OUTFLOW	138.57	140.00	174.29	210.00	245.71
ELEVATION	54.00	54.04	55.00	56.00	57.00

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HYDROGRAPH AT STATION 05Det

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	0.0	50.0	1		0320	101	79.	5.2	52.4	1		0640	201	28.	1.4	50.9
1		0002	2	1.	0.1	50.0	1		0322	102	84.	5.6	52.5	1		0642	202	27.	1.4	50.9
1		0004	3	1.	0.1	50.0	1		0324	103	89.	6.0	52.6	1		0644	203	25.	1.3	50.9
1		0006	4	1.	0.1	50.0	1		0326	104	93.	6.4	52.7	1		0646	204	24.	1.3	50.9

1	0008	5	1.	0.1	50.0 * 1	0328	105	96.	6.7	52.8 * 1	0648	205	23.	1.3	50.9
1	0010	6	1.	0.0	50.0 * 1	0330	106	100.	6.9	52.9 * 1	0650	206	22.	1.2	50.8
1	0012	7	1.	0.0	50.0 * 1	0332	107	102.	7.2	53.0 * 1	0652	207	21.	1.2	50.8
1	0014	8	1.	0.0	50.0 * 1	0334	108	105.	7.4	53.1 * 1	0654	208	21.	1.2	50.8
1	0016	9	1.	0.0	50.0 * 1	0336	109	107.	7.6	53.1 * 1	0656	209	20.	1.1	50.8
1	0018	10	1.	0.0	50.0 * 1	0338	110	109.	7.8	53.2 * 1	0658	210	19.	1.1	50.8
1	0020	11	1.	0.0	50.0 * 1	0340	111	111.	7.9	53.2 * 1	0700	211	19.	1.1	50.8
1	0022	12	1.	0.0	50.0 * 1	0342	112	112.	8.0	53.3 * 1	0702	212	18.	1.1	50.7
1	0024	13	1.	0.0	50.0 * 1	0344	113	113.	8.1	53.3 * 1	0704	213	18.	1.0	50.7
1	0026	14	1.	0.0	50.0 * 1	0346	114	114.	8.2	53.3 * 1	0706	214	18.	1.0	50.7
1	0028	15	1.	0.0	50.0 * 1	0348	115	115.	8.3	53.4 * 1	0708	215	17.	1.0	50.7
1	0030	16	1.	0.0	50.0 * 1	0350	116	116.	8.4	53.4 * 1	0710	216	17.	1.0	50.7
1	0032	17	1.	0.0	50.0 * 1	0352	117	116.	8.4	53.4 * 1	0712	217	16.	0.9	50.7
1	0034	18	0.	0.0	50.0 * 1	0354	118	117.	8.4	53.4 * 1	0714	218	16.	0.9	50.6
1	0036	19	0.	0.0	50.0 * 1	0356	119	117.	8.5	53.4 * 1	0716	219	16.	0.9	50.6
1	0038	20	0.	0.0	50.0 * 1	0358	120	117.	8.5	53.4 * 1	0718	220	15.	0.9	50.6
1	0040	21	0.	0.0	50.0 * 1	0400	121	117.	8.5	53.4 * 1	0720	221	15.	0.9	50.6
1	0042	22	0.	0.0	50.0 * 1	0402	122	117.	8.5	53.4 * 1	0722	222	14.	0.8	50.6
1	0044	23	0.	0.0	50.0 * 1	0404	123	117.	8.5	53.4 * 1	0724	223	14.	0.8	50.6
1	0046	24	0.	0.0	50.0 * 1	0406	124	117.	8.5	53.4 * 1	0726	224	14.	0.8	50.5
1	0048	25	0.	0.0	50.0 * 1	0408	125	117.	8.4	53.4 * 1	0728	225	13.	0.8	50.5
1	0050	26	0.	0.0	50.0 * 1	0410	126	116.	8.4	53.4 * 1	0730	226	13.	0.7	50.5
1	0052	27	0.	0.0	50.0 * 1	0412	127	116.	8.4	53.4 * 1	0732	227	13.	0.7	50.5
1	0054	28	0.	0.0	50.0 * 1	0414	128	116.	8.3	53.4 * 1	0734	228	12.	0.7	50.5
1	0056	29	0.	0.0	50.0 * 1	0416	129	115.	8.3	53.3 * 1	0736	229	12.	0.7	50.5
1	0058	30	0.	0.0	50.0 * 1	0418	130	115.	8.3	53.3 * 1	0738	230	12.	0.7	50.5
1	0100	31	0.	0.0	50.0 * 1	0420	131	114.	8.2	53.3 * 1	0740	231	11.	0.7	50.5
1	0102	32	0.	0.0	50.0 * 1	0422	132	114.	8.2	53.3 * 1	0742	232	11.	0.6	50.4
1	0104	33	0.	0.0	50.0 * 1	0424	133	113.	8.1	53.3 * 1	0744	233	11.	0.6	50.4
1	0106	34	0.	0.0	50.0 * 1	0426	134	112.	8.1	53.3 * 1	0746	234	11.	0.6	50.4
1	0108	35	0.	0.0	50.0 * 1	0428	135	112.	8.0	53.3 * 1	0748	235	10.	0.6	50.4
1	0110	36	0.	0.0	50.0 * 1	0430	136	111.	8.0	53.2 * 1	0750	236	10.	0.6	50.4
1	0112	37	0.	0.0	50.0 * 1	0432	137	111.	7.9	53.2 * 1	0752	237	10.	0.6	50.4
1	0114	38	0.	0.0	50.0 * 1	0434	138	110.	7.8	53.2 * 1	0754	238	9.	0.5	50.4
1	0116	39	0.	0.0	50.0 * 1	0436	139	109.	7.8	53.2 * 1	0756	239	9.	0.5	50.4
1	0118	40	0.	0.0	50.0 * 1	0438	140	108.	7.7	53.2 * 1	0758	240	9.	0.5	50.4
1	0120	41	0.	0.0	50.0 * 1	0440	141	108.	7.7	53.2 * 1	0800	241	9.	0.5	50.4
1	0122	42	0.	0.0	50.0 * 1	0442	142	107.	7.6	53.1 * 1	0802	242	9.	0.5	50.3
1	0124	43	0.	0.0	50.0 * 1	0444	143	105.	7.4	53.1 * 1	0804	243	8.	0.5	50.3
1	0126	44	0.	0.0	50.0 * 1	0446	144	104.	7.3	53.0 * 1	0806	244	8.	0.5	50.3
1	0128	45	0.	0.0	50.0 * 1	0448	145	102.	7.2	53.0 * 1	0808	245	8.	0.5	50.3
1	0130	46	0.	0.0	50.0 * 1	0450	146	101.	7.1	53.0 * 1	0810	246	8.	0.4	50.3
1	0132	47	0.	0.0	50.0 * 1	0452	147	99.	6.9	52.9 * 1	0812	247	7.	0.4	50.3
1	0134	48	0.	0.0	50.0 * 1	0454	148	98.	6.8	52.9 * 1	0814	248	7.	0.4	50.3
1	0136	49	0.	0.0	50.0 * 1	0456	149	97.	6.7	52.8 * 1	0816	249	7.	0.4	50.3

1	0138	50	0.	0.0	50.0	*	1	0458	150	95.	6.5	52.8	*	1	0818	250	7.	0.4	50.3
1	0140	51	0.	0.0	50.0	*	1	0500	151	93.	6.4	52.8	*	1	0820	251	7.	0.4	50.3
1	0142	52	0.	0.0	50.0	*	1	0502	152	92.	6.3	52.7	*	1	0822	252	7.	0.4	50.3
1	0144	53	0.	0.0	50.0	*	1	0504	153	90.	6.1	52.7	*	1	0824	253	6.	0.4	50.3
1	0146	54	0.	0.0	50.0	*	1	0506	154	89.	6.0	52.6	*	1	0826	254	6.	0.4	50.2
1	0148	55	0.	0.0	50.0	*	1	0508	155	87.	5.9	52.6	*	1	0828	255	6.	0.4	50.2
1	0150	56	0.	0.0	50.0	*	1	0510	156	86.	5.7	52.5	*	1	0830	256	6.	0.3	50.2
1	0152	57	0.	0.0	50.0	*	1	0512	157	84.	5.6	52.5	*	1	0832	257	6.	0.3	50.2
1	0154	58	0.	0.0	50.0	*	1	0514	158	83.	5.5	52.5	*	1	0834	258	6.	0.3	50.2
1	0156	59	0.	0.0	50.0	*	1	0516	159	81.	5.3	52.4	*	1	0836	259	5.	0.3	50.2
1	0158	60	0.	0.0	50.0	*	1	0518	160	80.	5.2	52.4	*	1	0838	260	5.	0.3	50.2
1	0200	61	0.	0.0	50.0	*	1	0520	161	78.	5.1	52.3	*	1	0840	261	5.	0.3	50.2
1	0202	62	0.	0.0	50.0	*	1	0522	162	77.	4.9	52.3	*	1	0842	262	5.	0.3	50.2
1	0204	63	0.	0.0	50.0	*	1	0524	163	76.	4.8	52.3	*	1	0844	263	5.	0.3	50.2
1	0206	64	0.	0.0	50.0	*	1	0526	164	74.	4.7	52.2	*	1	0846	264	5.	0.3	50.2
1	0208	65	0.	0.0	50.0	*	1	0528	165	73.	4.5	52.2	*	1	0848	265	5.	0.3	50.2
1	0210	66	0.	0.0	50.0	*	1	0530	166	72.	4.4	52.1	*	1	0850	266	5.	0.3	50.2
1	0212	67	0.	0.0	50.0	*	1	0532	167	70.	4.3	52.1	*	1	0852	267	4.	0.3	50.2
1	0214	68	0.	0.0	50.0	*	1	0534	168	69.	4.2	52.1	*	1	0854	268	4.	0.2	50.2
1	0216	69	0.	0.0	50.0	*	1	0536	169	68.	4.0	52.0	*	1	0856	269	4.	0.2	50.2
1	0218	70	0.	0.0	50.0	*	1	0538	170	67.	3.9	52.0	*	1	0858	270	4.	0.2	50.2
1	0220	71	0.	0.0	50.0	*	1	0540	171	65.	3.8	51.9	*	1	0900	271	4.	0.2	50.2
1	0222	72	0.	0.0	50.0	*	1	0542	172	64.	3.7	51.9	*	1	0902	272	4.	0.2	50.2
1	0224	73	0.	0.0	50.0	*	1	0544	173	63.	3.6	51.9	*	1	0904	273	4.	0.2	50.2
1	0226	74	0.	0.0	50.0	*	1	0546	174	62.	3.5	51.8	*	1	0906	274	4.	0.2	50.1
1	0228	75	0.	0.0	50.0	*	1	0548	175	60.	3.4	51.8	*	1	0908	275	4.	0.2	50.1
1	0230	76	1.	0.0	50.0	*	1	0550	176	59.	3.3	51.8	*	1	0910	276	4.	0.2	50.1
1	0232	77	1.	0.0	50.0	*	1	0552	177	58.	3.2	51.7	*	1	0912	277	3.	0.2	50.1
1	0234	78	1.	0.0	50.0	*	1	0554	178	56.	3.1	51.7	*	1	0914	278	3.	0.2	50.1
1	0236	79	1.	0.0	50.0	*	1	0556	179	55.	3.0	51.6	*	1	0916	279	3.	0.2	50.1
1	0238	80	1.	0.0	50.0	*	1	0558	180	54.	2.9	51.6	*	1	0918	280	3.	0.2	50.1
1	0240	81	1.	0.1	50.0	*	1	0600	181	52.	2.8	51.6	*	1	0920	281	3.	0.2	50.1
1	0242	82	1.	0.1	50.0	*	1	0602	182	51.	2.7	51.5	*	1	0922	282	3.	0.2	50.1
1	0244	83	1.	0.1	50.1	*	1	0604	183	50.	2.6	51.5	*	1	0924	283	3.	0.2	50.1
1	0246	84	2.	0.1	50.1	*	1	0606	184	49.	2.5	51.4	*	1	0926	284	3.	0.2	50.1
1	0248	85	2.	0.1	50.1	*	1	0608	185	48.	2.4	51.4	*	1	0928	285	3.	0.2	50.1
1	0250	86	3.	0.1	50.1	*	1	0610	186	47.	2.3	51.4	*	1	0930	286	3.	0.2	50.1
1	0252	87	3.	0.2	50.1	*	1	0612	187	46.	2.3	51.3	*	1	0932	287	3.	0.2	50.1
1	0254	88	4.	0.2	50.2	*	1	0614	188	45.	2.2	51.3	*	1	0934	288	3.	0.2	50.1
1	0256	89	5.	0.3	50.2	*	1	0616	189	44.	2.1	51.3	*	1	0936	289	3.	0.1	50.1
1	0258	90	6.	0.4	50.3	*	1	0618	190	43.	2.0	51.3	*	1	0938	290	2.	0.1	50.1
1	0300	91	8.	0.5	50.3	*	1	0620	191	42.	2.0	51.2	*	1	0940	291	2.	0.1	50.1
1	0302	92	11.	0.7	50.5	*	1	0622	192	41.	1.9	51.2	*	1	0942	292	2.	0.1	50.1
1	0304	93	16.	0.9	50.6	*	1	0624	193	39.	1.8	51.2	*	1	0944	293	2.	0.1	50.1
1	0306	94	23.	1.3	50.9	*	1	0626	194	38.	1.8	51.1	*	1	0946	294	2.	0.1	50.1

1	0308	95	34.	1.7	51.1	*	1	0628	195	36.	1.7	51.1	*	1	0948	295	2.	0.1	50.1
1	0310	96	44.	2.1	51.3	*	1	0630	196	34.	1.7	51.1	*	1	0950	296	2.	0.1	50.1
1	0312	97	52.	2.7	51.5	*	1	0632	197	33.	1.6	51.0	*	1	0952	297	2.	0.1	50.1
1	0314	98	61.	3.4	51.8	*	1	0634	198	32.	1.6	51.0	*	1	0954	298	2.	0.1	50.1
1	0316	99	68.	4.0	52.0	*	1	0636	199	30.	1.5	51.0	*	1	0956	299	2.	0.1	50.1
1	0318	100	74.	4.6	52.2	*	1	0638	200	29.	1.5	51.0	*	1	0958	300	2.	0.1	50.1
						*							*						

****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
+ (CFS)	(HR)					
		(CFS)				
+ 117.	4.00		54.	33.	33.	33.
		(INCHES)	1.075	1.090	1.090	1.090
		(AC-FT)	27.	27.	27.	27.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	9.97-HR
+ (AC-FT)	(HR)				
8.	4.00	3.	2.	2.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	9.97-HR
+ (FEET)	(HR)				
53.41	4.00	51.62	51.00	51.00	51.00

CUMULATIVE AREA = 0.46 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+					6-HOUR	24-HOUR	72-HOUR			
	HYDROGRAPH AT									
+		070808	12.	3.43	2.	1.	1.	0.02		
	DIVERSION TO									
+		808OUT	0.	3.43	0.	0.	0.	0.02		
	HYDROGRAPH AT									

+	808PP	12.	3.43	2.	1.	1.	0.02
	ROUTED TO						
+	070610	12.	3.43	2.	1.	1.	0.02
	HYDROGRAPH AT						
+	070610	5.	3.43	1.	0.	0.	0.01
	DIVERSION TO						
+	610OUT	0.	3.40	0.	0.	0.	0.01
	HYDROGRAPH AT						
+	610PP	5.	3.40	1.	0.	0.	0.01
	2 COMBINED AT						
+	070610	17.	3.43	3.	2.	2.	0.02
	ROUTED TO						
+	070508	17.	3.43	3.	2.	2.	0.02
	HYDROGRAPH AT						
+	070508	4.	3.50	1.	0.	0.	0.01
	DIVERSION TO						
+	508OUT	0.	3.50	0.	0.	0.	0.01
	HYDROGRAPH AT						
+	508PP	4.	3.50	1.	0.	0.	0.01
	2 COMBINED AT						
+	070508	21.	3.47	3.	2.	2.	0.03
	ROUTED TO						
+	070010	21.	3.47	3.	2.	2.	0.03
	HYDROGRAPH AT						
+	070010	7.	3.43	1.	1.	1.	0.01
	DIVERSION TO						
+	010OUT	0.	3.43	0.	0.	0.	0.01
	HYDROGRAPH AT						
+	010PP	6.	3.43	1.	1.	1.	0.01
	2 COMBINED AT						

+	070010	27.	3.47	4.	3.	3.	0.04
	ROUTED TO						
+	070210	27.	3.47	4.	3.	3.	0.04
	HYDROGRAPH AT						
+	070209	12.	3.47	2.	1.	1.	0.02
	ROUTED TO						
+	070210	12.	3.47	2.	1.	1.	0.02
	HYDROGRAPH AT						
+	070210	5.	3.47	1.	0.	0.	0.01
	2 COMBINED AT						
+	070210	17.	3.47	3.	2.	2.	0.03
	DIVERSION TO						
+	210OUT	0.	3.43	0.	0.	0.	0.03
	HYDROGRAPH AT						
+	210PP	17.	3.43	3.	2.	2.	0.03
	2 COMBINED AT						
+	070210	44.	3.47	7.	4.	4.	0.07
	ROUTED TO						
+	050005	44.	3.47	7.	4.	4.	0.07
	HYDROGRAPH AT						
+	050005	21.	3.53	3.	2.	2.	0.04
	DIVERSION TO						
+	005OUT	0.	3.53	0.	0.	0.	0.04
	HYDROGRAPH AT						
+	005PP	21.	3.53	3.	2.	2.	0.04
	HYDROGRAPH AT						
+	070010	0.	3.37	0.	0.	0.	0.00
	ROUTED TO						
+	070020	0.	3.47	0.	0.	0.	0.00
	ROUTED TO						

+	070030	0.	3.67	0.	0.	0.	0.00
	HYDROGRAPH AT						
+	070030	5.	3.07	1.	0.	0.	0.00
	2 COMBINED AT						
+	070030	5.	3.07	1.	0.	0.	0.00
	ROUTED TO						
+	070040	5.	3.10	1.	0.	0.	0.00
	HYDROGRAPH AT						
+	070210	0.	3.47	0.	0.	0.	0.00
	ROUTED TO						
+	070220	0.	3.47	0.	0.	0.	0.00
	ROUTED TO						
+	070040	0.	3.77	0.	0.	0.	0.00
	HYDROGRAPH AT						
+	070040	5.	3.20	1.	0.	0.	0.01
	3 COMBINED AT						
+	070040	9.	3.13	1.	1.	1.	0.01
	ROUTED TO						
+	070050	9.	3.17	1.	1.	1.	0.01
	HYDROGRAPH AT						
+	070050	23.	3.07	2.	1.	1.	0.02
	2 COMBINED AT						
+	070050	30.	3.10	4.	2.	2.	0.03
	ROUTED TO						
+	070060	30.	3.13	4.	2.	2.	0.03
	HYDROGRAPH AT						
+	070310	30.	3.07	3.	2.	2.	0.02
	ROUTED TO						
+	070060	30.	3.10	3.	2.	2.	0.02
	HYDROGRAPH AT						

+		070060	26.	3.10	3.	2.	2.	0.02	
	3 COMBINED AT								
+		070060	83.	3.10	9.	6.	6.	0.07	
	ROUTED TO								
+		070070	82.	3.13	9.	6.	6.	0.07	
	HYDROGRAPH AT								
+		070070	43.	3.07	4.	3.	3.	0.03	
	HYDROGRAPH AT								
+		070080	52.	3.13	4.	2.	2.	0.02	
	3 COMBINED AT								
+		070080	168.	3.13	17.	10.	10.	0.12	
	ROUTED TO								
+		07Det	46.	3.67	17.	10.	10.	0.12	
+									69.95 3.67
	DIVERSION TO								
+		07Qspl	0.	3.67	0.	0.	0.	0.12	
	HYDROGRAPH AT								
+		07Qpip	46.	3.67	17.	10.	10.	0.12	
	ROUTED TO								
+		070420	46.	3.67	17.	10.	10.	0.12	
	HYDROGRAPH AT								
+		070410	17.	3.13	2.	1.	1.	0.01	
	ROUTED TO								
+		070420	17.	3.13	2.	1.	1.	0.01	
	HYDROGRAPH AT								
+		070420	5.	3.20	0.	0.	0.	0.00	
	3 COMBINED AT								
+		070420	59.	3.20	19.	12.	12.	0.14	
	ROUTED TO								
+		210005	59.	3.20	19.	12.	12.	0.14	

	HYDROGRAPH AT								
+		210005	13.	3.23	1.	1.	1.	0.01	
	2 COMBINED AT								
+		210005	72.	3.23	20.	12.	12.	0.15	
	ROUTED TO								
+		050030	72.	3.23	20.	12.	12.	0.15	
	HYDROGRAPH AT								
+		050005	0.	3.40	0.	0.	0.	0.00	
	ROUTED TO								
+		050010	0.	4.63	0.	0.	0.	0.00	
	HYDROGRAPH AT								
+		050010	96.	3.13	8.	5.	5.	0.07	
	2 COMBINED AT								
+		050010	96.	3.13	8.	5.	5.	0.07	
	ROUTED TO								
+		050020	93.	3.17	8.	5.	5.	0.07	
	HYDROGRAPH AT								
+		050210	100.	3.13	8.	5.	5.	0.05	
	ROUTED TO								
+		210ST	0.	5.53	0.	0.	0.	0.05	
+									0.55 9.97
	ROUTED TO								
+		050020	0.	4.73	0.	0.	0.	0.05	
	HYDROGRAPH AT								
+		050020	13.	3.17	1.	1.	1.	0.01	
	3 COMBINED AT								
+		050020	105.	3.17	10.	6.	6.	0.13	
	ROUTED TO								
+		050030	103.	3.20	10.	6.	6.	0.13	
	HYDROGRAPH AT								
+		050030	54.	3.10	3.	2.	2.	0.02	

	ROUTED TO								
+		030ST	20.	3.27	2.	1.	1.	0.02	
+								68.13	3.27
	3 COMBINED AT								
+		050030	190.	3.20	32.	20.	20.	0.30	
	ROUTED TO								
+		050305	188.	3.20	32.	20.	20.	0.30	
	ROUTED TO								
+		050050	186.	3.27	32.	20.	20.	0.30	
	HYDROGRAPH AT								
+		050040	105.	3.20	12.	7.	7.	0.10	
	ROUTED TO								
+		40STOR	37.	3.67	12.	7.	7.	0.10	
+								61.58	3.67
	ROUTED TO								
+		050050	37.	3.67	12.	7.	7.	0.10	
	HYDROGRAPH AT								
+		050310	11.	3.13	1.	1.	1.	0.01	
	ROUTED TO								
+		SRPDet	5.	3.37	1.	1.	1.	0.01	
+								54.43	3.37
	HYDROGRAPH AT								
+		S 64th	7.	3.30	1.	0.	0.	0.01	
	HYDROGRAPH AT								
+		050065	38.	3.07	2.	1.	1.	0.01	
	HYDROGRAPH AT								
+		050062	16.	3.10	1.	1.	1.	0.01	
	ROUTED TO								
+		050050	15.	3.13	1.	1.	1.	0.01	
	6 COMBINED AT								
+		050050	254.	3.23	49.	30.	30.	0.43	

	HYDROGRAPH AT								
+		050060	53.	3.17	5.	3.	3.	0.03	
	2 COMBINED AT								
+		050050	303.	3.23	54.	33.	33.	0.46	
	ROUTED TO								
+		05Det	117.	4.00	54.	33.	33.	0.46	
+									53.41 4.00
	DIVERSION TO								
+		05Qspl	0.	4.00	0.	0.	0.	0.46	
	HYDROGRAPH AT								
+		05Qpip	117.	4.00	54.	33.	33.	0.46	
	HYDROGRAPH AT								
+		050610	99.	3.17	10.	6.	6.	0.08	
	2 COMBINED AT								
+		050610	143.	3.17	63.	38.	38.	0.54	
	ROUTED TO								
+		050620	142.	3.20	63.	38.	38.	0.54	
	HYDROGRAPH AT								
+		050620	110.	3.17	12.	7.	7.	0.10	
	2 COMBINED AT								
+		050620	249.	3.20	75.	45.	45.	0.64	
	ROUTED TO								
+		050630	249.	3.20	75.	45.	45.	0.64	
	HYDROGRAPH AT								
+		050630	120.	3.13	9.	6.	6.	0.06	
	2 COMBINED AT								
+		050630	343.	3.20	84.	51.	51.	0.70	
	ROUTED TO								
+		050640	342.	3.20	84.	51.	51.	0.70	
	HYDROGRAPH AT								

+		050640	65.	3.20	6.	3.	3.	0.03
	2 COMBINED AT							
+		050640	407.	3.20	89.	54.	54.	0.74
	ROUTED TO							
+		051510	401.	3.20	89.	54.	54.	0.74
	HYDROGRAPH AT							
+		050810	25.	3.17	2.	1.	1.	0.01
	ROUTED TO							
+		051510	25.	3.20	2.	1.	1.	0.01
	HYDROGRAPH AT							
+		051510	21.	3.13	2.	1.	1.	0.01
	3 COMBINED AT							
+		051510	444.	3.20	93.	57.	57.	0.76
	ROUTED TO							
+		051520	440.	3.27	93.	56.	56.	0.76
	ROUTED TO							
+		050131	432.	3.30	93.	56.	56.	0.76
	HYDROGRAPH AT							
+		050131	55.	3.13	4.	3.	3.	0.02
	2 COMBINED AT							
+		050131	464.	3.27	97.	59.	59.	0.78
	ROUTED TO							
+		051410	461.	3.30	97.	59.	59.	0.78
	HYDROGRAPH AT							
+		051410	178.	3.13	13.	8.	8.	0.07
	2 COMBINED AT							
+		051410	553.	3.27	110.	67.	67.	0.86
	ROUTED TO							
+		IBW	552.	3.30	110.	67.	67.	0.86

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING

KINEMATIC WAVE SUMMARIES REMOVED FOR PRINTOUT- SEE ELECTRONIC FILE

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 210ST
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	0.00	1.00	1.00
STORAGE	0.	8.	8.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	0.55	0.00	4.	0.	0.00	9.97	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 030ST
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	65.00	68.00	68.00
STORAGE	0.	1.	1.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	68.13	0.13	1.	20.	6.87	3.27	0.00

*** NORMAL END OF HEC-1 ***

Alternative C, Scottsdale Road-

PBAltC.DAT

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1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              MAY   1991               *
*           VERSION 4.0.1E              *
*     Lahey F77L-EM/32 version 5.01     *
*       Dodson & Associates, Inc.       *
*  RUN DATE  05/05/99  TIME  06:29:00   *
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*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*        DAVIS, CALIFORNIA 95616        *
*            (916) 551-1748             *
*                                       *
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X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX  XXXXX            XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

              * ************************************************************************
              * This is ALTERNATIVE A hydrology for Change Order #2
              *
              * - This model is based on the Recommended Plan - Part A for the Osborn Road
              *     Outfall with the following changes:
              *        Osborn Road Outfall has been modified to include a junction structure
              *        at Miller Road.  The junction conveys excess runoff across Osborn Road
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*        into Osborn Park located between old Osborn Road and new Osborn Road.
*        The outfall structure(s) for the park have been augmented to handle the
*        excess runoff.  The primary runoff continues east along Osborn Road and
*        outfalls to Indian Bend Wash.
*
ID    ********************************************************************************
ID    STP-PAPAGO REGIONAL FLOOD CONTROL PROJECT
ID    SCOTTSDALE - TEMPE - PHOENIX
ID    ********************************************************************************
ID
ID    Kimley-Horn and Associates, Inc.
ID    KVL Consultants, Inc.
ID
ID    10-Year, 6-Hour Storm Event
ID    10/97
ID
ID    PARSONS BRINCKERHOFF MODIFICATIONS TO ORIGINAL KIMLEY HORN MODEL
ID    PARSONS BRINCKERHOFF FILE NAME: PBALTC.DAT
ID    ALTERNATIVE C- OSBORN TO SCOTTSDALE TO EARLL TO INDIAN BEND WASH
ID
ID    FILE MODIFIED BY PARSONS BRINCKERHOFF TO BE USED IN DESIGN OF OSBORN OUTFALL
ID
ID    MODIFICATIONS TO PB FILE PBALTA.DAT:
ID    1) MODIFY PARSONS BRINCKERHOFF FILE PBALTA.DAT. USE MODEL FOR ROUTING DOWN
ID       SCOTTSDALE ROAD IN EXISTING PIPE.
ID    2) NO INFLOW TO STORM DRAIN SYSTEM EAST OF SCOTTSDALE ROAD.
ID    3) ADD SUBBASINS 050650, 050660 AND 050910 TO MODEL. THESE CONTRIBUTE FLOW
ID       TO THE EXISTING STORM DRAIN IN SCOTTSDALE ROAD. ORIGINAL MODELING CARDS
ID       FROM K-H MODEL ALTC610.DAT, 12/97
ID    4) ADD K-H HYDROGRAPH CARDS FOR SUBBASINS 050130 AND 051410(ORIGINAL KH MODE
ID       ALTB610.DAT).  REVISE AREA OF 050130 AND INSERT CONCENTRATION
ID       POINT AT EARLL AND CIVIC CENTER. HYDROGRAPHS NEEDED TO DETERMINE FLOW
ID       EAST OF SCOTTSDALE ROAD.
ID    5) ADD DIVERSION IN SCOTTSDALE ROAD AT EARLL. ASSUME JUNCTION STRUCTURE THAT
ID       ALLOWS FLOWS CONVEYED BY SCOTTSDALE ROAD STORM DRIAN TO CONTINUE IN
ID       SCOTTSDALE ROAD STORM DRAIN. PROPOSED SYSTEM TO CONVEY FLOWS COLLECTED
ID       UPSTRWEAM FROM 71ST PLACE AND FROM PAIUTE PARK. COLLECT ADDITIONAL FLOW
ID       EAST OF SCOTTSDALE ROAD.
ID    6) REVISE PIPE SIZES IN ROUTE CARDS TO REFLECT PB PRELIMINARY DESIGN
ID
ID    MODIFICATIONS TO ORIGINAL K-H MODEL:
ID    1) SUBBASIN 050062 REROUTED DIRECTLY TO PAIUTE PARK- IMPROVEMENTS TO 64TH ST
ID       CONVEY FLOW TO DETENTION BASIN. AREA REDUCED TO 3.9 ACRES (0.0061 SM)
ID    2) PAIUTE PARK STAGE/DISCHARGE CURVE ADJUSTED
ID    3) SUBBASINS CONTRIBUTING TO 66" ADOT PIPE AND CONCENTRATION POINT 051510
```

```
 41          ID       (BROWN ROAD) ROUTED TO EXISTING PIPE IN SCOTTSDALE ROAD(SUBBASINS 050710,
 42          ID       050720, 051510 AND 050810).
 43          ID    4) REVISE AREA OF SUBBASIN 050310 FROM 0.041 SM TO 0.0063 SM.AND ROUTE TO
1                                        HEC-1 INPUT                                    PAGE  2

 LINE        ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 44          ID       EXISTING DETENTION BASIN. REMAINING AREA IS SRP PROPERTY WHICH DRAINS
 45          ID       WEST.
 46          ID       AREA REDUCTION DUE TO:
 47          ID       REMOVE APARTMENTS AT THOMAS AND 64TH ST DUE TO ON-SITE RETENTION.
 48          ID       REMOVE PORTION OF SRP SUBSTATION WHICH DRAINS EAST.
 49          ID       COLLECT PAVEMENT FLOWS FROM 64TH ST (THOMAS TO PAIUTE PARK) IN LARGE PIPE
 50          ID       COLLECT FLOWS FROM PAVED AREA BETWEEN SUBSTATION AND APARTMENTS IN LARGE
 51          ID       PIPE
 52          ID
 53          ID    Parsons Brinckerhoff
 54          ID    Alan Humphrey
 55          ID    5/5/99
             *
             *DIAGRAM
 56          IT       2                    300
 57          IO       5

 58          KK  070808   BASIN
 59          BA   0.017
 60          PH       0       0    0.50    0.97    1.61    1.76    1.86    2.05
 61          LS       0      88       0       0      98       0
 62          UK     300  0.0100    0.20      99
 63          UK     100  0.0100    0.10       1
 64          RK    1600   0.214    0.03            TRAP       2     3.5
             *
             * The 10 year flows are diverted into a proposed storm drain along Oak Street.
             * In storm events greater than the 10 yr, the remaining flow will follow its
             * natural course across and sheet flow across Oak Street to the north.
             *

 65          KK   808PP  Divert 10-year flows into storm drain
 66          DT  808OUT
 67          DI       0      12      13      15      50     100
 68          DQ       0    0.01       1       3      38      88

 69          KK  070610 FROM  070808
 70          RK     240  0.0066   0.013           CIRC    3.00
```

```
   71          KK  070610   BASIN
   72          BA   0.007
   73          LS      0      88       0       0      98       0
   74          UK    300  0.0100    0.20      99
   75          UK    100  0.0100    0.10       1
   76          RK    500   0.054    0.03            TRAP       2     3.5

   77          KK   610PP  Divert 10-year flows into storm drain
   78          DT   610OUT
   79          DI      0       5       6      10      50     100
   80          DQ      0     .01       1       5      45      95
1                                          HEC-1 INPUT                                                    PAGE  3

 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   81          KK  070610 COMBINE
   82          HC       2

   83          KK  070508    FROM  070610
   84          RK    420  0.0066   0.013            CIRC    3.00

   85          KK  070508   BASIN
   86          BA   0.008
   87          LS      0      85       0       0      98       0
   88          UK    300  0.0100    0.20      99
   89          UK    100  0.0100    0.10       1
   90          RK    600   0.048    0.03            TRAP       9     1.0

   91          KK   508PP  Divert 10-year flows into storm drain
   92          DT   508OUT
   93          DI      0       4       5      15      50     100
   94          DQ      0     .01       1      11      46      96

   95          KK  070508 COMBINE
   96          HC       2

   97          KK  070010    FROM  070508
   98          RK    270  0.0066   0.013            CIRC    3.00

   99          KK  070010   BASIN
  100          BA   0.009
  101          LS      0      88       0       0      98       0
  102          UK    300  0.0100    0.20      99
  103          UK    100  0.0100    0.10       1
```

```
104          RK    1200   0.042    0.03            TRAP       2     3.5

105          KK   010PP  Divert 10-year flows into storm drain
106          DT  010OUT
107          DI       0       7      10      15      50     100
108          DQ       0     .01       3       8      43      93

109          KK  070010 COMBINE
110          HC       2

111          KK  070210    FROM  070010
112          RK     120  0.0033   0.013            CIRC    3.00

113          KK  070209   BASIN
114          BA   0.018
115          LS       0      87       0       0      98       0
116          UK     300  0.0100    0.20      99
117          UK     100  0.0100    0.10       1
118          RK    1200   0.252    0.03            TRAP       2     3.5
1                                          HEC-1 INPUT                                                PAGE  4

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

119          KK  070210    FROM  070209
120          RK     750   0.252   0.013            TRAP      10       1

121          KK  070210   BASIN
122          BA   0.008
123          LS       0      87       0       0      98       0
124          UK     300  0.0100    0.20      99
125          UK     100  0.0100    0.10       1
126          RK     600   0.043    0.03            TRAP       2     3.5

127          KK  070210 COMBINE
128          HC       2

129          KK   210PP  Divert 10-year flows into storm drain
130          DT  210OUT
131          DI       0      17      20      30      50     100
132          DQ       0     .01       3      13      33      83

133          KK  070210 COMBINE
134          HC       2
```

```
 135          KK  050005    FROM 070210
 136          RK     950    0.008   0.013            CIRC    3.00

 137          KK  050005    BASIN
 138          BA   0.038
 139          LS       0       85       0       0      98       0
 140          UK     300   0.0100     0.20      99
 141          UK     100   0.0100     0.10       1
 142          RK    1650     0.09     0.03            TRAP      30     1.0

 143          KK   005PP  Divert 10-year flows into storm drain
 144          DT  005OUT
 145          DI       0       21       22     100     150     200
 146          DQ       0      .01        1      79     129     179
              *
              * The start of the Osborn Road outfall hydrology
              *

 147          KK  070010
 148          KM    Retrieve overland flows at CP 070010
 149          DR  010OUT

 150          KK  070020    FROM  070010
 151          RK     178  0.0131   0.013            CIRC     1.0

 152          KK  070030    FROM  070020
 153          RK     520  0.0146   0.025            TRAP     9.0       1
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 154          KK  070030   BASIN
 155          BA   0.004
 156          LS       0       85       0       0      98       0
 157          UK     150   0.0100     0.30      65
 158          UK      50   0.0100     0.10      35
 159          RK     522  0.0146     0.03            TRAP       2     3.5

 160          KK  070030 COMBINE
 161          HC       2

 162          KK  070040    FROM  070030
 163          RK     177  0.0146   0.017            TRAP    54.8       1
```

```
164          KK  070210
165          KM    Retrieve overland flows at CP 070210
166          DR  210OUT

167          KK  070220     FROM  070210
168          RK     164  0.0131   0.013            CIRC     1.0

169          KK  070040     FROM  070220
170          RK     723  0.0146   0.017            TRAP     54.8       1

171          KK  070040    BASIN
172          BA   0.006
173          LS       0       86       0       0      98        0
174          UK     181  0.0100    0.28      72
175          UK      60  0.0100    0.10      28
176          RK    1946  0.0146    0.02            TRAP       30     1.0

177          KK  070040 COMBINE
178          HC       3

179          KK  070050     FROM  070040
180          RK     878  0.0146   0.025            TRAP     20.0     1.0

181          KK  070050    BASIN
182          BA   0.018
183          LS       0       86       0       0      98        0
184          UK     150  0.0100    0.30      65
185          UK      50  0.0100    0.10      35
186          RK     290  0.0058    0.02            TRAP       11     1.0
187          RK     981  0.0146    0.02            TRAP       11     1.0

188          KK  070050 COMBINE
189          HC       2

190          KK  070060     FROM  070050
191          RK     872  0.0058   0.025            TRAP      1.0     1.0
1                                          HEC-1 INPUT                                                    PAGE  6

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


192          KK  070310    BASIN
193          BA   0.023
194          LS       0       86       0       0      98        0
195          UK     150  0.0100    0.30      65
```

```
196          UK      50  0.0100    0.10      35
197          RK     278  0.0058    0.02            TRAP      11     1.0
198          RK     986  0.0146    0.02            TRAP      11     1.0

199          KK  070060    FROM  070310
200          RK     745  0.0058   0.025            TRAP     1.0     1.0

201          KK  070060   BASIN
202          BA   0.020
203          LS       0      86       0       0      98       0
204          UK     150  0.0100    0.30      65
205          UK      50  0.0100    0.10      35
206          RK    1096  0.0058    0.03            TRAP       2     1.0

207          KK  070060 COMBINE
208          HC       3

209          KK  070070    FROM  070060
210          RK     726  0.0146   0.025            TRAP    30.0     1.0

211          KK  070070   BASIN
212          BA   0.032
213          LS       0      86       0       0      98       0
214          UK     150  0.0100    0.30      65
215          UK      50  0.0100    0.10      35
216          RK    1209  0.0146    0.03            TRAP       2     1.0

217          KK  070080   BASIN
218          BA   0.021
219          LS       0      83       0       0      98       0
220          UK      29  0.0100    0.39       9
221          UK     189  0.0100    0.10      91
222          RK    1257  0.0058    0.02            TRAP      30     1.0

223          KK  070080 COMBINE
224          HC       3

225          KK   07Det   Detention basin at Marriott's Brighton Gardens
226          RS       1    STOR
227          SV       0    0.78    1.64    2.65    3.84    5.21    6.77    6.77
228          SE      66      67      68      69      70      71      72      73
229          SQ       0      12      36      42      46      48      52     355
             *
             * Marriott's Brighton Gardens outfall - 07Qpip is the outflow in the storm drain
             * 07Qspl is the flow overtopping the basin
```

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  230         KK  07Qpip
  231         DT  07Qspl
  232         DI       0      71     112     172     245     329     420     518     623
  233         DQ       0     0.1      26      72     132     204     285     374     471

  234         KK  070420   FROM 07Qpip
  235         RK    1000   0.005   0.013           CIRC     3.0

  236         KK  070410   BASIN
  237         BA   0.011
  238         LS       0      84       0       0      98       0
  239         UK     144  0.0100    0.32      44
  240         UK     121  0.0100    0.10      56
  241         RK    1816  0.0146    0.02            TRAP      23     1.0

  242         KK  070420    FROM  070410
  243         RK     183  0.0058   0.017            TRAP    52.5       1

  244         KK  070420   BASIN
  245         BA   0.003
  246         LS       0      79       0       0      98       0
  247         UK     177  0.0100    0.31      25
  248         UK     200  0.0100    0.10      75
  249         RK    1046  0.0058    0.02            TRAP      49     1.0

  250         KK  070420 COMBINE
  251         HC       3

  252         KK  210005  FROM 070420
  253         RK     450   0.005   0.013           CIRC     3.5

  254         KK  210005   BASIN
  255         BA   0.008
  256         LS       0      79       0       0      98       0
  257         UK      94  0.0100    0.34      26
  258         UK     116  0.0100    0.10      74
  259         RK     523  0.0032    0.02            TRAP      38     1.0
  260         RK    1250  0.0020    0.02            TRAP      45     1.0
```

```
 261          KK  210005 COMBINE
 262          HC       2

 263          KK  050030   FROM 210005
 264          RK    1600   0.005   0.013            CIRC       4

 265          KK  050005
 266          KM    Retrieve overland flows at CP 050005
 267          DR  005OUT
1                                        HEC-1 INPUT                                        PAGE  8

 LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10


 268          KK  050010   FROM 050005
 269          RK    1300   0.015    0.02            TRAP      35       1

 270          KK  050010   BASIN
 271          BA   0.066
 272          LS       0      81       0       0      98       0
 273          UK     144  0.0100    0.30      52
 274          UK      57  0.0100    0.10      48
 275          RK    1189  0.0033    0.02            TRAP      30     1.0
 276          RK    1197  0.0038    0.02            TRAP      60     1.0

 277          KK  050010   COMBINE
 278          HC       2

 279          KK  050020    FROM  050010
 280          RK    1370  0.0038   0.017            TRAP    37.5       1

 281          KK  050210   BASIN
 282          BA   0.054
 283          LS       0      79       0       0      98       0
 284          UK     200  0.0100    0.30      28
 285          UK     200  0.0100    0.10      72
 286          RK     564  0.0038    0.02            TRAP      23     1.0
 287          RK    1199  0.0033    0.02            TRAP      23     1.0

 288          KK   210ST STORAGE
 289          RS       1    STOR
 290          SV    0.00    7.72    7.72
 291          SE    0.00    1.00    2.00
 292          SQ    0.00    0.01    0.01
 293          ST     1.0     500     3.0     1.5
```

```
294          KK  050020    FROM  050210
295          RK     278  0.0033   0.017            TRAP    60.0       1

296          KK  050020   BASIN
297          BA   0.009
298          LS       0      79       0       0      98       0
299          UK     166  0.0100    0.30      39
300          UK      98  0.0100    0.10      61
301          RK    1304  0.0038    0.02            TRAP      60     1.0

302          KK  050020 COMBINE
303          HC       3

304          KK  050030    FROM  050020
305          RK     347  0.0038   0.017            TRAP    37.5       1

306          KK  050030   BASIN
307          BA   0.020
308          LS       0      79       0       0      98       0
309          UK     150  0.0100    0.30      15
310          UK      50  0.0100    0.10      85
311          RK     278  0.0038    0.02            TRAP       9     1.0
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

312          RK    1468  0.0033    0.02            TRAP       9     1.0
             *
             * Scottsdale Executive Villas natural storage in parking lot
             *

313          KK   030ST STORAGE
314          RS       1    STOR
315          SV       0    0.01    0.06    0.62    2.72    2.72
316          SE      65      66      67      68      69      70
317          SQ    0.00    0.01    0.01    0.01    0.01    0.01
318          ST      68     150     3.0     1.5

319          KK  050030 COMBINE
320          HC       3

321          KK  050305   FROM 050030
322          RK     150   0.002   0.013            CIRC     5.5
```

```
323          KK  050050   FROM 050305
324          RK    1500   0.001   0.013            TRAP       9     1.0

325          KK  050040   BASIN
326          BA   0.102
327          LS       0      79       0       0      98       0
328          UK     150  0.0100    0.30      57
329          UK      50  0.0100    0.10      43
330          RK    2230  0.0038    0.02            TRAP      38     1.0
331          RK    2654  0.0038    0.02            TRAP      38     1.0

332          KK  40STOR  Storage on west side of cross-cut canal
333          RS       1
334          SV       0       0       0       0     2.6    13.5    13.5
335          SE      58      59      60      61      62      63      64
336          SQ       0      10      22      32      40      50      55

337          KK  050050    FROM  050040
338          RK     491  0.0334   0.013            CIRC     2.5
             * ***************************************************************
             * PB Modification:
             * Reduce Area of Subbasin 050310 to 4.0 Acres (0.0063 SM)
             * Remaining area is west side of SRP substation
             * Remove one routing card for internal flows- this reduces route
             * length.
             * Add storage route through existing detention basin
             * Flows from other areas of original subbasin retained on-site or
             * collected by large pipe in 64th St.
             * ***************************************************************

339          KK  050310   BASIN
             * BA 0.041
340          BA   0.0063
341          LS       0      79       0       0      98       0
342          UK     200  0.0100    0.30      28
343          UK     200  0.0100    0.10      72
344          RK     816  0.0033    0.02            TRAP      30     1.0
             * RK   848  0.0038    0.02            TRAP      30     1.0
```



```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

345          KK  SRPDet
346          RS       1    STOR
```

```
347          SA   0.152   0.207   0.207
348          SE    53.4      56      57
349          SQ       0       2       4       5       8      10      20      40
350          SE    53.4    54.0    54.3    54.5    54.9    55.1   53.48      57
             * ********************************************************************
             * PB Modification:
             * Add subbasin to represent flows from pavement of 64th St south
             * of Paiute Park and paved area between SRP substation and new
             * apartments. Area to be collected by large pipe in 64th St.
             * ********************************************************************

351          KK  S 64th   BASIN
352          BA   0.011
353          LS       0      79       0       0      83       0
354          UK     100   0.004     0.1      53
355          UK     100   0.008     0.1      47
356          RK    1430   0.004   0.015            TRAP      35       1

357          KK  050065   BASIN
358          BA   0.014
359          LS       0      79       0       0      98       0
360          UK     100    0.01     0.1      15
361          UK     100    0.01     0.1      85
362          RK     500   0.005   0.012            TRAP      60       1
             *
             * ********************************************************************
             * PB Modification:
             * Relocate hydrograph and subsequent route for Basin 050060
             * Combine separately to get peak flow in main pipe
             * ********************************************************************
             * KK050060   BASIN
             * BA 0.029
             * LS      0      79       0       0      98       0
             * UK    105    0.01     0.3      20
             * UK    160    0.01     0.1      80
             * RK   1300  0.0038    0.03            TRAP     100     1.0
             *
             * ********************************************************************
             * PB Modification:
             * Relocate hydrograph and subsequent route for Basin 050062
             * Modify pipe length to reflect storm drain route on 64th St
             * Insert hydrographs at this location
             * Revise basin area to 3.8 acres (0.0061 square miles)
             * ********************************************************************
```

```
363          KK  050062   BASIN
364          BA   0.0061
             * Original KH model had 2 BA cards. The 0.006 card was first, leaving
             * the 0.014 card to be used in the model.
             * BA 0.006
             * BA 0.014
365          LS       0      79       0       0      98       0
1                                      HEC-1 INPUT                                          PAGE 11

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

366          UK     100    0.01     0.3      15
367          UK      50    0.01     0.1      85
368          RK     900   0.005   0.012            TRAP      60       1

369          KK  050050   FROM 050062
370          RK    1000   0.002   0.013            CIRC     2.5       1
             *
             * Flows combined from 050040, 050305, revised 050310 and 050065
             * into main pipe above Paiute Park. PB- Add 050062 and S 64th
             *

371          KK  050050 COMBINE
372          KM   Peak flow in main pipe above Paiute Park
373          HC       6
             * Revise Hydrograph combine count from 5 to 6
             * Move Subbasin 050060 (Paiute Park) to combine here.

374          KK  050060   BASIN
375          BA   0.029
376          LS       0      79       0       0      98       0
377          UK     105    0.01     0.3      20
378          UK     160    0.01     0.1      80
379          RK    1300  0.0038    0.03            TRAP     100     1.0

380          KK  050050 COMBINE
381          KM   Paiute Park inflow
382          HC       2
             * ****************************************************************
             * PB Modification:
             * Revise Kimley-Horn stage/storage/discharge curve
             * Revisions based on iterative calculations which included effect of
             * Paiute Park discharges on downstream pipe system.
             * ****************************************************************
```

```
383          KK   05Det
384          KO       2
             * Original KH Curve
             * RS      1    STOR
             * SV      0    0.64    2.37    5.14    8.40    11.7    15.1    18.5    22.1
             *     22.1S
             * SE     49      50      51      52      53      54      55      56      57
             *        58
             * SQ    4.5      22      37      47      56      65      73      81      88
             *       156
             * Revised PB Curve
385          RS        1    STOR
386          SA     1.20    1.84    3.17    3.21    3.31    3.35    3.42    3.49
387          SE       50      51      52      53      54      55      56      57
388          SQ        0      20      40      60      80     100     120     140
389          SE       50    50.8   51.18   51.78   52.39   52.94   53.48   54.04
             *
             * Paiute Park outfall - 05Qpip is the outflow in the storm drain
             * 05Qspl is the flow overtopping the basin
             *
             *
             * Overflows to CP 050060
             *
1                                          HEC-1 INPUT                                    PAGE 12

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


390          KK  05Qpip
391          DT  05Qspl
392          DI        0     160     382     780    1292    1897
393          DQ        0    0.01     212     600    1102    1697
             *
             * Begin storm drain system in Osborn Road
             *
             * ***************************************************************
             * PB Modification:
             * Relocate hydrograph and subsequent route for Basin 050062
             * Remove hydrographs from this location
             * ***************************************************************
             * KK050062   BASIN
             * BA 0.006
             * BA 0.014
             * LS      0      79       0       0      98       0
             * UK    100    0.01     0.3      15
```

```
                * UK    50    0.01     0.1      85
                * RK   900   0.005   0.012            TRAP      60       1
                * KK050610   FROM 050062
                * RK  1500   0.003   0.013            TRAP      60       1

  394           KK  050610   BASIN
  395           BA   0.081
  396           LS       0      79       0       0      98       0
  397           UK     130  0.0100    0.32      56
  398           UK      70  0.0100    0.10      44
  399           RK    1450  0.0038    0.02            TRAP      45     1.0
  400           RK    1240  0.0033    0.02            TRAP      60     1.0
                * ***************************************************************
                * PB Modification:
                * Revise combine operation from 3 to 2 hydrographs due to hydrograph
                * relocation.
                * ***************************************************************

  401           KK  050610    COMBINE
  402           KM   OSBORN & PINTO
  403           HC       2

  404           KK  050620    FROM  050610
                * ***************************************************************
                * PB Modification
                * Revise pipe size in routing card to reflect PB preliminary design.
                * ***************************************************************
  405           RK    1050  0.0037   0.013            CIRC       5
                * RK  1050  0.0037   0.013            CIRC       6

  406           KK  050620   BASIN
  407           BA   0.099
  408           LS       0      79       0       0      98       0
  409           UK     147  0.0100    0.30      56
  410           UK      53  0.0100    0.10      44
  411           RK     940  0.0033    0.02            TRAP      41     1.0
  412           RK    2545  0.0038    0.02            TRAP      60     1.0
1                                      HEC-1 INPUT                                    PAGE 13

 LINE           ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10


  413           KK  050620 COMBINE
  414           KM   OSBORN & 68TH ST
  415           HC       2
```

```
KK  050630    FROM  050620
* ********************************************************************
* PB Modification
* Revise pipe size in routing card to reflect PB preliminary design.
* ********************************************************************
RK    1440  0.0028   0.013            CIRC       6
* RK  1440  0.0028   0.013            CIRC       7

KK  050630   BASIN
BA   0.062
LS       0      79       0       0      98       0
UK     138  0.0100    0.31      33
UK      64  0.0100    0.10      67
RK    1205  0.0038    0.02            TRAP      41     1.0
RK    1348  0.0033    0.02            TRAP      60     1.0

KK  050630 COMBINE
KM   OSBORN & 70TH ST
HC       2

KK  050640    FROM  050630
RK    1150  0.0024   0.013            CIRC       8
* ********************************************************************
* PB Modification:
* Move hydrograph from 050640 to combine with 050630 at this location
* Revise combine hydrograph operations as required.
* ********************************************************************

KK  050640   BASIN
BA   0.032
LS       0      79       0       0      98       0
UK      64  0.0100    0.37      15
UK     149  0.0100    0.10      85
RK    1605  0.0038    0.02            TRAP      41     1.0
RK    1168  0.0033    0.02            TRAP      60     1.0

KK  050640 COMBINE
KM   OSBORN & SCOTTSDALE
HC       2

KK  050710   BASIN
BA   0.005
LS       0      79       0       0      98       0
UK      21  0.0100    0.40      15
```

```
444          UK     200  0.0100    0.10      85
445          RK     610  0.0038    0.02            TRAP      55     1.0
1                                    HEC-1 INPUT                                    PAGE 14

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

446          KK  050720    FROM  050710
447          RK     316  0.0045   0.013           CIRC     5.5

448          KK  050720   BASIN
449          BA   0.028
450          LS       0      79       0       0      98       0
451          UK      57  0.0100    0.38      17
452          UK     188  0.0100    0.10      83
453          RK     580  0.0038    0.02            TRAP      45     1.0
454          RK    1594  0.0033    0.02            TRAP      55     1.0

455          KK  050720   COMBINE
456          HC       2

457          KK  050640    FROM  050720
458          RK     422  0.0045   0.013           CIRC     5.5
             * KK050640   BASIN
             * BA 0.032
             * LS      0      79       0       0      98       0
             * UK     64  0.0100    0.37      15
             * UK    149  0.0100    0.10      85
             * RK   1605  0.0038    0.02            TRAP      41     1.0
             * RK   1168  0.0033    0.02            TRAP      60     1.0

459          KK  050640 COMBINE
460          KM   OSBORN & SCOTTSDALE- PROJECT FLOWS: CONVEY THIS FLOW TO IBW
461          KM   EAST OF SCOTTSDALE ROAD
462          HC       2
             * ****************************************************************
             * PB Modification:
             * Original model routes flow from Scottsdale to Brown in 144" pipe
             * Revise order to route flow from Brown to Scottsdale in 48" pipe.
             * ****************************************************************
             * KK051510   FROM 050640
             * RK    700  0.0044   0.013           CIRC     9.5

463          KK  050810   BASIN
464          BA   0.013
```

```
465          LS       0      79       0       0      98       0
466          UK      88  0.0100    0.36      20
467          UK     200  0.0100    0.10      80
468          RK     164  0.0033    0.02            TRAP      28     1.0
469          RK    1031  0.0038    0.02            TRAP      55     1.0

470          KK  051510    FROM  050810
471          RK     705  0.0025   0.013            CIRC     4.0

472          KK  051510   BASIN
473          BA   0.010
474          LS       0      79       0       0      98       0
475          UK      59  0.0100    0.38      18
476          UK     200  0.0100    0.10      82
477          RK     139  0.0038    0.02            TRAP      41     1.0
478          RK     521  0.0033    0.02            TRAP      71     1.0
1                                      HEC-1 INPUT                                    PAGE 15

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


479          KK  051510    COMBINE
480          HC       2
             * Revise route and add HC card

481          KK  050640 FROM 051510                                                   KK
482          RK     700  0.0044   0.013            CIRC       4

483          KK  050640
484          KM   SCOTTSDALE AND OSBORN- ALL FLOWS
485          HC       2
             * ***************************************************************
             * PB Modification:
             * Add subbasins 050650, 050660 and 050910 to model. These subbasins
             * contribute flow to the Scottsdale Road system in the existing
             * condition. Modeling cards from KH HEC-1 model altC610.dat, 12/97
             * ***************************************************************

486          KK  050650   FROM 050640
             * Use equivalent 96-inch pipe to represent 45-inch waterline and
             * existing 84-inch storm drain.
             * RK    700  0.0029   0.013            CIRC       6
487          RK     700  0.0029   0.013            CIRC       8

488          KK  050910   BASIN
```

```
489          BA   0.012
490          LS       0      79       0       0      98       0
491          UK     170  0.0100    0.32      26
492          UK     200  0.0100    0.10      74
493          RK     837  0.0038    0.02            TRAP      38     1.0

494          KK  050650    FROM  050910
495          RK     751  0.0045   0.013            DEEP     5.0

496          KK  050650   BASIN
497          BA   0.019
498          LS       0      79       0       0      98       0
499          UK      29  0.0100    0.40      16
500          UK     200  0.0100    0.10      84
501          RK     598  0.0033    0.02            TRAP      23     1.0
502          RK     566  0.0038    0.02            TRAP      90     1.0

503          KK  050650 COMBINE
504          HC       3

505          KK  050660    FROM  050650
             * ****************************************************************
             * PB Modification
             * Revise pipe size in routing card to reflect PB preliminary design.
             * Use equivalent 100-inch pipe to represent 45-inch waterline and
             * existing 90-inch storm drain.
             * ****************************************************************
506          RK     700  0.0029   0.013            CIRC      8.4
             * RK   700  0.0029   0.013            CIRC      7.5
             * ****************************************************************
             * PB Modification:
             * Allow subbasin 050100 (71st St) to continue down Scottsdale Road.
             * Do not combine with pipe flows.
             * ****************************************************************
             * KK050100   BASIN
             * BA 0.034
             * LS     0      79       0       0      98       0
             * UK    20  0.0100    0.40       7
             * UK   200  0.0100    0.10      93
             * RK   505  0.0033    0.02            TRAP      30     1.0
             * RK  1727  0.0038    0.02            TRAP      23     1.0
1                                    HEC-1 INPUT                                    PAGE 16

     LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
```

```
507         KK  050660   BASIN
508         BA   0.018
509         LS       0      79       0       0      98       0
510         UK      20  0.0100    0.40      15
511         UK     200  0.0100    0.10      85
512         RK     578  0.0033    0.02            TRAP      49     1.0
513         RK     582  0.0038    0.02            TRAP      90     1.0
            * ********************************************************************
            * PB Modification:
            * Revise concentration point name to maintain consistency in model.
            * ********************************************************************

514         KK  050660 COMBINE
            * KK050650 COMBINE
515         HC       2
            * ********************************************************************
            * PB Modification:
            * Add diversion to split out flows which are conveyed in Scottsdale
            * Road storm drain in existing condition. Diversion transfers peak
            * flow of 344 cfs from 050640 (Osborn and Scottsdale) to Earll
            * and Scottsdale.
            * ********************************************************************

516         KK  SCOTTS
517         KM   SPLIT FLOW AT SCOTTSDALE AND EARLL
518         DT  EARLL
519         DI       0     594     863
520         DQ       0     344     500

521         KK  EARLL
522         DR  EARLL
            * ********************************************************************
            * PB Modification:
            * Collect flows east of Scottsdale Road into large pipe. Earll Drive
            * divides subbasin 50130.  Runoff generated north of Earll Drive to
            * be collected at Earll Drive.  New subbasin north of Earll to be
            * 050131. Add required combine and route cards. Modify routing card
            * from 050660. Revise KH routes from TRAP to CIRC.
            * ********************************************************************
            *

523         KK  050131   FROM 050660
            * KK051410   FROM 050660
            * KH routing card
```

```
                * RK  2640  0.0015   0.013           TRAP      16
  524           RK    1300  0.0015   0.013           CIRC       8

  525           KK  050131
                * BA 0.096
  526           BA   0.024
  527           LS       0      79       0       0      98       0
  528           UK      45  0.0100    0.38      15
  529           UK     171  0.0100    0.10      85
                * RK  1905  0.0038    0.02           TRAP      71     1.0
                * RK  1212  0.0033    0.02           TRAP      71     1.0
1                                     HEC-1 INPUT                                    PAGE 17

 LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  530           RK    1000   0.004    0.02           TRAP      71     1.0

  531           KK  050131   COMBINE
  532           HC       2

  533           KK  051410   FROM 050131
  534           KM   ROUTE FROM CIVIC CENTER TO MILLER
  535           RK    1300  0.0015   0.013           CIRC       8
                * ***************************************************************
                * PB Modification:
                * Add subbasin 051410 to model. Generates flow north and west of Miller
                * and Earll. Concentration point is at Miller and Earll. Use original
                * KH cards (from model altb610.dat) for subbasin. Route to Indian Bend
                * Wash.
                * ***************************************************************

  536           KK  051410   BASIN
  537           BA   0.072
  538           LS       0      79       0       0      98       0
  539           UK      64  0.0100    0.37       9
  540           UK     150  0.0100    0.10      91
  541           RK    1170  0.0033    0.02           TRAP      38     1.0
  542           RK    1180  0.0038    0.02           TRAP      55     1.0

  543           KK  051410    COMBINE
  544           HC       2
                *
                * EARLL DR OUTFALL TO INDIAN BEND WASH
                *
                * ***************************************************************
```

```
* PB Modification:
* Revise route to reflect storm drain from Miller to IBW
* Use 105-inch pipe to represent 10' x 6' box culvert.
* ********************************************************************

545     KK  051420    FROM  051410
        * RK  1460   0.0015   0.013            TRAP       14
546     RK    1300  0.0015   0.013           CIRC       8
        * ********************************************************************
        * PB Modification:
        * Remove hydrographs below this point. No additional inflow to
        * proposed system east of Scottsdale Road. Subbasins 050710, 050720,
        * 051510 and 050810 conveyed to Scottsdale Road by ADOT 66" and
        * Brown Road lateral.
        * ********************************************************************
        * KK051520    FROM  051510
        * RK   680  0.0028   0.013            CIRC     9.5
        * KK051610   BASIN
        * BA 0.021
        * LS     0      79       0       0      98       0
        * UK   165  0.0100    0.32      25
        * UK   200  0.0100    0.10      75
        * RK   624  0.0038    0.02            TRAP      41     1.0
        * RK   792  0.0033    0.02            TRAP      60     1.0
        * KK051520    FROM  051610
        * RK   601  0.0047   0.013            CIRC     5.0
        * KK051710   BASIN
        * BA 0.004
        * LS     0      79       0       0      98       0
        * UK   146  0.0100    0.33      24
        * UK   200  0.0100    0.10      76
        * RK   515  0.0038    0.02            TRAP      30     1.0
        * RK   287  0.0033    0.02            TRAP      30     1.0
        * KK051520    FROM  051710
        * RK   567  0.0032   0.013            CIRC     4.0
        * KK051520   BASIN
        * BA 0.023
        * LS     0      79       0       0      98       0
        * UK   179  0.0100    0.31      26
        * UK   198  0.0100    0.10      74
        * RK   473  0.0038    0.02            TRAP      60     1.0
        * RK   704  0.0033    0.02            TRAP      71     1.0
        * KK051520 COMBINE
        * HC     4
        * KK051530    FROM  051520
```

```
* RK   926   0.001   0.013            CIRC     9.5
* KK051530   BASIN
* BA 0.041
* LS     0      79       0       0      98       0
* UK    26  0.0100    0.40      15
* UK   193  0.0100    0.10      85
* RK   889  0.0038    0.02            TRAP     38     1.0
* RK   860  0.0033    0.02            TRAP     60     1.0
* KK051530 COMBINE
* HC     2
* KK051540    FROM  051530
* RK   360   0.001   0.013            CIRC     9.5
* KK051810   BASIN
* BA 0.005
* LS     0      79       0       0      98       0
* UK    23  0.0100    0.40      16
* UK   196  0.0100    0.10      84
* RK   272  0.0033    0.02            TRAP     19     1.0
* RK   272  0.0038    0.02            TRAP     30     1.0
* KK051540    FROM  051810
* RK   218  0.0045   0.013            CIRC     4.5
* KK051540   BASIN
* BA 0.004
* LS     0      79       0       0      98       0
* UK    44  0.0100    0.38      16
* UK   172  0.0100    0.10      84
* RK   233  0.0038    0.02            TRAP     12     1.0
* RK   265  0.0033    0.02            TRAP     60     1.0
* KK051540 COMBINE
* HC     3
* KK051550    FROM  051540
* RK   273   0.001   0.013            TRAP     8.0    1.0
* KK  05EX
* DT 05PRK
* DI     0   246.1    1000
* DQ     0     246     246
* KK051560    FROM  051550
* RK   800  0.0038   0.013            CIRC     7.0
* *
* * Osborn Rd outfall to Indian Bend Wash
* *
* KK051570    FROM  051560
* RK   228   0.003   0.013            CIRC     7.0
* *
* * Osborn Park Storage and Outflow to IBW
```

```
* *
* KK051550
* DR 05PRK
* KK051560   BASIN
* BA 0.008
* LS     0      79       0       0      98       0
* UK   116  0.0100    0.33      47
* UK    89  0.0100    0.10      53
* RK  1126  0.0033    0.02            TRAP      60     1.0
* KK   PRK
* HC     2
* KK05PKST   STORAGE
* RS     1    STOR
* SV     0    0.08    0.31    0.69    1.20    1.92    3.01    3.01
* SE  1224    1225    1226    1227    1228    1229    1230    1231
* SQ     0    0.01      62     111     167     218     262     600
*
* New CP 051565 located at the outfall from Osborn Park to IBW
*
* KK051565    FROM   05PRK
* RK   130   0.003   0.013            TRAP       7
*
* Notice:
* This document, together with the concepts and designs presented herein, as an
* instrument of service, is intended for the specific purpose and client for
* which it was prepared.  Reuse of and improper reliance on this document
* without written authorization and adaptation by Kimley-Horn and Associates,
* Inc. shall be without liability to Kimley-Horn and Associates, Inc.
*
1                                        HEC-1 INPUT                                    PAGE 18

          LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

           547          ZZ
1
               SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    58      070808
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                 .
    66           .-------->  808OUT
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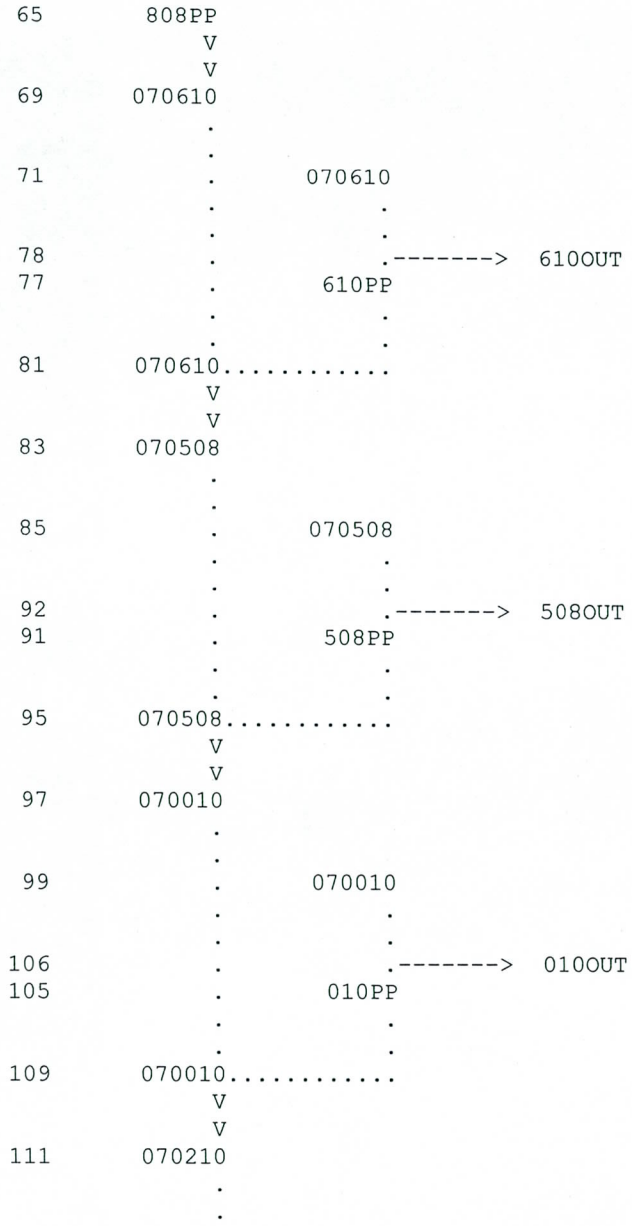
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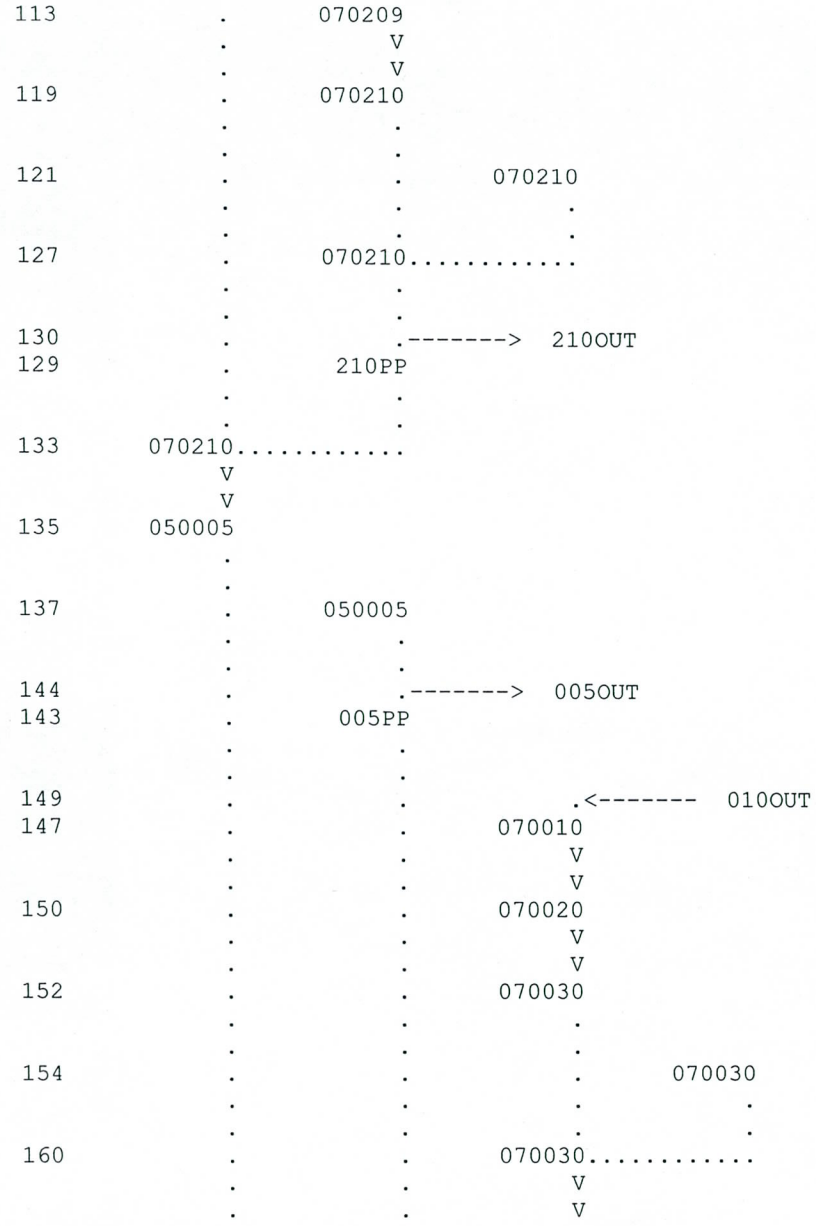
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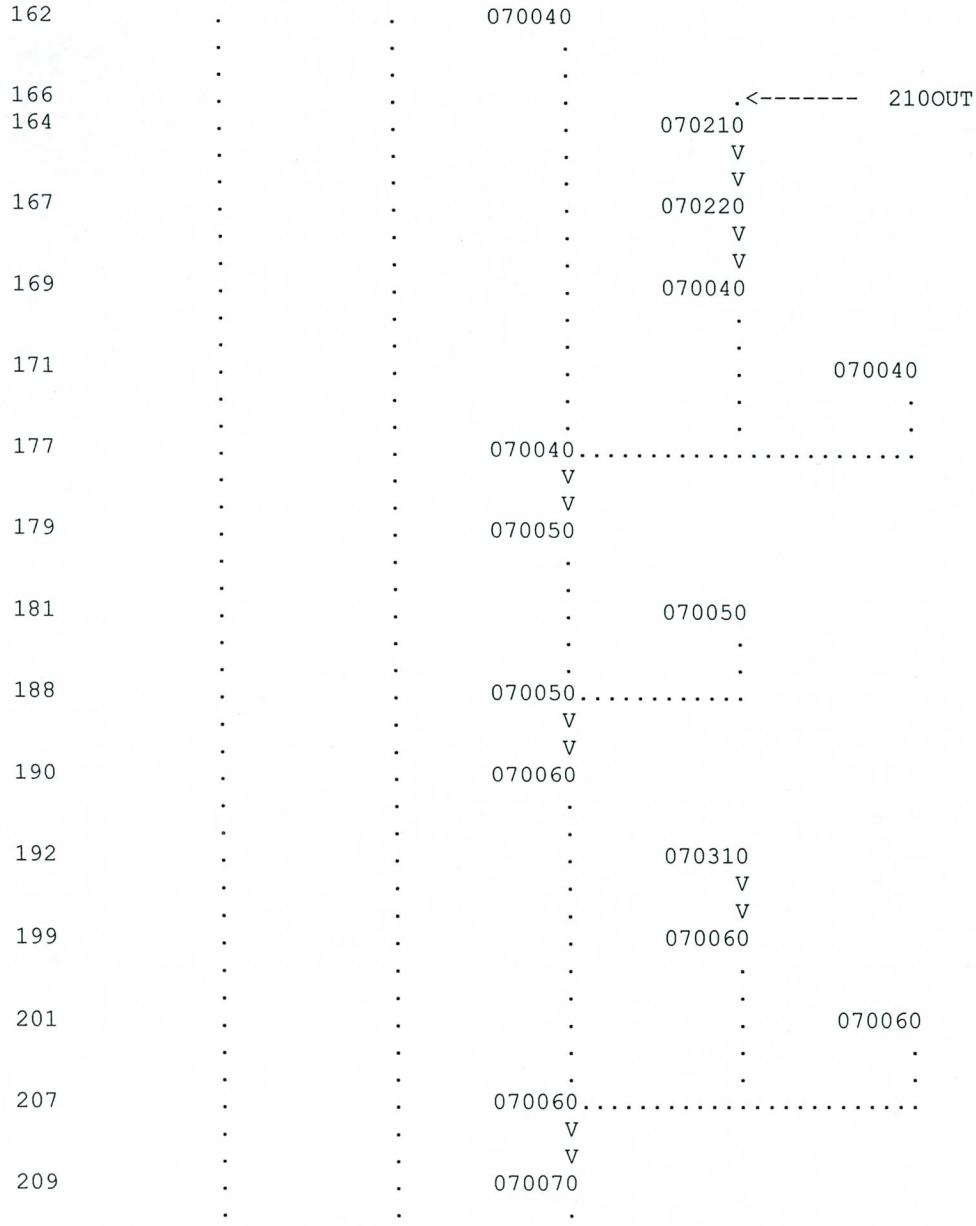
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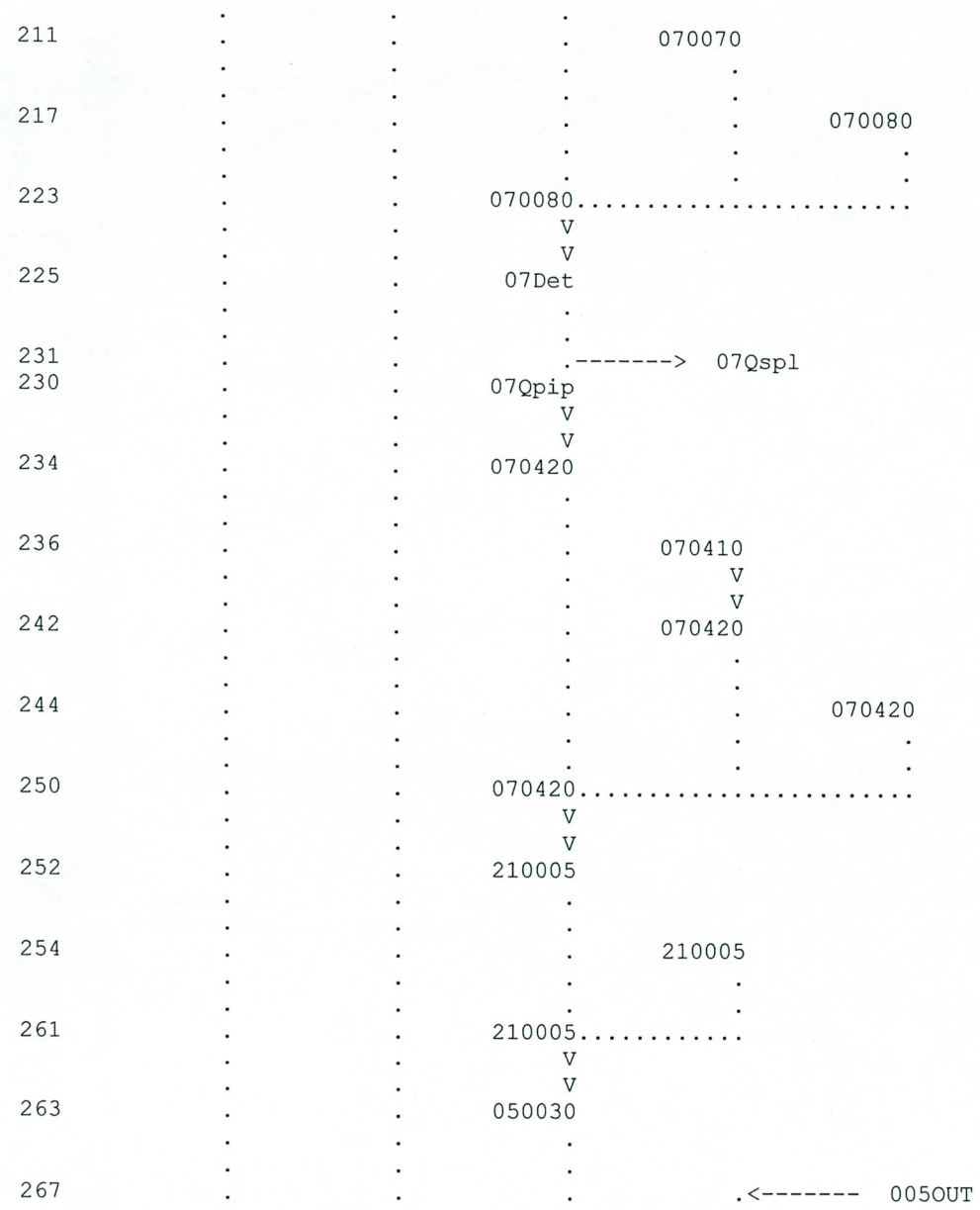
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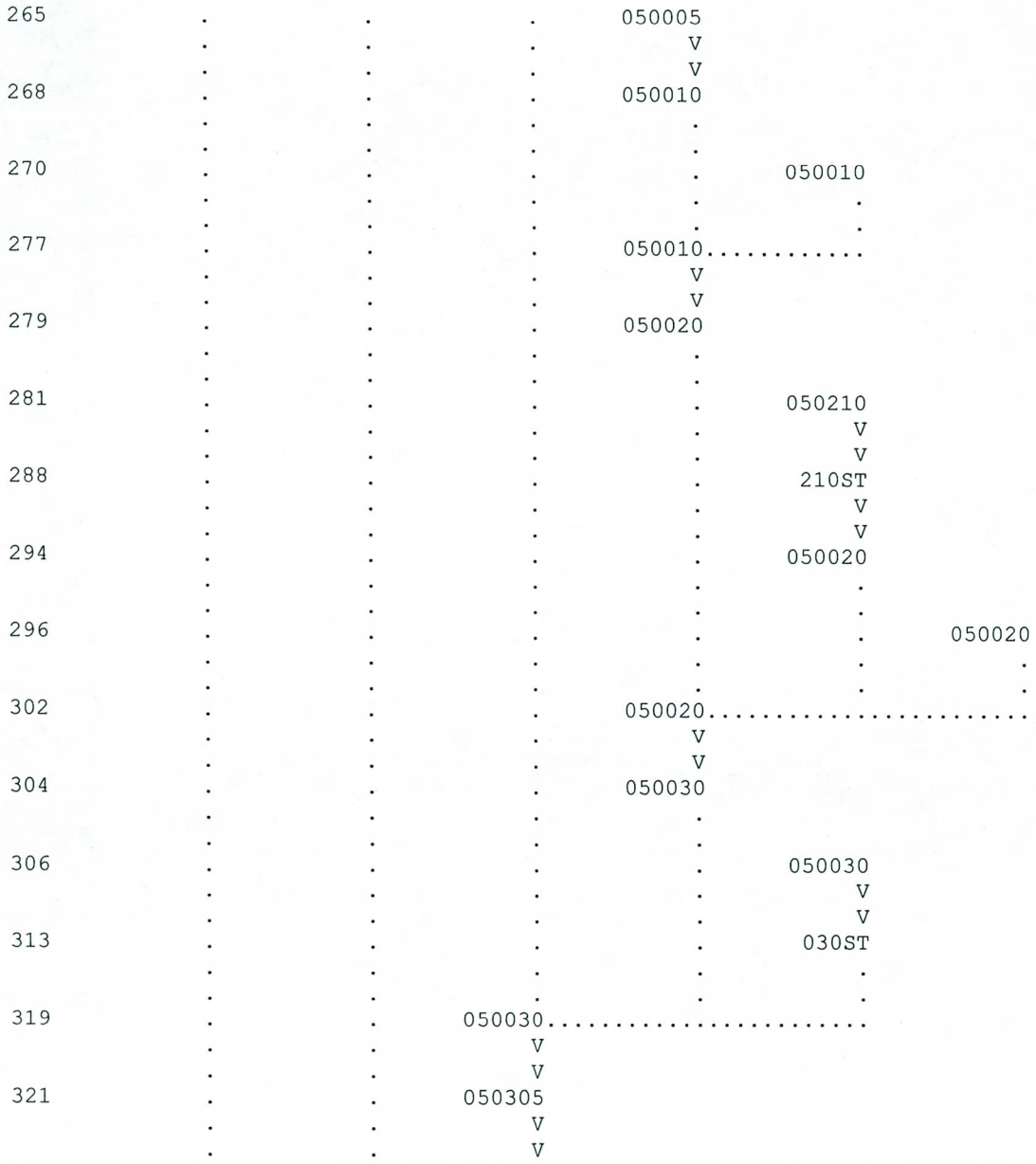
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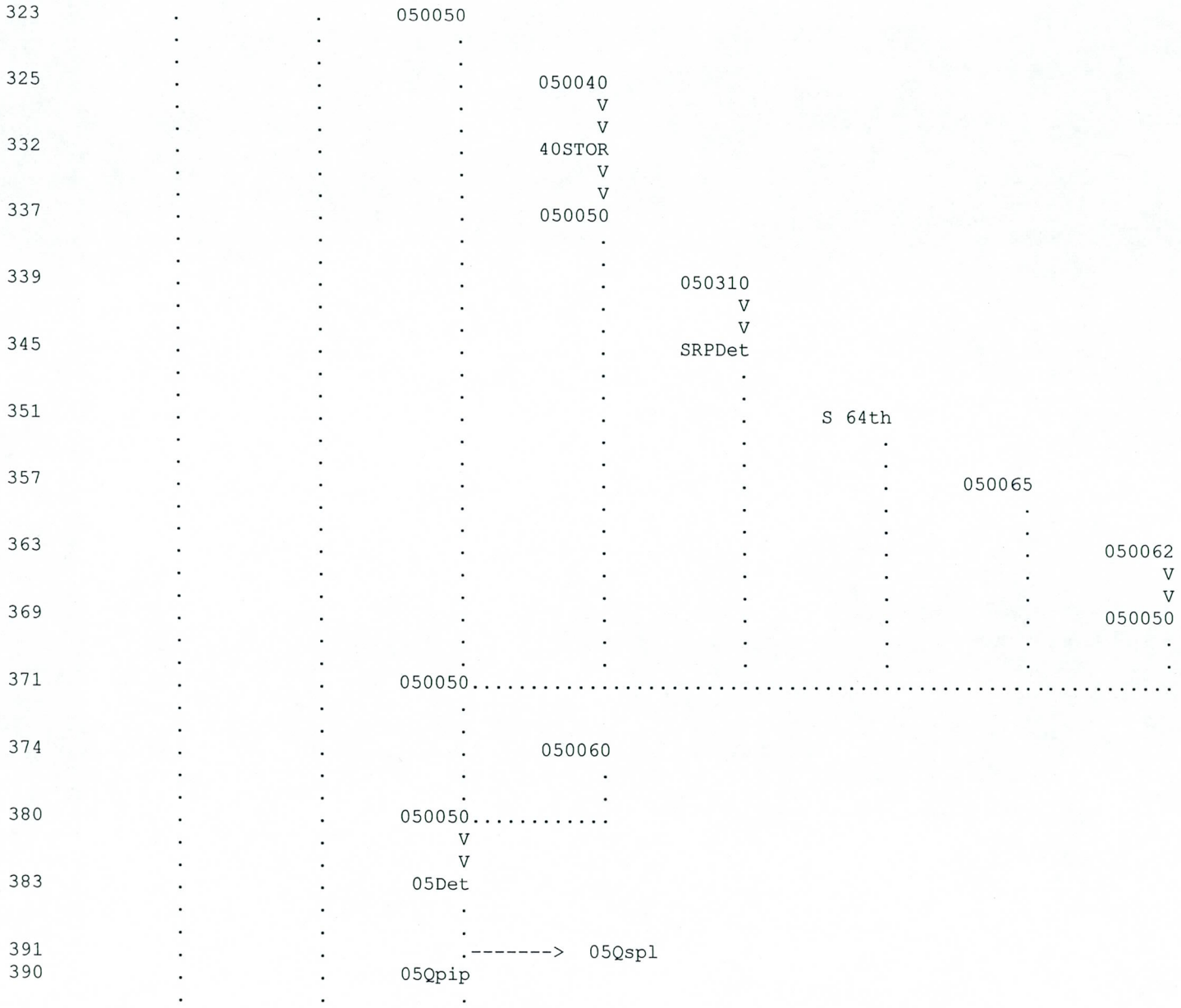
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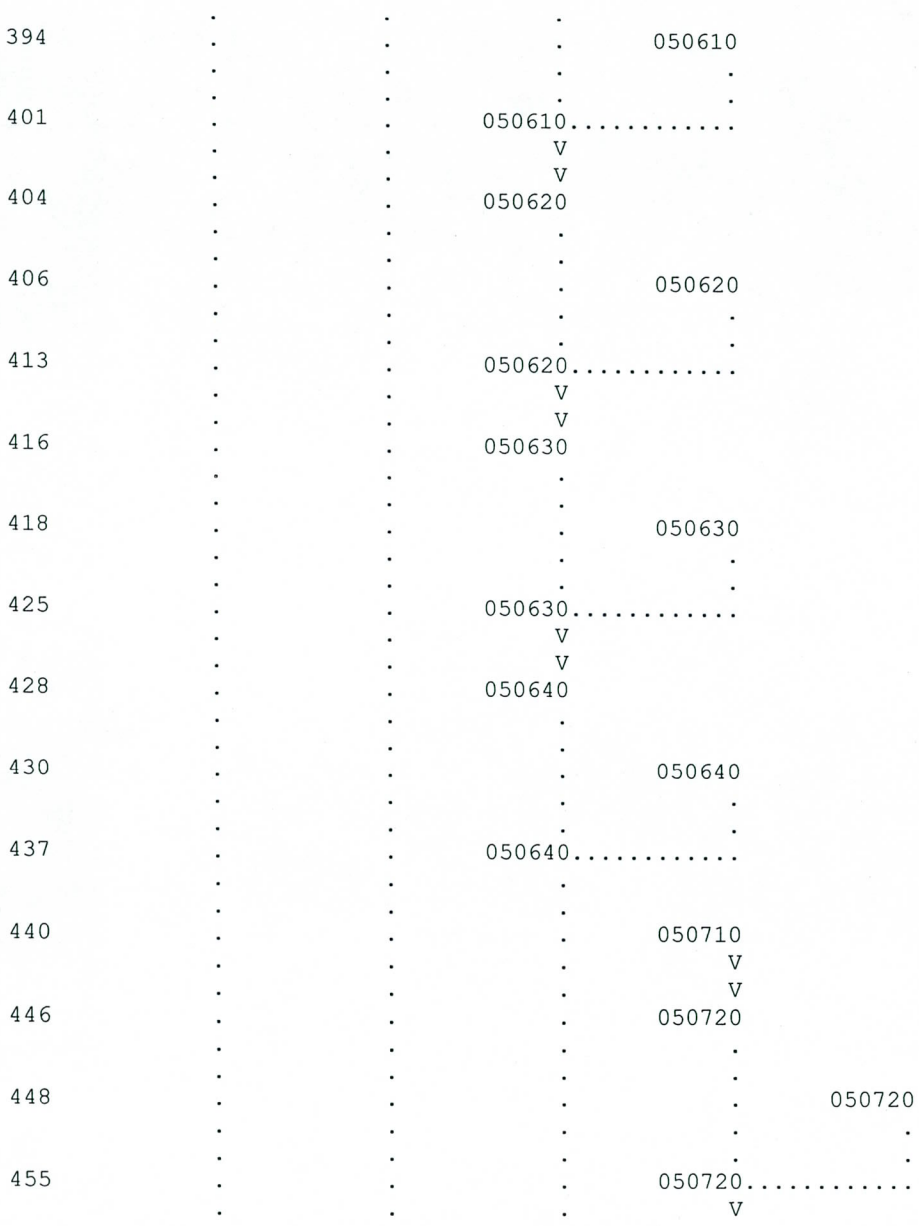
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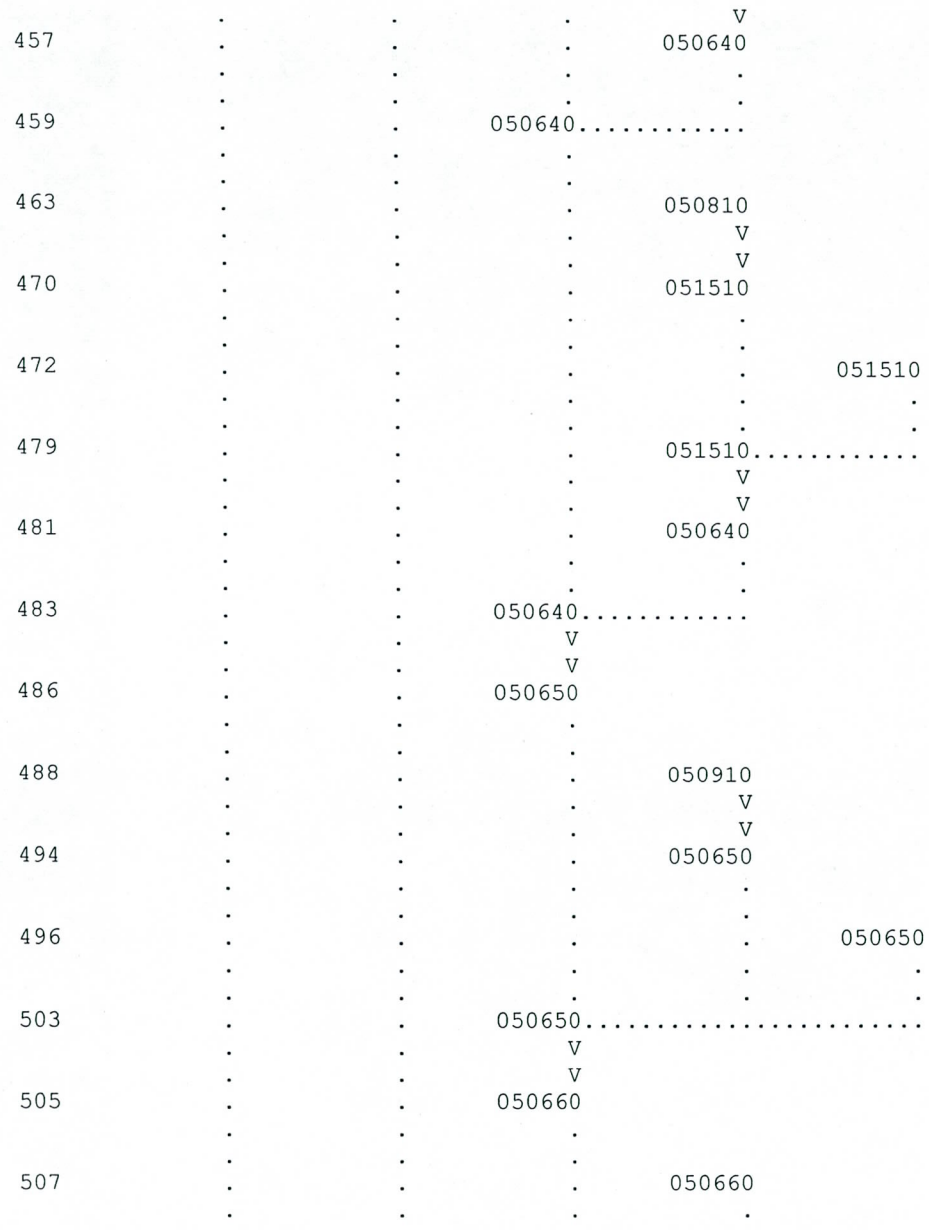
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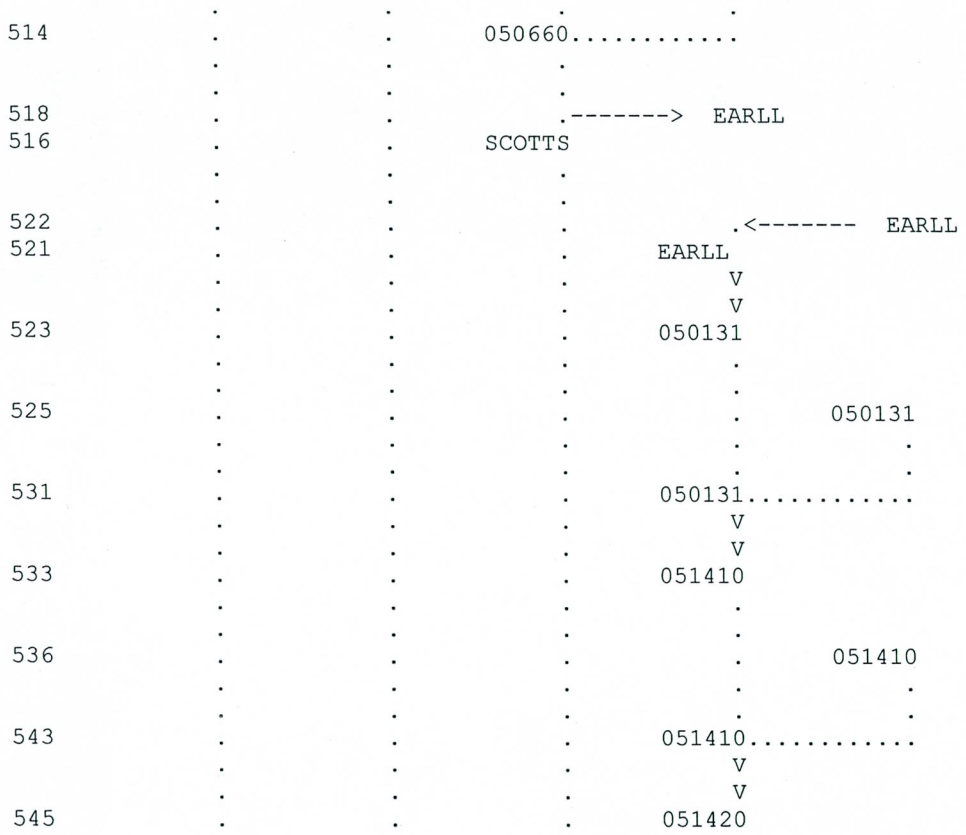

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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 *               MAY   1991              *
 *            VERSION 4.0.1E             *
 *     Lahey F77L-EM/32 version 5.01     *
 *       Dodson & Associates, Inc.       *
 *  RUN DATE  05/05/99  TIME  06:29:00   *
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```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 551-1748              *
*                                       *
*****************************************
```

```
**************************************************************************
STP-PAPAGO REGIONAL FLOOD CONTROL PROJECT
SCOTTSDALE - TEMPE - PHOENIX
**************************************************************************

Kimley-Horn and Associates, Inc.
KVL Consultants, Inc.

10-Year, 6-Hour Storm Event
10/97

PARSONS BRINCKERHOFF MODIFICATIONS TO ORIGINAL KIMLEY HORN MODEL
PARSONS BRINCKERHOFF FILE NAME: PBALTC.DAT
ALTERNATIVE C- OSBORN TO SCOTTSDALE TO EARLL TO INDIAN BEND WASH

FILE MODIFIED BY PARSONS BRINCKERHOFF TO BE USED IN DESIGN OF OSBORN OUTFALL

MODIFICATIONS TO PB FILE PBALTA.DAT:
1) MODIFY PARSONS BRINCKERHOFF FILE PBALTA.DAT. USE MODEL FOR ROUTING DOWN
   SCOTTSDALE ROAD IN EXISTING PIPE.
2) NO INFLOW TO STORM DRAIN SYSTEM EAST OF SCOTTSDALE ROAD.
3) ADD SUBBASINS 050650, 050660 AND 050910 TO MODEL. THESE CONTRIBUTE FLOW
   TO THE EXISTING STORM DRAIN IN SCOTTSDALE ROAD. ORIGINAL MODELING CARDS
   FROM K-H MODEL ALTC610.DAT, 12/97
4) ADD K-H HYDROGRAPH CARDS FOR SUBBASINS 050130 AND 051410(ORIGINAL KH MODE
   ALTB610.DAT).  REVISE AREA OF 050130 AND INSERT CONCENTRATION
   POINT AT EARLL AND CIVIC CENTER. HYDROGRAPHS NEEDED TO DETERMINE FLOW
   EAST OF SCOTTSDALE ROAD.
5) ADD DIVERSION IN SCOTTSDALE ROAD AT EARLL. ASSUME JUNCTION STRUCTURE THAT
   ALLOWS FLOWS CONVEYED BY SCOTTSDALE ROAD STORM DRIAN TO CONTINUE IN
   SCOTTSDALE ROAD STORM DRAIN. PROPOSED SYSTEM TO CONVEY FLOWS COLLECTED
   UPSTRWEAM FROM 71ST PLACE AND FROM PAIUTE PARK. COLLECT ADDITIONAL FLOW
   EAST OF SCOTTSDALE ROAD.
6) REVISE PIPE SIZES IN ROUTE CARDS TO REFLECT PB PRELIMINARY DESIGN

MODIFICATIONS TO ORIGINAL K-H MODEL:
1) SUBBASIN 050062 REROUTED DIRECTLY TO PAIUTE PARK- IMPROVEMENTS TO 64TH ST
   CONVEY FLOW TO DETENTION BASIN. AREA REDUCED TO 3.9 ACRES (0.0061 SM)
2) PAIUTE PARK STAGE/DISCHARGE CURVE ADJUSTED
3) SUBBASINS CONTRIBUTING TO 66" ADOT PIPE AND CONCENTRATION POINT 051510
   (BROWN ROAD) ROUTED TO EXISTING PIPE IN SCOTTSDALE ROAD(SUBBASINS 050710,
   050720, 051510 AND 050810).
4) REVISE AREA OF SUBBASIN 050310 FROM 0.041 SM TO 0.0063 SM.AND ROUTE TO
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                  EXISTING DETENTION BASIN. REMAINING AREA IS SRP PROPERTY WHICH DRAINS
                  WEST.
                  AREA REDUCTION DUE TO:
                  REMOVE APARTMENTS AT THOMAS AND 64TH ST DUE TO ON-SITE RETENTION.
                  REMOVE PORTION OF SRP SUBSTATION WHICH DRAINS EAST.
                  COLLECT PAVEMENT FLOWS FROM 64TH ST (THOMAS TO PAIUTE PARK) IN LARGE PIPE
                  COLLECT FLOWS FROM PAVED AREA BETWEEN SUBSTATION AND APARTMENTS IN LARGE
                  PIPE

               Parsons Brinckerhoff
               Alan Humphrey
               5/5/99

  57 IO        OUTPUT CONTROL VARIABLES
                     IPRNT           5  PRINT CONTROL
                     IPLOT           0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

     IT        HYDROGRAPH TIME DATA
                      NMIN           2  MINUTES IN COMPUTATION INTERVAL
                     IDATE      1    0  STARTING DATE
                     ITIME        0000  STARTING TIME
                        NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE      1    0  ENDING DATE
                    NDTIME        0958  ENDING TIME
                     ICENT          19  CENTURY MARK

                 COMPUTATION INTERVAL    0.03 HOURS
                      TOTAL TIME BASE    9.97 HOURS

         ENGLISH UNITS
              DRAINAGE AREA          SQUARE MILES
              PRECIPITATION DEPTH    INCHES
              LENGTH, ELEVATION      FEET
              FLOW                   CUBIC FEET PER SECOND
              STORAGE VOLUME         ACRE-FEET
              SURFACE AREA           ACRES
              TEMPERATURE            DEGREES FAHRENHEIT


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          *            *
383 KK    *     05Det  *
          *            *
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384 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          2  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

              HYDROGRAPH ROUTING DATA

385 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       STOR  TYPE OF INITIAL CONDITION
                     RSVRIC       0.00  INITIAL CONDITION
                          X       0.00 WORKING R AND D COEFFICIENT

386 SA            AREA        1.2      1.8      3.2      3.2      3.3      3.3      3.4      3.5

387 SE          ELEVATION     50.00    51.00    52.00    53.00    54.00    55.00    56.00    57.00

388 SQ          DISCHARGE      0.       20.      40.      60.      80.      100.     120.     140.

389 SE          ELEVATION     50.00    50.80    51.18    51.78    52.39    52.94    53.48    54.04

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                                   COMPUTED STORAGE-ELEVATION DATA

            STORAGE      0.00     1.51     3.98     7.17    10.43    13.76    17.15    20.60
          ELEVATION     50.00    51.00    52.00    53.00    54.00    55.00    56.00    57.00

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

            STORAGE      0.00     1.15     1.51     1.86     3.32     3.98     5.22     6.98     7.17     8.73
            OUTFLOW      0.00    20.00    30.53    40.00    60.00    67.21    80.00   100.00   102.22   120.00
          ELEVATION     50.00    50.80    51.00    51.18    51.78    52.00    52.39    52.94    53.00    53.48

            STORAGE     10.43    10.57    13.76    17.15    20.60
            OUTFLOW    138.57   140.00   174.29   210.00   245.71
          ELEVATION     54.00    54.04    55.00    56.00    57.00

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HYDROGRAPH AT STATION 05Det

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	0.0	50.0	1		0320	101	79.	5.2	52.4	1		0640	201	28.	1.4	50.9
1		0002	2	1.	0.1	50.0	1		0322	102	84.	5.6	52.5	1		0642	202	27.	1.4	50.9
1		0004	3	1.	0.1	50.0	1		0324	103	89.	6.0	52.6	1		0644	203	25.	1.3	50.9
1		0006	4	1.	0.1	50.0	1		0326	104	93.	6.4	52.7	1		0646	204	24.	1.3	50.9
1		0008	5	1.	0.1	50.0	1		0328	105	96.	6.7	52.8	1		0648	205	23.	1.3	50.9
1		0010	6	1.	0.0	50.0	1		0330	106	100.	6.9	52.9	1		0650	206	22.	1.2	50.8
1		0012	7	1.	0.0	50.0	1		0332	107	102.	7.2	53.0	1		0652	207	21.	1.2	50.8
1		0014	8	1.	0.0	50.0	1		0334	108	105.	7.4	53.1	1		0654	208	21.	1.2	50.8
1		0016	9	1.	0.0	50.0	1		0336	109	107.	7.6	53.1	1		0656	209	20.	1.1	50.8
1		0018	10	1.	0.0	50.0	1		0338	110	109.	7.8	53.2	1		0658	210	19.	1.1	50.8
1		0020	11	1.	0.0	50.0	1		0340	111	111.	7.9	53.2	1		0700	211	19.	1.1	50.8
1		0022	12	1.	0.0	50.0	1		0342	112	112.	8.0	53.3	1		0702	212	18.	1.1	50.7
1		0024	13	1.	0.0	50.0	1		0344	113	113.	8.1	53.3	1		0704	213	18.	1.0	50.7
1		0026	14	1.	0.0	50.0	1		0346	114	114.	8.2	53.3	1		0706	214	18.	1.0	50.7
1		0028	15	1.	0.0	50.0	1		0348	115	115.	8.3	53.4	1		0708	215	17.	1.0	50.7
1		0030	16	1.	0.0	50.0	1		0350	116	116.	8.4	53.4	1		0710	216	17.	1.0	50.7
1		0032	17	1.	0.0	50.0	1		0352	117	116.	8.4	53.4	1		0712	217	16.	0.9	50.7
1		0034	18	0.	0.0	50.0	1		0354	118	117.	8.4	53.4	1		0714	218	16.	0.9	50.6
1		0036	19	0.	0.0	50.0	1		0356	119	117.	8.5	53.4	1		0716	219	16.	0.9	50.6
1		0038	20	0.	0.0	50.0	1		0358	120	117.	8.5	53.4	1		0718	220	15.	0.9	50.6
1		0040	21	0.	0.0	50.0	1		0400	121	117.	8.5	53.4	1		0720	221	15.	0.9	50.6
1		0042	22	0.	0.0	50.0	1		0402	122	117.	8.5	53.4	1		0722	222	14.	0.8	50.6
1		0044	23	0.	0.0	50.0	1		0404	123	117.	8.5	53.4	1		0724	223	14.	0.8	50.6
1		0046	24	0.	0.0	50.0	1		0406	124	117.	8.5	53.4	1		0726	224	14.	0.8	50.5
1		0048	25	0.	0.0	50.0	1		0408	125	117.	8.4	53.4	1		0728	225	13.	0.8	50.5
1		0050	26	0.	0.0	50.0	1		0410	126	116.	8.4	53.4	1		0730	226	13.	0.7	50.5
1		0052	27	0.	0.0	50.0	1		0412	127	116.	8.4	53.4	1		0732	227	13.	0.7	50.5
1		0054	28	0.	0.0	50.0	1		0414	128	116.	8.3	53.4	1		0734	228	12.	0.7	50.5
1		0056	29	0.	0.0	50.0	1		0416	129	115.	8.3	53.3	1		0736	229	12.	0.7	50.5
1		0058	30	0.	0.0	50.0	1		0418	130	115.	8.3	53.3	1		0738	230	12.	0.7	50.5
1		0100	31	0.	0.0	50.0	1		0420	131	114.	8.2	53.3	1		0740	231	11.	0.7	50.5
1		0102	32	0.	0.0	50.0	1		0422	132	114.	8.2	53.3	1		0742	232	11.	0.6	50.4
1		0104	33	0.	0.0	50.0	1		0424	133	113.	8.1	53.3	1		0744	233	11.	0.6	50.4
1		0106	34	0.	0.0	50.0	1		0426	134	112.	8.1	53.3	1		0746	234	11.	0.6	50.4
1		0108	35	0.	0.0	50.0	1		0428	135	112.	8.0	53.3	1		0748	235	10.	0.6	50.4
1		0110	36	0.	0.0	50.0	1		0430	136	111.	8.0	53.2	1		0750	236	10.	0.6	50.4
1		0112	37	0.	0.0	50.0	1		0432	137	111.	7.9	53.2	1		0752	237	10.	0.6	50.4
1		0114	38	0.	0.0	50.0	1		0434	138	110.	7.8	53.2	1		0754	238	9.	0.5	50.4
1		0116	39	0.	0.0	50.0	1		0436	139	109.	7.8	53.2	1		0756	239	9.	0.5	50.4

1	0118	40	0.	0.0	50.0 * 1	0438 140	108.	7.7	53.2 * 1	0758 240	9.	0.5	50.4
1	0120	41	0.	0.0	50.0 * 1	0440 141	108.	7.7	53.2 * 1	0800 241	9.	0.5	50.4
1	0122	42	0.	0.0	50.0 * 1	0442 142	107.	7.6	53.1 * 1	0802 242	9.	0.5	50.3
1	0124	43	0.	0.0	50.0 * 1	0444 143	105.	7.4	53.1 * 1	0804 243	8.	0.5	50.3
1	0126	44	0.	0.0	50.0 * 1	0446 144	104.	7.3	53.0 * 1	0806 244	8.	0.5	50.3
1	0128	45	0.	0.0	50.0 * 1	0448 145	102.	7.2	53.0 * 1	0808 245	8.	0.5	50.3
1	0130	46	0.	0.0	50.0 * 1	0450 146	101.	7.1	53.0 * 1	0810 246	8.	0.4	50.3
1	0132	47	0.	0.0	50.0 * 1	0452 147	99.	6.9	52.9 * 1	0812 247	7.	0.4	50.3
1	0134	48	0.	0.0	50.0 * 1	0454 148	98.	6.8	52.9 * 1	0814 248	7.	0.4	50.3
1	0136	49	0.	0.0	50.0 * 1	0456 149	97.	6.7	52.8 * 1	0816 249	7.	0.4	50.3
1	0138	50	0.	0.0	50.0 * 1	0458 150	95.	6.5	52.8 * 1	0818 250	7.	0.4	50.3
1	0140	51	0.	0.0	50.0 * 1	0500 151	93.	6.4	52.8 * 1	0820 251	7.	0.4	50.3
1	0142	52	0.	0.0	50.0 * 1	0502 152	92.	6.3	52.7 * 1	0822 252	7.	0.4	50.3
1	0144	53	0.	0.0	50.0 * 1	0504 153	90.	6.1	52.7 * 1	0824 253	6.	0.4	50.3
1	0146	54	0.	0.0	50.0 * 1	0506 154	89.	6.0	52.6 * 1	0826 254	6.	0.4	50.2
1	0148	55	0.	0.0	50.0 * 1	0508 155	87.	5.9	52.6 * 1	0828 255	6.	0.4	50.2
1	0150	56	0.	0.0	50.0 * 1	0510 156	86.	5.7	52.5 * 1	0830 256	6.	0.3	50.2
1	0152	57	0.	0.0	50.0 * 1	0512 157	84.	5.6	52.5 * 1	0832 257	6.	0.3	50.2
1	0154	58	0.	0.0	50.0 * 1	0514 158	83.	5.5	52.5 * 1	0834 258	6.	0.3	50.2
1	0156	59	0.	0.0	50.0 * 1	0516 159	81.	5.3	52.4 * 1	0836 259	5.	0.3	50.2
1	0158	60	0.	0.0	50.0 * 1	0518 160	80.	5.2	52.4 * 1	0838 260	5.	0.3	50.2
1	0200	61	0.	0.0	50.0 * 1	0520 161	78.	5.1	52.3 * 1	0840 261	5.	0.3	50.2
1	0202	62	0.	0.0	50.0 * 1	0522 162	77.	4.9	52.3 * 1	0842 262	5.	0.3	50.2
1	0204	63	0.	0.0	50.0 * 1	0524 163	76.	4.8	52.3 * 1	0844 263	5.	0.3	50.2
1	0206	64	0.	0.0	50.0 * 1	0526 164	74.	4.7	52.2 * 1	0846 264	5.	0.3	50.2
1	0208	65	0.	0.0	50.0 * 1	0528 165	73.	4.5	52.2 * 1	0848 265	5.	0.3	50.2
1	0210	66	0.	0.0	50.0 * 1	0530 166	72.	4.4	52.1 * 1	0850 266	5.	0.3	50.2
1	0212	67	0.	0.0	50.0 * 1	0532 167	70.	4.3	52.1 * 1	0852 267	4.	0.3	50.2
1	0214	68	0.	0.0	50.0 * 1	0534 168	69.	4.2	52.1 * 1	0854 268	4.	0.2	50.2
1	0216	69	0.	0.0	50.0 * 1	0536 169	68.	4.0	52.0 * 1	0856 269	4.	0.2	50.2
1	0218	70	0.	0.0	50.0 * 1	0538 170	67.	3.9	52.0 * 1	0858 270	4.	0.2	50.2
1	0220	71	0.	0.0	50.0 * 1	0540 171	65.	3.8	51.9 * 1	0900 271	4.	0.2	50.2
1	0222	72	0.	0.0	50.0 * 1	0542 172	64.	3.7	51.9 * 1	0902 272	4.	0.2	50.2
1	0224	73	0.	0.0	50.0 * 1	0544 173	63.	3.6	51.9 * 1	0904 273	4.	0.2	50.2
1	0226	74	0.	0.0	50.0 * 1	0546 174	62.	3.5	51.8 * 1	0906 274	4.	0.2	50.1
1	0228	75	0.	0.0	50.0 * 1	0548 175	60.	3.4	51.8 * 1	0908 275	4.	0.2	50.1
1	0230	76	1.	0.0	50.0 * 1	0550 176	59.	3.3	51.8 * 1	0910 276	4.	0.2	50.1
1	0232	77	1.	0.0	50.0 * 1	0552 177	58.	3.2	51.7 * 1	0912 277	3.	0.2	50.1
1	0234	78	1.	0.0	50.0 * 1	0554 178	56.	3.1	51.7 * 1	0914 278	3.	0.2	50.1
1	0236	79	1.	0.0	50.0 * 1	0556 179	55.	3.0	51.6 * 1	0916 279	3.	0.2	50.1
1	0238	80	1.	0.0	50.0 * 1	0558 180	54.	2.9	51.6 * 1	0918 280	3.	0.2	50.1
1	0240	81	1.	0.1	50.0 * 1	0600 181	52.	2.8	51.6 * 1	0920 281	3.	0.2	50.1
1	0242	82	1.	0.1	50.0 * 1	0602 182	51.	2.7	51.5 * 1	0922 282	3.	0.2	50.1
1	0244	83	1.	0.1	50.1 * 1	0604 183	50.	2.6	51.5 * 1	0924 283	3.	0.2	50.1
1	0246	84	2.	0.1	50.1 * 1	0606 184	49.	2.5	51.4 * 1	0926 284	3.	0.2	50.1

1	0248	85	2.	0.1	50.1 *	1	0608	185	48.	2.4	51.4 *	1	0928	285	3.	0.2	50.1
1	0250	86	3.	0.1	50.1 *	1	0610	186	47.	2.3	51.4 *	1	0930	286	3.	0.2	50.1
1	0252	87	3.	0.2	50.1 *	1	0612	187	46.	2.3	51.3 *	1	0932	287	3.	0.2	50.1
1	0254	88	4.	0.2	50.2 *	1	0614	188	45.	2.2	51.3 *	1	0934	288	3.	0.2	50.1
1	0256	89	5.	0.3	50.2 *	1	0616	189	44.	2.1	51.3 *	1	0936	289	3.	0.1	50.1
1	0258	90	6.	0.4	50.3 *	1	0618	190	43.	2.0	51.3 *	1	0938	290	2.	0.1	50.1
1	0300	91	8.	0.5	50.3 *	1	0620	191	42.	2.0	51.2 *	1	0940	291	2.	0.1	50.1
1	0302	92	11.	0.7	50.5 *	1	0622	192	41.	1.9	51.2 *	1	0942	292	2.	0.1	50.1
1	0304	93	16.	0.9	50.6 *	1	0624	193	39.	1.8	51.2 *	1	0944	293	2.	0.1	50.1
1	0306	94	23.	1.3	50.9 *	1	0626	194	38.	1.8	51.1 *	1	0946	294	2.	0.1	50.1
1	0308	95	34.	1.7	51.1 *	1	0628	195	36.	1.7	51.1 *	1	0948	295	2.	0.1	50.1
1	0310	96	44.	2.1	51.3 *	1	0630	196	34.	1.7	51.1 *	1	0950	296	2.	0.1	50.1
1	0312	97	52.	2.7	51.5 *	1	0632	197	33.	1.6	51.0 *	1	0952	297	2.	0.1	50.1
1	0314	98	61.	3.4	51.8 *	1	0634	198	32.	1.6	51.0 *	1	0954	298	2.	0.1	50.1
1	0316	99	68.	4.0	52.0 *	1	0636	199	30.	1.5	51.0 *	1	0956	299	2.	0.1	50.1
1	0318	100	74.	4.6	52.2 *	1	0638	200	29.	1.5	51.0 *	1	0958	300	2.	0.1	50.1
					*						*						

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
+ (CFS)	(HR)					
		(CFS)				
+ 117.	4.00		54.	33.	33.	33.
		(INCHES)	1.075	1.090	1.090	1.090
		(AC-FT)	27.	27.	27.	27.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	9.97-HR
+ (AC-FT)	(HR)				
8.	4.00	3.	2.	2.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	9.97-HR
+ (FEET)	(HR)				
53.41	4.00	51.62	51.00	51.00	51.00

CUMULATIVE AREA = 0.46 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	PEAK	TIME OF	AVERAGE FLOW FOR MAXIMUM PERIOD	BASIN	MAXIMUM	TIME OF

	OPERATION	STATION	FLOW	PEAK	6-HOUR	24-HOUR	72-HOUR	AREA	STAGE	MAX STAGE
+	HYDROGRAPH AT	070808	12.	3.43	2.	1.	1.	0.02		
+	DIVERSION TO	808OUT	0.	3.43	0.	0.	0.	0.02		
+	HYDROGRAPH AT	808PP	12.	3.43	2.	1.	1.	0.02		
+	ROUTED TO	070610	12.	3.43	2.	1.	1.	0.02		
+	HYDROGRAPH AT	070610	5.	3.43	1.	0.	0.	0.01		
+	DIVERSION TO	610OUT	0.	3.40	0.	0.	0.	0.01		
+	HYDROGRAPH AT	610PP	5.	3.40	1.	0.	0.	0.01		
+	2 COMBINED AT	070610	17.	3.43	3.	2.	2.	0.02		
+	ROUTED TO	070508	17.	3.43	3.	2.	2.	0.02		
+	HYDROGRAPH AT	070508	4.	3.50	1.	0.	0.	0.01		
+	DIVERSION TO	508OUT	0.	3.50	0.	0.	0.	0.01		
+	HYDROGRAPH AT	508PP	4.	3.50	1.	0.	0.	0.01		
+	2 COMBINED AT	070508	21.	3.47	3.	2.	2.	0.03		
+	ROUTED TO	070010	21.	3.47	3.	2.	2.	0.03		

	HYDROGRAPH AT						
+	070010	7.	3.43	1.	1.	1.	0.01
	DIVERSION TO						
+	010OUT	0.	3.43	0.	0.	0.	0.01
	HYDROGRAPH AT						
+	010PP	6.	3.43	1.	1.	1.	0.01
	2 COMBINED AT						
+	070010	27.	3.47	4.	3.	3.	0.04
	ROUTED TO						
+	070210	27.	3.47	4.	3.	3.	0.04
	HYDROGRAPH AT						
+	070209	12.	3.47	2.	1.	1.	0.02
	ROUTED TO						
+	070210	12.	3.47	2.	1.	1.	0.02
	HYDROGRAPH AT						
+	070210	5.	3.47	1.	0.	0.	0.01
	2 COMBINED AT						
+	070210	17.	3.47	3.	2.	2.	0.03
	DIVERSION TO						
+	210OUT	0.	3.43	0.	0.	0.	0.03
	HYDROGRAPH AT						
+	210PP	17.	3.43	3.	2.	2.	0.03
	2 COMBINED AT						
+	070210	44.	3.47	7.	4.	4.	0.07
	ROUTED TO						
+	050005	44.	3.47	7.	4.	4.	0.07
	HYDROGRAPH AT						
+	050005	21.	3.53	3.	2.	2.	0.04
	DIVERSION TO						
+	005OUT	0.	3.53	0.	0.	0.	0.04

	HYDROGRAPH AT						
+		005PP	21.	3.53	3.	2.	2.	0.04
	HYDROGRAPH AT						
+		070010	0.	3.37	0.	0.	0.	0.00
	ROUTED TO						
+		070020	0.	3.47	0.	0.	0.	0.00
	ROUTED TO						
+		070030	0.	3.67	0.	0.	0.	0.00
	HYDROGRAPH AT						
+		070030	5.	3.07	1.	0.	0.	0.00
	2 COMBINED AT						
+		070030	5.	3.07	1.	0.	0.	0.00
	ROUTED TO						
+		070040	5.	3.10	1.	0.	0.	0.00
	HYDROGRAPH AT						
+		070210	0.	3.47	0.	0.	0.	0.00
	ROUTED TO						
+		070220	0.	3.47	0.	0.	0.	0.00
	ROUTED TO						
+		070040	0.	3.77	0.	0.	0.	0.00
	HYDROGRAPH AT						
+		070040	5.	3.20	1.	0.	0.	0.01
	3 COMBINED AT						
+		070040	9.	3.13	1.	1.	1.	0.01
	ROUTED TO						
+		070050	9.	3.17	1.	1.	1.	0.01
	HYDROGRAPH AT						
+		070050	23.	3.07	2.	1.	1.	0.02
	2 COMBINED AT						
+		070050	30.	3.10	4.	2.	2.	0.03

	ROUTED TO								
+		070060	30.	3.13	4.	2.	2.	0.03	
	HYDROGRAPH AT								
+		070310	30.	3.07	3.	2.	2.	0.02	
	ROUTED TO								
+		070060	30.	3.10	3.	2.	2.	0.02	
	HYDROGRAPH AT								
+		070060	26.	3.10	3.	2.	2.	0.02	
	3 COMBINED AT								
+		070060	83.	3.10	9.	6.	6.	0.07	
	ROUTED TO								
+		070070	82.	3.13	9.	6.	6.	0.07	
	HYDROGRAPH AT								
+		070070	43.	3.07	4.	3.	3.	0.03	
	HYDROGRAPH AT								
+		070080	52.	3.13	4.	2.	2.	0.02	
	3 COMBINED AT								
+		070080	168.	3.13	17.	10.	10.	0.12	
	ROUTED TO								
+		07Det	46.	3.67	17.	10.	10.	0.12	
+									69.95 3.67
	DIVERSION TO								
+		07Qspl	0.	3.67	0.	0.	0.	0.12	
	HYDROGRAPH AT								
+		07Qpip	46.	3.67	17.	10.	10.	0.12	
	ROUTED TO								
+		070420	46.	3.67	17.	10.	10.	0.12	
	HYDROGRAPH AT								
+		070410	17.	3.13	2.	1.	1.	0.01	
	ROUTED TO								
+		070420	17.	3.13	2.	1.	1.	0.01	

	HYDROGRAPH AT								
+		070420	5.	3.20	0.	0.	0.	0.00	
	3 COMBINED AT								
+		070420	59.	3.20	19.	12.	12.	0.14	
	ROUTED TO								
+		210005	59.	3.20	19.	12.	12.	0.14	
	HYDROGRAPH AT								
+		210005	13.	3.23	1.	1.	1.	0.01	
	2 COMBINED AT								
+		210005	72.	3.23	20.	12.	12.	0.15	
	ROUTED TO								
+		050030	72.	3.23	20.	12.	12.	0.15	
	HYDROGRAPH AT								
+		050005	0.	3.40	0.	0.	0.	0.00	
	ROUTED TO								
+		050010	0.	4.63	0.	0.	0.	0.00	
	HYDROGRAPH AT								
+		050010	96.	3.13	8.	5.	5.	0.07	
	2 COMBINED AT								
+		050010	96.	3.13	8.	5.	5.	0.07	
	ROUTED TO								
+		050020	93.	3.17	8.	5.	5.	0.07	
	HYDROGRAPH AT								
+		050210	100.	3.13	8.	5.	5.	0.05	
	ROUTED TO								
+		210ST	0.	5.53	0.	0.	0.	0.05	
+									0.55 9.97
	ROUTED TO								
+		050020	0.	4.73	0.	0.	0.	0.05	
	HYDROGRAPH AT								

+		050020	13.	3.17	1.	1.	1.	0.01	
	3 COMBINED AT								
+		050020	105.	3.17	10.	6.	6.	0.13	
	ROUTED TO								
+		050030	103.	3.20	10.	6.	6.	0.13	
	HYDROGRAPH AT								
+		050030	54.	3.10	3.	2.	2.	0.02	
	ROUTED TO								
+		030ST	20.	3.27	2.	1.	1.	0.02	
+									68.13 3.27
	3 COMBINED AT								
+		050030	190.	3.20	32.	20.	20.	0.30	
	ROUTED TO								
+		050305	188.	3.20	32.	20.	20.	0.30	
	ROUTED TO								
+		050050	186.	3.27	32.	20.	20.	0.30	
	HYDROGRAPH AT								
+		050040	105.	3.20	12.	7.	7.	0.10	
	ROUTED TO								
+		40STOR	37.	3.67	12.	7.	7.	0.10	
+									61.58 3.67
	ROUTED TO								
+		050050	37.	3.67	12.	7.	7.	0.10	
	HYDROGRAPH AT								
+		050310	11.	3.13	1.	1.	1.	0.01	
	ROUTED TO								
+		SRPDet	5.	3.37	1.	1.	1.	0.01	
+									54.43 3.37
	HYDROGRAPH AT								
+		S 64th	7.	3.30	1.	0.	0.	0.01	
	HYDROGRAPH AT								

+		050065	38.	3.07	2.	1.	1.	0.01	
	HYDROGRAPH AT								
+		050062	16.	3.10	1.	1.	1.	0.01	
	ROUTED TO								
+		050050	15.	3.13	1.	1.	1.	0.01	
	6 COMBINED AT								
+		050050	254.	3.23	49.	30.	30.	0.43	
	HYDROGRAPH AT								
+		050060	53.	3.17	5.	3.	3.	0.03	
	2 COMBINED AT								
+		050050	303.	3.23	54.	33.	33.	0.46	
	ROUTED TO								
+		05Det	117.	4.00	54.	33.	33.	0.46	
+									53.41 4.00
	DIVERSION TO								
+		05Qspl	0.	4.00	0.	0.	0.	0.46	
	HYDROGRAPH AT								
+		05Qpip	117.	4.00	54.	33.	33.	0.46	
	HYDROGRAPH AT								
+		050610	99.	3.17	10.	6.	6.	0.08	
	2 COMBINED AT								
+		050610	143.	3.17	63.	38.	38.	0.54	
	ROUTED TO								
+		050620	142.	3.20	63.	38.	38.	0.54	
	HYDROGRAPH AT								
+		050620	110.	3.17	12.	7.	7.	0.10	
	2 COMBINED AT								
+		050620	249.	3.20	75.	45.	45.	0.64	
	ROUTED TO								
+		050630	249.	3.20	75.	45.	45.	0.64	

	HYDROGRAPH AT						
+		050630	120.	3.13	9.	6.	6.	0.06
	2 COMBINED AT						
+		050630	343.	3.20	84.	51.	51.	0.70
	ROUTED TO						
+		050640	342.	3.20	84.	51.	51.	0.70
	HYDROGRAPH AT						
+		050640	65.	3.20	6.	3.	3.	0.03
	2 COMBINED AT						
+		050640	407.	3.20	89.	54.	54.	0.74
	HYDROGRAPH AT						
+		050710	11.	3.13	1.	1.	1.	0.00
	ROUTED TO						
+		050720	11.	3.17	1.	1.	1.	0.00
	HYDROGRAPH AT						
+		050720	54.	3.20	5.	3.	3.	0.03
	2 COMBINED AT						
+		050720	64.	3.20	6.	3.	3.	0.03
	ROUTED TO						
+		050640	63.	3.20	6.	3.	3.	0.03
	2 COMBINED AT						
+		050640	470.	3.20	95.	58.	58.	0.77
	HYDROGRAPH AT						
+		050810	25.	3.17	2.	1.	1.	0.01
	ROUTED TO						
+		051510	25.	3.20	2.	1.	1.	0.01
	HYDROGRAPH AT						
+		051510	21.	3.13	2.	1.	1.	0.01
	2 COMBINED AT						
+		051510	45.	3.17	4.	2.	2.	0.02

	ROUTED TO						
+		050640	44.	3.17	4.	2.	2.	0.02
	2 COMBINED AT						
+		050640	514.	3.20	99.	60.	60.	0.79
	ROUTED TO						
+		050650	508.	3.20	99.	60.	60.	0.79
	HYDROGRAPH AT						
+		050910	23.	3.13	2.	1.	1.	0.01
	ROUTED TO						
+		050650	22.	3.17	2.	1.	1.	0.01
	HYDROGRAPH AT						
+		050650	42.	3.13	3.	2.	2.	0.02
	3 COMBINED AT						
+		050650	566.	3.20	104.	63.	63.	0.82
	ROUTED TO						
+		050660	557.	3.20	104.	63.	63.	0.82
	HYDROGRAPH AT						
+		050660	40.	3.17	3.	2.	2.	0.02
	2 COMBINED AT						
+		050660	594.	3.20	107.	65.	65.	0.84
	DIVERSION TO						
+		EARLL	344.	3.20	62.	38.	38.	0.84
	HYDROGRAPH AT						
+		SCOTTS	250.	3.20	45.	27.	27.	0.84
	HYDROGRAPH AT						
+		EARLL	344.	3.20	62.	38.	38.	0.00
	ROUTED TO						
+		050131	342.	3.23	62.	38.	38.	0.00
	HYDROGRAPH AT						
+		050131	55.	3.13	4.	3.	3.	0.02

	2 COMBINED AT						
+		050131	380.	3.23	66.	40.	40.	0.02
	ROUTED TO						
+		051410	374.	3.27	66.	40.	40.	0.02
	HYDROGRAPH AT						
+		051410	178.	3.13	13.	8.	8.	0.07
	2 COMBINED AT						
+		051410	500.	3.23	79.	48.	48.	0.10
	ROUTED TO						
+		051420	495.	3.23	79.	48.	48.	0.10

1 SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING

KINEMATIC WAVE SUMMARIES REMOVED FOR PRINTOUT- SEE ELECTRONIC FILE

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 210ST
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	0.00	1.00	1.00
STORAGE	0.	8.	8.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	0.55	0.00	4.	0.	0.00	9.97	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 030ST
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	65.00	68.00	68.00
STORAGE	0.	1.	1.
OUTFLOW	0.	0.	0.

RATIO OF	MAXIMUM RESERVOIR	MAXIMUM DEPTH	MAXIMUM STORAGE	MAXIMUM OUTFLOW	DURATION OVER TOP	TIME OF MAX OUTFLOW	TIME OF FAILURE

PMF	W.S.ELEV	OVER DAM	AC-FT	CFS	HOURS	HOURS	HOURS
1.00	68.13	0.13	1.	20.	6.87	3.27	0.00

*** NORMAL END OF HEC-1 ***

Alternative D, 71st Street-

PBAltD.DAT

```
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *               MAY   1991             *
 *           VERSION 4.0.1E             *
 *     Lahey F77L-EM/32 version 5.01    *
 *       Dodson & Associates, Inc.      *
 *  RUN DATE  05/05/99  TIME  07:15:45  *
 ****************************************
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****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 551-1748             *
*                                      *
****************************************
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X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX          XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

                * ************************************************************************
                * This is ALTERNATIVE D hydrology for Change Order #2
                *
                * - This model is based on the Recommended Plan - Part A for the Osborn Road
                *     Outfall with the following changes:
                *         Osborn Road Outfall has been modified to include a storm drain in
                *         Osborn Road running from the Paiute Basin to 71st Street, south on
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*          71st Street to Earll Drive and east on Earll Dr. to Indian Bend Wash.
*          Use of the existing storm drain in Osborn Road for excess runoff has
*          not been included in this model, since the benefit of this alternative
*          is the elimination of any construction activities in Osborn Road east
*          of Scottsdale Road.
*
*
 1        ID    ***************************************************************************
 2        ID    STP-PAPAGO REGIONAL FLOOD CONTROL PROJECT
 3        ID    SCOTTSDALE - TEMPE - PHOENIX
 4        ID    ***************************************************************************
 5        ID
 6        ID    Kimley-Horn and Associates, Inc.
 7        ID    KVL Consultants, Inc.
 8        ID
 9        ID    10-Year, 6-Hour Storm Event
10        ID    10/97
11        ID
12        ID    PARSONS BRINCKERHOFF MODIFICATIONS TO ORIGINAL KIMLEY HORN MODEL
13        ID    PARSONS BRINCKERHOFF FILE NAME: PBALTD.DAT
14        ID    ALTERNATIVE D- OSBORN TO 71ST STREET TO EARLL TO INDIAN BEND WASH
15        ID
16        ID    FILE MODIFIED BY PARSONS BRINCKERHOFF TO BE USED IN DESIGN OF OSBORN OUTFALL
17        ID    MODIFICATIONS:
18        ID    1) SUBBASIN 050062 REROUTED DIRECTLY TO PAIUTE PARK- IMPROVEMENTS TO 64TH ST
19        ID       CONVEY FLOW TO DETENTION BASIN. AREA REDUCED TO 3.9 ACRES (0.0061 SM)
20        ID    2) PAIUTE PARK STAGE/DISCHARGE CURVE ADJUSTED
21        ID    3) SUBBASINS CONTRIBUTING TO 66" ADOT PIPE AND SCOTTSDALE ROAD SOUTH OF
22        ID       OSBORN ROAD REMOVED FROM MODEL (SUBBASINS 050710, 050720,058810, 050640,
23        ID       050910, and 050650. FLOWS COLLECTED AND CONVEYED BY SCOTTSDALE ROAD
24        ID       STORM DRAIN.
25        ID    4) REVISE AREA OF SUBBASIN 050310 FROM 0.041 SM TO 0.0063 SM.AND ROUTE TO
26        ID       EXISTING DETENTION BASIN. REMAINING AREA IS SRP PROPERTY WHICH DRAINS
27        ID       WEST.
28        ID       AREA REDUCTION DUE TO:
29        ID       REMOVE APARTMENTS AT THOMAS AND 64TH ST DUE TO ON-SITE RETENTION.
30        ID       REMOVE PORTION OF SRP SUBSTATION WHICH DRAINS EAST.
31        ID       COLLECT PAVEMENT FLOWS FROM 64TH ST (THOMAS TO PAIUTE PARK) IN LARGE PIPE
32        ID       COLLECT FLOWS FROM PAVED AREA BETWEEN SUBSTATION AND APARTMENTS IN LARGE
33        ID       PIPE.
34        ID    5) REVISE HYDROGRAPH CARDS FOR SUBBASIN 050130.  INSERT CONCENTRATION
35        ID       POINT AT EARLL AND CIVIC CENTER
36        ID    6) REVISE HYDROGRAPH CARDS FOR SUBBASIN 050100.  EARLL ALIGNMENT DIVIDES
37        ID       SUBBASIN. ROUTE FLOWS TO CONCENTRATION POINT AT EARLL AND SCOTTSDALE.
38        ID    7) REVISE PIPE SIZES IN ROUTE CARDS TO REFLECT PB PRELIMINARY DESIGN
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                39          ID
                40          ID    Parsons Brinckerhoff
                41          ID    Alan Humphrey
1                                                HEC-1 INPUT                                                PAGE  2

           LINE             ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

                42          ID    5/5/99
                            *
                            *DIAGRAM
                43          IT       2                    300
                44          IO       5

                45          KK  070808   BASIN
                46          BA   0.017
                47          PH       0       0    0.50    0.97    1.61    1.76    1.86    2.05
                48          LS       0      88       0       0      98       0
                49          UK     300  0.0100    0.20      99
                50          UK     100  0.0100    0.10       1
                51          RK    1600   0.214    0.03            TRAP       2     3.5
                            *
                            * The 10 year flows are diverted into a proposed storm drain along Oak Street.
                            * In storm events greater than the 10 yr, the remaining flow will follow its
                            * natural course across and sheet flow across Oak Street to the north.
                            *

                52          KK   808PP  Divert 10-year flows into storm drain
                53          DT  808OUT
                54          DI       0      12      13      15      50     100
                55          DQ       0    0.01       1       3      38      88

                56          KK  070610 FROM  070808
                57          RK     240  0.0066   0.013            CIRC    3.00

                58          KK  070610   BASIN
                59          BA   0.007
                60          LS       0      88       0       0      98       0
                61          UK     300  0.0100    0.20      99
                62          UK     100  0.0100    0.10       1
                63          RK     500   0.054    0.03            TRAP       2     3.5

                64          KK   610PP  Divert 10-year flows into storm drain
                65          DT  610OUT
                66          DI       0       5       6      10      50     100
                67          DQ       0     .01       1       5      45      95
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 68          KK  070610 COMBINE
 69          HC       2

 70          KK  070508    FROM  070610
 71          RK     420  0.0066   0.013           CIRC    3.00

 72          KK  070508   BASIN
 73          BA   0.008
 74          LS       0      85       0       0      98       0
 75          UK     300  0.0100    0.20      99
 76          UK     100  0.0100    0.10       1
 77          RK     600   0.048    0.03           TRAP       9     1.0
1                                      HEC-1 INPUT                                    PAGE  3

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 78          KK   508PP  Divert 10-year flows into storm drain
 79          DT  508OUT
 80          DI       0       4       5      15      50     100
 81          DQ       0     .01       1      11      46      96

 82          KK  070508 COMBINE
 83          HC       2

 84          KK  070010    FROM  070508
 85          RK     270  0.0066   0.013           CIRC    3.00

 86          KK  070010   BASIN
 87          BA   0.009
 88          LS       0      88       0       0      98       0
 89          UK     300  0.0100    0.20      99
 90          UK     100  0.0100    0.10       1
 91          RK    1200   0.042    0.03           TRAP       2     3.5

 92          KK   010PP  Divert 10-year flows into storm drain
 93          DT  010OUT
 94          DI       0       7      10      15      50     100
 95          DQ       0     .01       3       8      43      93

 96          KK  070010 COMBINE
 97          HC       2

 98          KK  070210    FROM  070010
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 99          RK     120  0.0033   0.013            CIRC    3.00

100          KK  070209   BASIN
101          BA   0.018
102          LS       0      87       0       0      98       0
103          UK     300  0.0100    0.20      99
104          UK     100  0.0100    0.10       1
105          RK    1200   0.252    0.03            TRAP       2     3.5

106          KK  070210    FROM  070209
107          RK     750   0.252   0.013            TRAP      10       1

108          KK  070210   BASIN
109          BA   0.008
110          LS       0      87       0       0      98       0
111          UK     300  0.0100    0.20      99
112          UK     100  0.0100    0.10       1
113          RK     600   0.043    0.03            TRAP       2     3.5

114          KK  070210 COMBINE
115          HC       2
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

116          KK   210PP  Divert 10-year flows into storm drain
117          DT  210OUT
118          DI       0      17      20      30      50     100
119          DQ       0     .01       3      13      33      83

120          KK  070210 COMBINE
121          HC       2

122          KK  050005   FROM 070210
123          RK     950   0.008   0.013            CIRC    3.00

124          KK  050005   BASIN
125          BA   0.038
126          LS       0      85       0       0      98       0
127          UK     300  0.0100    0.20      99
128          UK     100  0.0100    0.10       1
129          RK    1650    0.09    0.03            TRAP      30     1.0

130          KK   005PP  Divert 10-year flows into storm drain
```

```
131          DT  005OUT
132          DI        0       21       22      100      150      200
133          DQ        0      .01        1       79      129      179
             *
             * The start of the Osborn Road outfall hydrology
             *

134          KK  070010
135          KM    Retrieve overland flows at CP 070010
136          DR  010OUT

137          KK  070020     FROM  070010
138          RK      178  0.0131   0.013            CIRC      1.0

139          KK  070030     FROM  070020
140          RK      520  0.0146   0.025            TRAP      9.0        1

141          KK  070030    BASIN
142          BA   0.004
143          LS        0       85        0        0       98        0
144          UK      150  0.0100     0.30       65
145          UK       50  0.0100     0.10       35
146          RK      522  0.0146     0.03            TRAP        2      3.5

147          KK  070030 COMBINE
148          HC        2

149          KK  070040     FROM  070030
150          RK      177  0.0146   0.017            TRAP     54.8        1
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

151          KK  070210
152          KM    Retrieve overland flows at CP 070210
153          DR  210OUT

154          KK  070220     FROM  070210
155          RK      164  0.0131   0.013            CIRC      1.0

156          KK  070040     FROM  070220
157          RK      723  0.0146   0.017            TRAP     54.8        1

158          KK  070040    BASIN
```

```
159          BA   0.006
160          LS       0      86       0       0      98       0
161          UK     181  0.0100    0.28      72
162          UK      60  0.0100    0.10      28
163          RK    1946  0.0146    0.02            TRAP      30     1.0

164          KK  070040 COMBINE
165          HC       3

166          KK  070050    FROM  070040
167          RK     878  0.0146   0.025            TRAP    20.0     1.0

168          KK  070050   BASIN
169          BA   0.018
170          LS       0      86       0       0      98       0
171          UK     150  0.0100    0.30      65
172          UK      50  0.0100    0.10      35
173          RK     290  0.0058    0.02            TRAP      11     1.0
174          RK     981  0.0146    0.02            TRAP      11     1.0

175          KK  070050 COMBINE
176          HC       2

177          KK  070060    FROM  070050
178          RK     872  0.0058   0.025            TRAP     1.0     1.0

179          KK  070310   BASIN
180          BA   0.023
181          LS       0      86       0       0      98       0
182          UK     150  0.0100    0.30      65
183          UK      50  0.0100    0.10      35
184          RK     278  0.0058    0.02            TRAP      11     1.0
185          RK     986  0.0146    0.02            TRAP      11     1.0

186          KK  070060    FROM  070310
187          RK     745  0.0058   0.025            TRAP     1.0     1.0

188          KK  070060   BASIN
189          BA   0.020
190          LS       0      86       0       0      98       0
191          UK     150  0.0100    0.30      65
192          UK      50  0.0100    0.10      35
193          RK    1096  0.0058    0.03            TRAP       2     1.0
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 194          KK  070060 COMBINE
 195          HC       3

 196          KK  070070    FROM  070060
 197          RK     726  0.0146   0.025            TRAP    30.0     1.0

 198          KK  070070   BASIN
 199          BA   0.032
 200          LS       0      86       0       0      98       0
 201          UK     150  0.0100    0.30      65
 202          UK      50  0.0100    0.10      35
 203          RK    1209  0.0146    0.03            TRAP       2     1.0

 204          KK  070080   BASIN
 205          BA   0.021
 206          LS       0      83       0       0      98       0
 207          UK      29  0.0100    0.39       9
 208          UK     189  0.0100    0.10      91
 209          RK    1257  0.0058    0.02            TRAP      30     1.0

 210          KK  070080 COMBINE
 211          HC       3

 212          KK   07Det   Detention basin at Marriott's Brighton Gardens
 213          RS       1    STOR
 214          SV       0    0.78    1.64    2.65    3.84    5.21    6.77    6.77
 215          SE      66      67      68      69      70      71      72      73
 216          SQ       0      12      36      42      46      48      52     355
              *
              * Marriott's Brighton Gardens outfall - 07Qpip is the outflow in the storm drain
              * 07Qspl is the flow overtopping the basin
              *

 217          KK  07Qpip
 218          DT  07Qspl
 219          DI       0      71     112     172     245     329     420     518     623
 220          DQ       0     0.1      26      72     132     204     285     374     471

 221          KK  070420   FROM 07Qpip
 222          RK    1000   0.005   0.013           CIRC     3.0

 223          KK  070410   BASIN
```

```
224          BA   0.011
225          LS      0      84       0       0      98       0
226          UK    144  0.0100    0.32      44
227          UK    121  0.0100    0.10      56
228          RK   1816  0.0146    0.02            TRAP      23     1.0

229          KK  070420    FROM  070410
230          RK    183  0.0058   0.017            TRAP    52.5        1
1                                        HEC-1 INPUT                                    PAGE  7

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

231          KK  070420   BASIN
232          BA   0.003
233          LS      0      79       0       0      98       0
234          UK    177  0.0100    0.31      25
235          UK    200  0.0100    0.10      75
236          RK   1046  0.0058    0.02            TRAP      49     1.0

237          KK  070420 COMBINE
238          HC       3

239          KK  210005  FROM 070420
240          RK    450   0.005   0.013            CIRC     3.5

241          KK  210005   BASIN
242          BA   0.008
243          LS      0      79       0       0      98       0
244          UK     94  0.0100    0.34      26
245          UK    116  0.0100    0.10      74
246          RK    523  0.0032    0.02            TRAP      38     1.0
247          RK   1250  0.0020    0.02            TRAP      45     1.0

248          KK  210005 COMBINE
249          HC       2

250          KK  050030   FROM 210005
251          RK   1600   0.005   0.013            CIRC       4

252          KK  050005
253          KM    Retrieve overland flows at CP 050005
254          DR  005OUT

255          KK  050010   FROM 050005
```

```
256          RK    1300   0.015    0.02           TRAP      35       1

257          KK  050010   BASIN
258          BA   0.066
259          LS       0      81       0       0      98       0
260          UK     144  0.0100    0.30      52
261          UK      57  0.0100    0.10      48
262          RK    1189  0.0033    0.02           TRAP      30     1.0
263          RK    1197  0.0038    0.02           TRAP      60     1.0

264          KK  050010   COMBINE
265          HC       2

266          KK  050020     FROM  050010
267          RK    1370  0.0038   0.017           TRAP    37.5       1

268          KK  050210   BASIN
269          BA   0.054
270          LS       0      79       0       0      98       0
271          UK     200  0.0100    0.30      28
272          UK     200  0.0100    0.10      72
273          RK     564  0.0038    0.02           TRAP      23     1.0
1                                        HEC-1 INPUT                                        PAGE  8

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

274          RK    1199  0.0033    0.02           TRAP      23     1.0

275          KK   210ST STORAGE
276          RS       1    STOR
277          SV    0.00    7.72    7.72
278          SE    0.00    1.00    2.00
279          SQ    0.00    0.01    0.01
280          ST     1.0     500     3.0     1.5

281          KK  050020     FROM  050210
282          RK     278  0.0033   0.017           TRAP    60.0       1

283          KK  050020   BASIN
284          BA   0.009
285          LS       0      79       0       0      98       0
286          UK     166  0.0100    0.30      39
287          UK      98  0.0100    0.10      61
288          RK    1304  0.0038    0.02           TRAP      60     1.0
```

```
289          KK  050020 COMBINE
290          HC       3

291          KK  050030    FROM  050020
292          RK     347  0.0038   0.017            TRAP    37.5       1

293          KK  050030   BASIN
294          BA   0.020
295          LS       0      79       0       0      98       0
296          UK     150  0.0100    0.30      15
297          UK      50  0.0100    0.10      85
298          RK     278  0.0038    0.02            TRAP       9     1.0
299          RK    1468  0.0033    0.02            TRAP       9     1.0
             *
             * Scottsdale Executive Villas natural storage in parking lot
             *

300          KK   030ST STORAGE
301          RS       1    STOR
302          SV       0    0.01    0.06    0.62    2.72    2.72
303          SE      65      66      67      68      69      70
304          SQ    0.00    0.01    0.01    0.01    0.01    0.01
305          ST      68     150     3.0     1.5

306          KK  050030 COMBINE
307          HC       3

308          KK  050305   FROM 050030
309          RK     150   0.002   0.013            CIRC     5.5

310          KK  050050   FROM 050305
311          RK    1500   0.001   0.013            TRAP       9     1.0
```

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```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

312          KK  050040   BASIN
313          BA   0.102
314          LS       0      79       0       0      98       0
315          UK     150  0.0100    0.30      57
316          UK      50  0.0100    0.10      43
317          RK    2230  0.0038    0.02            TRAP      38     1.0
318          RK    2654  0.0038    0.02            TRAP      38     1.0
```

```
319          KK  40STOR  Storage on west side of cross-cut canal
320          RS       1
321          SV       0       0       0       0     2.6    13.5    13.5
322          SE      58      59      60      61      62      63      64
323          SQ       0      10      22      32      40      50      55

324          KK  050050    FROM  050040
325          RK     491  0.0334   0.013           CIRC     2.5
             * ******************************************************************
             * PB Modification:
             * Reduce Area of Subbasin 050310 to 4.0 Acres (0.0063 SM)
             * Remaining area is west side of SRP substation
             * Remove one routing card for internal flows- this reduces route
             * length.
             * Add storage route through existing detention basin
             * Flows from other areas of original subbasin retained on-site or
             * collected by large pipe in 64th St.
             * ******************************************************************

326          KK  050310   BASIN
             * BA 0.041
327          BA   0.0063
328          LS       0      79       0       0      98       0
329          UK     200  0.0100    0.30      28
330          UK     200  0.0100    0.10      72
331          RK     816  0.0033    0.02            TRAP      30     1.0
             * RK   848  0.0038    0.02            TRAP      30     1.0

332          KK  SRPDet
333          RS       1    STOR
334          SA   0.152   0.207   0.207
335          SE    53.4      56      57
336          SQ       0       2       4       5       8      10      20      40
337          SE    53.4    54.0    54.3    54.5    54.9    55.1   53.48      57
             * ******************************************************************
             * PB Modification:
             * Add subbasin to represent flows from pavement of 64th St south
             * of Paiute Park and paved area between SRP substation and new
             * apartments. Area to be collected by large pipe in 64th St.

338          KK  S 64th   BASIN
339          BA   0.011
340          LS       0      79       0       0      83       0
341          UK     100   0.004     0.1      53
342          UK     100   0.008     0.1      47
```

```
 343          RK    1430   0.004   0.015           TRAP      35       1
1                                    HEC-1 INPUT                                    PAGE 10

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 344          KK  050065   BASIN
 345          BA   0.014
 346          LS       0      79       0       0      98       0
 347          UK     100    0.01     0.3      15
 348          UK     100    0.01     0.1      85
 349          RK     500   0.005   0.012           TRAP      60       1
              * ***************************************************************
              * PB Modification
              * Relocate hydrograph and subsequent route for Basin 050060
              * Combine separately to get peak flow in main pipe
              * KK050060   BASIN
              * BA 0.029
              * LS     0      79       0       0      98       0
              * UK   105    0.01     0.3      20
              * UK   160    0.01     0.1      80
              * RK  1300  0.0038    0.03           TRAP     100     1.0
              *
              * ***************************************************************
              * PB Modification
              * Relocate hydrograph and subsequent route for Basin 050062
              * Modify pipe length to reflect storm drain route on 64th St
              * Insert hydrographs at this location
              * Revise basin area to 3.9 acres (0.0061 square miles)
              * ***************************************************************

 350          KK  050062   BASIN
 351          BA   0.0061
              * Original KH model had 2 BA cards. The 0.006 card was first, leaving
              * the 0.014 card to be used in the model.
              * BA 0.006
              * BA 0.014
 352          LS       0      79       0       0      98       0
 353          UK     100    0.01     0.3      15
 354          UK      50    0.01     0.1      85
 355          RK     900   0.005   0.012           TRAP      60       1

 356          KK  050050   FROM 050062
 357          RK    1000   0.002   0.013           CIRC     2.5       1
              *
```

```
                * Flows combined from 050040, 050305, revised 050310 and 050065
                * into main pipe above Paiute Park. PB- Add 050062 and S 64th
                *

  358           KK  050050 COMBINE
  359           KM   Peak flow in main pipe above Paiute Park
  360           HC       6
                * Revise Hydrograph combine count from 5 to 6
                * Move Subbasin 050060 (Paiute Park) to combine here.
1                                       HEC-1 INPUT                                    PAGE 11

 LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  361           KK  050060   BASIN
  362           BA   0.029
  363           LS       0      79       0       0      98       0
  364           UK     105    0.01     0.3      20
  365           UK     160    0.01     0.1      80
  366           RK    1300  0.0038    0.03            TRAP     100     1.0

  367           KK  050050 COMBINE
  368           KM   Paiute Park inflow
  369           HC       2
                * ***************************************************************
                * PB Modification:
                * Revise Kimley-Horn stage/storage/discharge curve
                * Revisions based on iterative calculations which included effect of
                * Paiute Park discharges on downstream pipe system.
                * ***************************************************************

  370           KK   05Det  Storage
  371           KO       2
                * Original KH Curve
                * RS      1    STOR
                * SV      0    0.64    2.37    5.14    8.40    11.7    15.1    18.5    22.1
                *    22.1S
                * SE     49      50      51      52      53      54      55      56      57
                *       58
                * SQ    4.5      22      37      47      56      65      73      81      88
                *      156
                * Revised PB Curve
  372           RS       1    STOR
  373           SA    1.20    1.84    3.17    3.21    3.31    3.35    3.42    3.49
  374           SE      50      51      52      53      54      55      56      57
```

```
375          SQ       0      20      40      60      80     100     120     140
376          SE      50    50.8   51.18   51.78   52.39   52.94   53.48   54.04
             *
             * Paiute Park outfall - 05Qpip is the outflow in the storm drain
             * 05Qspl is the flow overtopping the basin
             *
             *
             * Overflows to CP 050060
             *

377          KK  05Qpip
378          DT  05Qspl
379          DI       0     160     382     780    1292    1897
380          DQ       0    0.01     212     600    1102    1697
             *
             * Begin storm drain system in Osborn Road
             *
             * ********************************************************************
             * PB Modification
             * Relocate hydrograph and subsequent route for Basin 050062
             * Remove hydrographs from this location
             * ********************************************************************
             * KK050062   BASIN
             * BA 0.006
             * BA 0.014
             * LS      0      79       0       0      98       0
             * UK    100    0.01     0.3      15
             * UK     50    0.01     0.1      85
             * RK    900   0.005   0.012            TRAP      60       1
             * KK050610   FROM 050062
             * RK   1500   0.003   0.013            TRAP      60       1
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

381          KK  050610   BASIN
382          BA   0.081
383          LS       0      79       0       0      98       0
384          UK     130  0.0100    0.32      56
385          UK      70  0.0100    0.10      44
386          RK    1450  0.0038    0.02            TRAP      45     1.0
387          RK    1240  0.0033    0.02            TRAP      60     1.0
             * ********************************************************************
             * PB Modification
```

```
                * Revise combine operation from 3 to 2 hydrographs due to hydrograph
                * relocation.
                * ***************************************************************

388             KK  050610    COMBINE
389             KM   OSBORN & PINTO
390             HC       2

391             KK  050620    FROM  050610
                * ***************************************************************
                * PB Modification
                * Revise pipe size in routing card to reflect PB preliminary design.
                * ***************************************************************
392             RK    1050  0.0037   0.013            CIRC       5
                * RK  1050  0.0037   0.013            CIRC       6

393             KK  050620   BASIN
394             BA   0.099
395             LS       0      79       0       0      98       0
396             UK     147  0.0100    0.30      56
397             UK      53  0.0100    0.10      44
398             RK     940  0.0033    0.02            TRAP      41     1.0
399             RK    2545  0.0038    0.02            TRAP      60     1.0

400             KK  050620 COMBINE
401             HC       2

402             KK  050630    FROM  050620
                * ***************************************************************
                * PB Modification
                * Revise pipe size in routing card to reflect PB preliminary design.
                * ***************************************************************
403             RK    1440  0.0028   0.013            CIRC     5.5
                * RK  1440  0.0028   0.013            CIRC       7

404             KK  050630   BASIN
405             BA   0.062
406             LS       0      79       0       0      98       0
407             UK     138  0.0100    0.31      33
408             UK      64  0.0100    0.10      67
409             RK    1205  0.0038    0.02            TRAP      41     1.0
410             RK    1348  0.0033    0.02            TRAP      60     1.0
```



```
LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
411         KK  050630 COMBINE
412         HC       2

413         KK  050660    FROM  050630
            * ********************************************************************
            * PB Modification
            * Revise pipe size in routing card to reflect PB preliminary design.
            * ********************************************************************
414         RK    2600  0.0015   0.013           CIRC     7.5
            * RK  2600  0.0015   0.013           CIRC       7
            * ********************************************************************
            * PB Modification:
            * Remove flows and subsequent routes from Subbasins 050710, 050720,
            * 050810, 050640, 050910, and 050650 from model. Flows drain to
            * Scottsdale Road. Allow flows to be collected by Scottsdale Road
            * system. Do not collect in Earll Road system.
            * ********************************************************************
            * KK050710   BASIN
            * BA 0.005
            * LS     0      79       0       0      98       0
            * UK    21  0.0100    0.40      15
            * UK   200  0.0100    0.10      85
            * RK   610  0.0038    0.02           TRAP      55     1.0
            * KK050720    FROM  050710
            * RK   316  0.0045   0.013           CIRC     5.5
            * KK050720   BASIN
            * BA 0.028
            * LS     0      79       0       0      98       0
            * UK    57  0.0100    0.38      17
            * UK   188  0.0100    0.10      83
            * RK   580  0.0038    0.02           TRAP      45     1.0
            * RK  1594  0.0033    0.02           TRAP      55     1.0
            * KK050720   COMBINE
            * HC     2
            * KK050640    FROM  050720
            * RK   422  0.0045   0.013           CIRC     5.5
            * KK050810   BASIN
            * BA 0.013
            * LS     0      79       0       0      98       0
            * UK    88  0.0100    0.36      20
            * UK   200  0.0100    0.10      80
            * RK   164  0.0033    0.02           TRAP      28     1.0
            * RK  1031  0.0038    0.02           TRAP      55     1.0
```

```
* KK050640    FROM  050810
* RK   705  0.0025   0.013           CIRC     4.0
* KK050640   BASIN
* BA 0.032
* LS     0      79       0       0      98       0
* UK    64  0.0100    0.37      15
* UK   149  0.0100    0.10      85
* RK  1605  0.0038    0.02           TRAP      41     1.0
* RK  1168  0.0033    0.02           TRAP      60     1.0
* KK050640 COMBINE
* HC     3
* KK050650   FROM 050640
* RK   700  0.0029   0.013           CIRC       6
* KK050910   BASIN
* BA 0.012
* LS     0      79       0       0      98       0
* UK   170  0.0100    0.32      26
* UK   200  0.0100    0.10      74
* RK   837  0.0038    0.02           TRAP      38     1.0
* KK050650    FROM  050910
* RK   751  0.0045   0.013           DEEP     5.0
* KK050650   BASIN
* BA 0.019
* LS     0      79       0       0      98       0
* UK    29  0.0100    0.40      16
* UK   200  0.0100    0.10      84
* RK   598  0.0033    0.02           TRAP      23     1.0
* RK   566  0.0038    0.02           TRAP      90     1.0
* KK050650 COMBINE
* HC     3
* KK050660    FROM  050650
* RK   648  0.0027   0.013           CIRC     7.5
*
* This alternative includes a storm drain in 71st St.  This storm drain will
* intercept flows from the north part of the existing conditions subbasin
* 050100.  For this reason, subbasin 050100 has been split into two with 050100
* being north of Earll Drive and 050105 south of earll drive.  See drainage
* figure in the Appendix of the Final Report.
*
```

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```
      LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

       415          KK  050100   BASIN
```

```
416          BA   0.034
417          LS       0      79       0       0      98       0
418          UK      20  0.0100    0.40       7
419          UK     200  0.0100    0.10      93
420          RK     505  0.0033    0.02            TRAP      30     1.0
421          RK    1727  0.0038    0.02            TRAP      23     1.0
             * ********************************************************************
             * PB Modification:
             * Remove flows from Subbasin 050660 from model. Drains to Scottsdale Road.
             * Allow flows to be collected by Scottsdale Road system.
             * Adjust combine card from 4 to 2
             * ********************************************************************
             * KK050660   BASIN
             * BA 0.018
             * LS       0      79       0       0      98       0
             * UK      20  0.0100    0.40      15
             * UK     200  0.0100    0.10      85
             * RK     578  0.0033    0.02            TRAP      49     1.0
             * RK     582  0.0038    0.02            TRAP      90     1.0

422          KK  050660 COMBINE
423          HC       2
             * ********************************************************************
             * PB Modification:
             * Collect local flows into large pipe. Earll Drive divides subbasin
             * 50130.  Runoff generated north of Earll Drive to be collected
             * at Earll Drive.  New subbasin north of Earll to be 050131. Add
             * required combine and route cards. Modify routing card from 050660.
             * Revise KH routes from TRAP to CIRC.
             * ********************************************************************
             *

424          KK  050131   FROM 050660
             * KK051410   FROM 050660
             * KH routing card
             * RK  2640  0.0015   0.013            TRAP      16
425          RK    1300  0.0015   0.013            CIRC     7.5

426          KK  050131
             * BA 0.096
427          BA   0.024
428          LS       0      79       0       0      98       0
429          UK      45  0.0100    0.38      15
430          UK     171  0.0100    0.10      85
             * RK  1905  0.0038    0.02            TRAP      71     1.0
```

```
                * RK  1212  0.0033    0.02            TRAP      71     1.0
      431       RK    1000   0.004    0.02            TRAP      71     1.0
1                                      HEC-1 INPUT                                    PAGE 15

     LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10


      432         KK  050131   COMBINE
      433         HC       2

      434         KK  051410   FROM 050131
      435         KM   ROUTE FROM CIVIC CENTER TO MILLER
      436         RK    1300  0.0015   0.013            CIRC       8

      437         KK  051410   BASIN
      438         BA   0.072
      439         LS       0      79       0       0      98       0
      440         UK      64  0.0100    0.37       9
      441         UK     150  0.0100    0.10      91
      442         RK    1170  0.0033    0.02            TRAP      38     1.0
      443         RK    1180  0.0038    0.02            TRAP      55     1.0

      444         KK  051410    COMBINE
      445         HC       2
                  *
                  * EARLL DR OUTFALL TO INDIAN BEND WASH
                  *
                  * ********************************************************************
                  * PB Modification:
                  * Revise route to reflect storm drain from Miller to IBW
                  * Use 105-inch pipe to represent 10' x 6' box culvert.
                  * ********************************************************************

      446         KK  051420    FROM  051410
                  * RK  1460  0.0015   0.013            TRAP      14
      447         RK    1300  0.0015   0.013            CIRC     8.7
                  * ********************************************************************
                  * PB Modification:
                  * End of area of interest. Remove subsequent hydrographs from model.
                  * ********************************************************************
                  *
                  * FLOW IN BASIN 05 EAST OF 71ST STREET FOLLOWS DRAINAGE PATHS OF EXISTING
                  * CONDITIONS MODEL IN THIS ALTERNATIVE - FLOWS IN THIS SECTION ARE NORTH OF
                  * OSBORN RD WITH THE EXCEPTION OF BASIN 051710 AND FLOW NATURALLY TO THE EAST
                  *
```

```
* KK051510   BASIN
* BA 0.010
* LS     0      79       0       0      98       0
* UK    59  0.0100    0.38      18
* UK   200  0.0100    0.10      82
* RK   139  0.0038    0.02            TRAP      41     1.0
* RK   521  0.0033    0.02            TRAP      71     1.0
* KK051520    FROM  051510
* RK   680  0.0028   0.013            CIRC     9.5
* KK051610   BASIN
* BA 0.021
* LS     0      79       0       0      98       0
* UK   165  0.0100    0.32      25
* UK   200  0.0100    0.10      75
* RK   624  0.0038    0.02            TRAP      41     1.0
* RK   792  0.0033    0.02            TRAP      60     1.0
* KK051520    FROM  051610
* RK   601  0.0047   0.013            CIRC     5.0
* KK051710   BASIN
* BA 0.004
* LS     0      79       0       0      98       0
* UK   146  0.0100    0.33      24
* UK   200  0.0100    0.10      76
* RK   515  0.0038    0.02            TRAP      30     1.0
* RK   287  0.0033    0.02            TRAP      30     1.0
* KK051520    FROM  051710
* RK   567  0.0032   0.013            CIRC     4.0
* KK051520   BASIN
* BA 0.023
* LS     0      79       0       0      98       0
* UK   179  0.0100    0.31      26
* UK   198  0.0100    0.10      74
* RK   473  0.0038    0.02            TRAP      60     1.0
* RK   704  0.0033    0.02            TRAP      71     1.0
* KK051520 COMBINE
* HC     4
* KK051530    FROM  051520
* RK   926   0.001   0.013            CIRC     6.0
* KK051530   BASIN
* BA 0.041
* LS     0      79       0       0      98       0
* UK    26  0.0100    0.40      15
* UK   193  0.0100    0.10      85
* RK   889  0.0038    0.02            TRAP      38     1.0
* RK   860  0.0033    0.02            TRAP      60     1.0
```

```
* KK051530 COMBINE
* HC      2
* KK051540     FROM  051530
* RK    360    0.001   0.013            CIRC      6.0
* KK051810    BASIN
* BA 0.005
* LS      0       79       0       0       98        0
* UK     23   0.0100     0.40      16
* UK    196   0.0100     0.10      84
* RK    272   0.0033     0.02            TRAP       19      1.0
* RK    272   0.0038     0.02            TRAP       30      1.0
* KK051540     FROM  051810
* RK    218   0.0045    0.013            CIRC      4.5
* KK051540    BASIN
* BA 0.004
* LS      0       79       0       0       98        0
* UK     44   0.0100     0.38      16
* UK    172   0.0100     0.10      84
* RK    233   0.0038     0.02            TRAP       12      1.0
* RK    265   0.0033     0.02            TRAP       60      1.0
* KK051540 COMBINE
* HC      3
* KK051550     FROM  051540
* RK    273    0.001    0.013            TRAP      8.0      1.0
* KK051560     FROM  051550
* RK    800   0.0038    0.013            CIRC      7.0
* KK051560    BASIN
* BA 0.008
* LS      0       79       0       0       98        0
* UK    116   0.0100     0.33      47
* UK     89   0.0100     0.10      53
* RK   1126   0.0033     0.02            TRAP       60      1.0
* KK051560 COMBINE
* HC      2
*
* Osborn Rd outfall to Indian Bend Wash
*
* KK051570     FROM  051560
* RK    228    0.003    0.013            CIRC      7.0
*
* Begin Thomas Rd outfall
*
* KK05Qspl  Retrieve spill from Paiute Park detention basin
* DR05Qspl
* KK050060     Qspl FROM  05Det
```

```
* RK   500   0.002   0.027            TRAP       5       1
* KK050070    FROM  050060
* RK  1429  0.0033   0.030            TRAP     5.0     1.0
* KK050410   BASIN
* BA 0.041
* LS     0      79       0       0      98       0
* UK    77  0.0100    0.36      25
* UK   137  0.0100    0.10      75
* RK   694  0.0038    0.02            TRAP      38     1.0
* RK  1177  0.0033    0.02            TRAP      38     1.0
* KK050070    FROM  050410
* RK   187  0.0038   0.017            TRAP    60.0       1
* KK050070   BASIN
* BA 0.084
* LS     0      79       0       0      98       0
* UK    22  0.0100    0.40       8
* UK   198  0.0100    0.10      92
* RK  3223  0.0038    0.02            TRAP      38     1.0
* KK050070 COMBINE
* HC     3
* KK050080    FROM  050070
* RK  1112  0.0027   0.013            CIRC     4.5
* KK050080   BASIN
* BA 0.021
* LS     0      79       0       0      98       0
* UK   132  0.0100    0.31      60
* UK    71  0.0100    0.10      40
* RK  1365  0.0033    0.02            TRAP      38     1.0
* KK050080 COMBINE
* HC     2
* KK050090    FROM  050080
* RK   416  0.0052   0.013            CIRC     4.0
* KK050510   BASIN
* BA 0.054
* LS     0      79       0       0      98       0
* UK   109  0.0100    0.33      48
* UK    97  0.0100    0.10      52
* RK  1096  0.0038    0.02            TRAP      41     1.0
* RK  1304  0.0033    0.02            TRAP      41     1.0
* KK050090    FROM  050510
* RK   626  0.0052   0.013            CIRC     4.0
* KK050090   BASIN
* BA 0.037
* LS     0      79       0       0      98       0
* UK    44  0.0100    0.38      23
```

```
* UK   172  0.0100    0.10      77
* RK   965  0.0038    0.02            TRAP      23     1.0
* RK  1064  0.0033    0.02            TRAP      45     1.0
* KK050090 COMBINE
* HC     3
* KK050105    FROM  050090
* RK   609  0.0028   0.013            CIRC     4.5
*
* This alternative includes a storm drain in 71st St.  This storm drain will
* intercept flows from the north part of the existing conditions subbasin
* 050100.  For this reason, subbasin 050100 has been split into two with 050100
* being north of Earll Drive and 050105 south of Earll Drive.  See drainage
* figure in the appendix of the Final Report.
*
* KK050105   BASIN
* BA 0.011
* LS     0      79       0       0      98       0
* UK    20  0.0100    0.40       7
* UK   200  0.0100    0.10      93
* RK   587  0.0033    0.02            TRAP      30     1.0
* RK   410  0.0038    0.02            TRAP      23     1.0
* KK050105 COMBINE
* HC     2
* KK050110    FROM  050105
* RK   692  0.0058   0.013            CIRC     4.0
* KK050110   BASIN
* BA 0.010
* LS     0      79       0       0      98       0
* UK    20  0.0100    0.40      15
* UK   200  0.0100    0.10      85
* RK   587  0.0033    0.02            TRAP      46     1.0
* RK   406  0.0038    0.02            TRAP      77     1.0
* KK050110 COMBINE
* HC     2
* KK050120    FROM  050110
* RK   888  0.0027   0.013            CIRC     7.5
* KK051010   BASIN
* BA 0.023
* LS     0      79       0       0      98       0
* UK   200  0.0100    0.30      28
* UK   200  0.0100    0.10      72
* RK   517  0.0033    0.02            TRAP      30     1.0
* RK   822  0.0038    0.02            TRAP      30     1.0
* KK1010ST STORAGE
* RS     1    STOR
```

```
* SV      0     0.20     0.70     1.49     1.49
* SE     58       59       60       61       62
* SQ      0     0.01     0.01     0.01     0.01
* ST     61      800      3.0      1.5
* KK051020     FROM   051010
* RK    948   0.0033    0.017             TRAP     60.0        1
* KK051110    BASIN
* BA 0.025
* LS      0       79        0        0       98        0
* UK     20   0.0100     0.40       10
* UK    200   0.0100     0.10       90
* RK    326   0.0038     0.02             TRAP        9      1.0
* RK   1382   0.0033     0.02             TRAP       19      1.0
* KK051020     FROM   051110
* RK    541   0.0038    0.017             TRAP     33.0        1
* KK051020    BASIN
* BA 0.027
* LS      0       79        0        0       98        0
* UK     64   0.0100     0.37       22
* UK    174   0.0100     0.10       78
* RK    409   0.0038     0.02             TRAP       26      1.0
* RK   1595   0.0033     0.02             TRAP       60      1.0
* KK051020 COMBINE
* HC      3
* KK051030     FROM   051020
* RK    694   0.0033    0.017             TRAP     60.0        1
* KK051210    BASIN
* BA 0.008
* LS      0       79        0        0       98        0
* UK     20   0.0100     0.40       15
* UK    200   0.0100     0.10       85
* RK    682   0.0038     0.02             TRAP        9      1.0
* KK051030     FROM   051210
* RK    241   0.0038    0.017             TRAP     60.0        1
* KK051310    BASIN
* BA 0.003
* LS      0       79        0        0       98        0
* UK     20   0.0100     0.40        6
* UK    200   0.0100     0.10       94
* RK    544   0.0033     0.02             TRAP       18      1.0
* KK051320     FROM   051310
* RK    333   0.0038    0.017             TRAP     60.0        1
* KK051320    BASIN
* BA 0.009
* LS      0       79        0        0       98        0
```

```
* UK    20  0.0100    0.40       7
* UK   200  0.0100    0.10      93
* RK   254  0.0038    0.02            TRAP       9     1.0
* RK   543  0.0033    0.02            TRAP      18     1.0
* KK051320 COMBINE
* HC     2
* KK051030    FROM  051320
* RK   960  0.0038   0.017            TRAP    60.0       1
* KK051030   BASIN
* BA 0.031
* LS     0      79       0       0      98       0
* UK    28  0.0100    0.39      13
* UK   190  0.0100    0.10      87
* RK  2532  0.0033    0.02            TRAP      49     1.0
* KK051030 COMBINE
* HC     4
* KK051040    FROM  051030
* RK  1501  0.0033   0.017            TRAP    60.0       1
* KK051040   BASIN
* BA 0.036
* LS     0      79       0       0      98       0
* UK   105  0.0100    0.34      39
* UK   102  0.0100    0.10      61
* RK  1159  0.0038    0.02            TRAP      45     1.0
* RK  1501  0.0033    0.02            TRAP      65     1.0
* KK051040 COMBINE
* HC     2
* KK050120    FROM  051040
* RK  1222   0.003   0.013            TRAP       8
* KK050120   BASIN
* BA 0.039
* LS     0      79       0       0      98       0
* UK    24  0.0100    0.40      14
* UK   195  0.0100    0.10      86
* RK   763  0.0038    0.02            TRAP      23     1.0
* RK  1114  0.0033    0.02            TRAP      90     1.0
* KK050120 COMBINE
* HC     3
* KK050130    FROM  050120
* RK  1265  0.0027   0.013            DEEP     7.0
* KK050130   BASIN
* BA 0.096
* LS     0      79       0       0      98       0
* UK    45  0.0100    0.38      15
* UK   171  0.0100    0.10      85
```

```
* RK  1905  0.0038    0.02            TRAP      71     1.0
* RK  1212  0.0033    0.02            TRAP      71     1.0
* KK050130 COMBINE
* HC     2
* KK050140    FROM  050130
* RK  1319  0.0027   0.013            DEEP     7.0
* KK050140   BASIN
* BA 0.086
* LS     0      79       0       0      98       0
* UK    94  0.0100    0.35      25
* UK   154  0.0100    0.10      75
* RK  1224  0.0038    0.02            TRAP       9     1.0
* RK  1267  0.0033    0.02            TRAP      79     1.0
* KK050140 COMBINE
* HC     2
* KK050150    FROM  050140
* RK  1252  0.0006   0.013            DEEP     5.0
* KK050150   BASIN
* BA 0.011
* LS     0      79       0       0      98       0
* UK   159  0.0100    0.30      57
* UK    57  0.0100    0.10      43
* RK  1202  0.0033    0.02            TRAP      60     1.0
* KK050150 COMBINE
* HC     2
*
* Thomas Rd Outfall to Indian Bend Wash
*
* KK050160    FROM  050150
* RK   332  0.0048   0.013            DEEP     6.0
*
* Notice:
* This document, together with the concepts and designs presented herein, as an
* instrument of service, is intended for the specific purpose and client for
* which it was prepared.  Reuse of and improper reliance on this document
* without written authorization and adaptation by Kimley-Horn and Associates,
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*
1                                    HEC-1 INPUT                                PAGE 16

     LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

      448          ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
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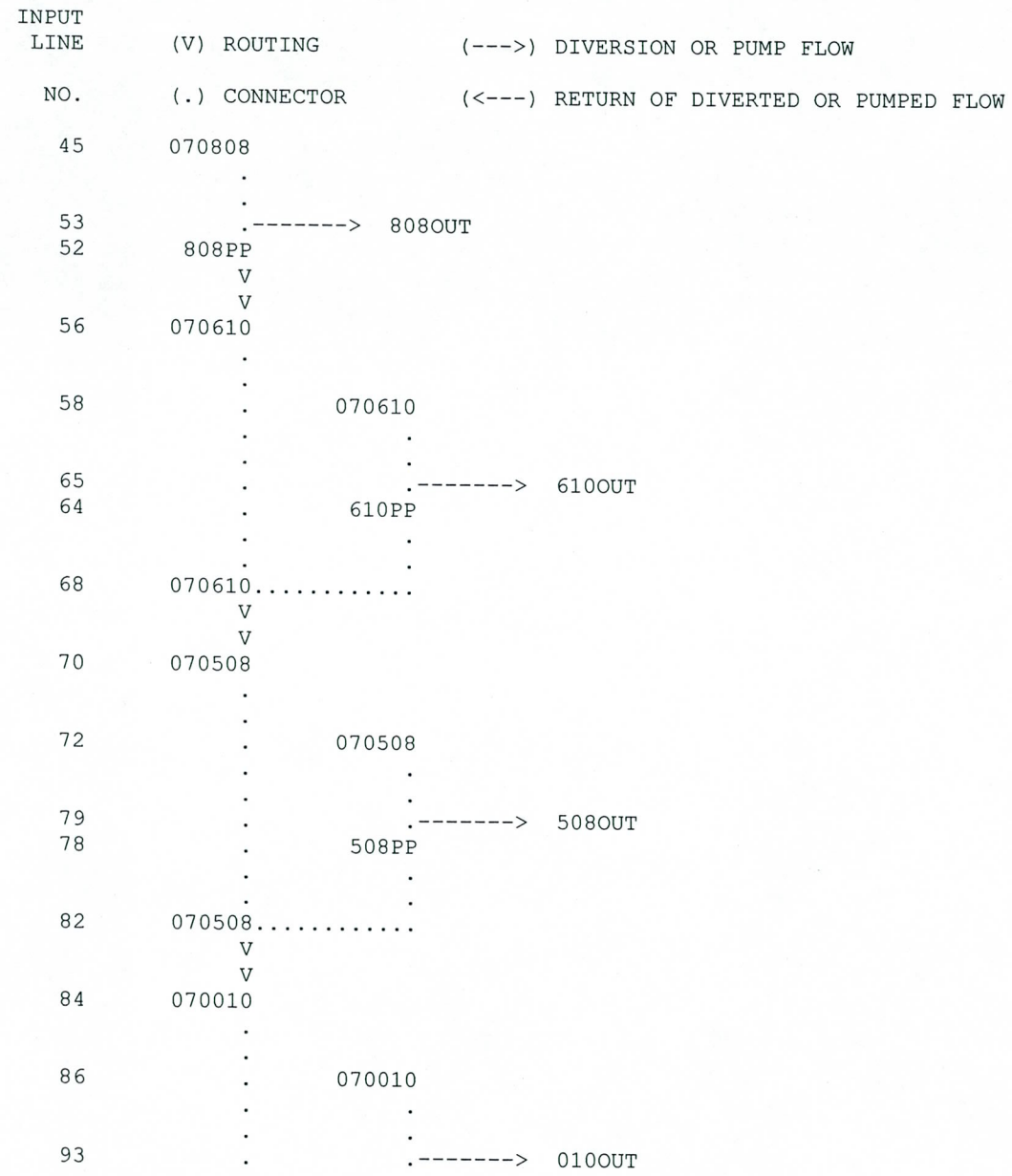
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NO.
(.) CONNECTOR
(<----) RETURN OF DIVERTED OR PUMPED FLOW
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070808
53
808OUT
52
808PP
56
070610
58
070610
65
610OUT
64
610PP
68
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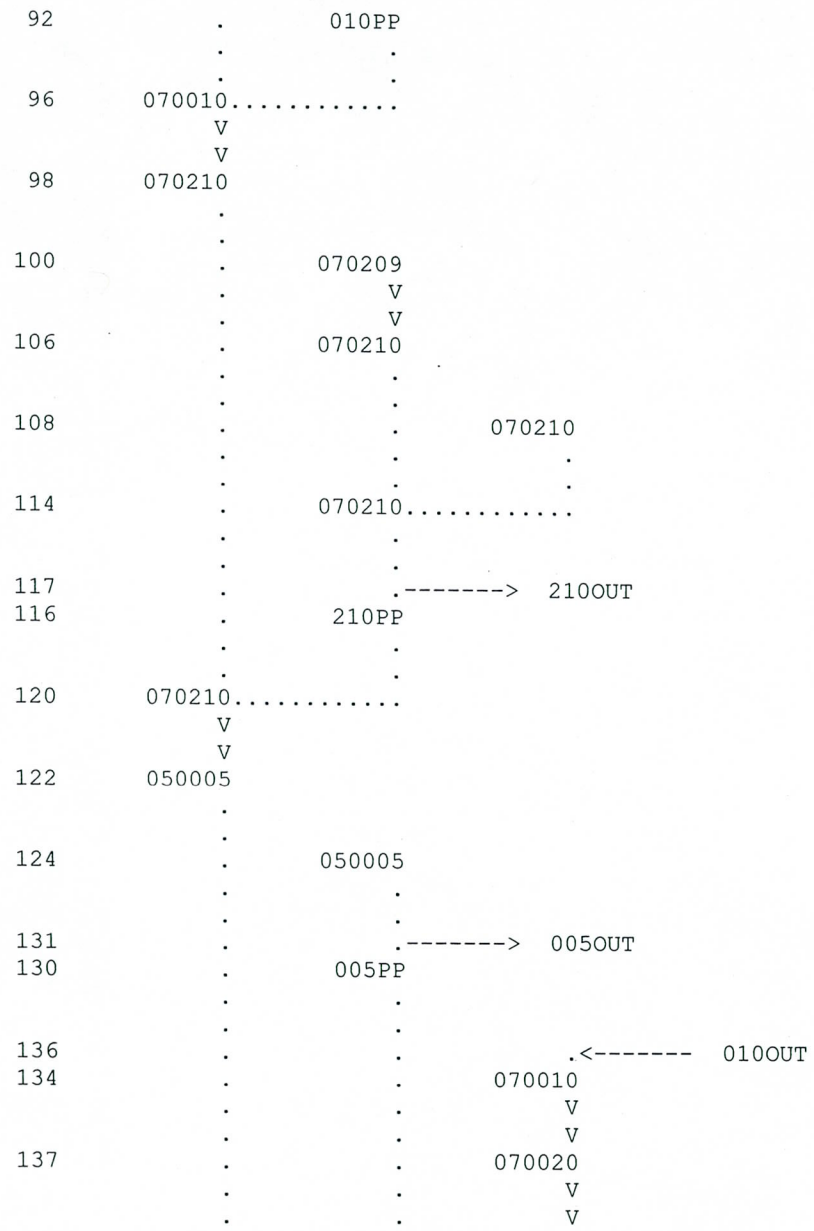
070010
93
010OUT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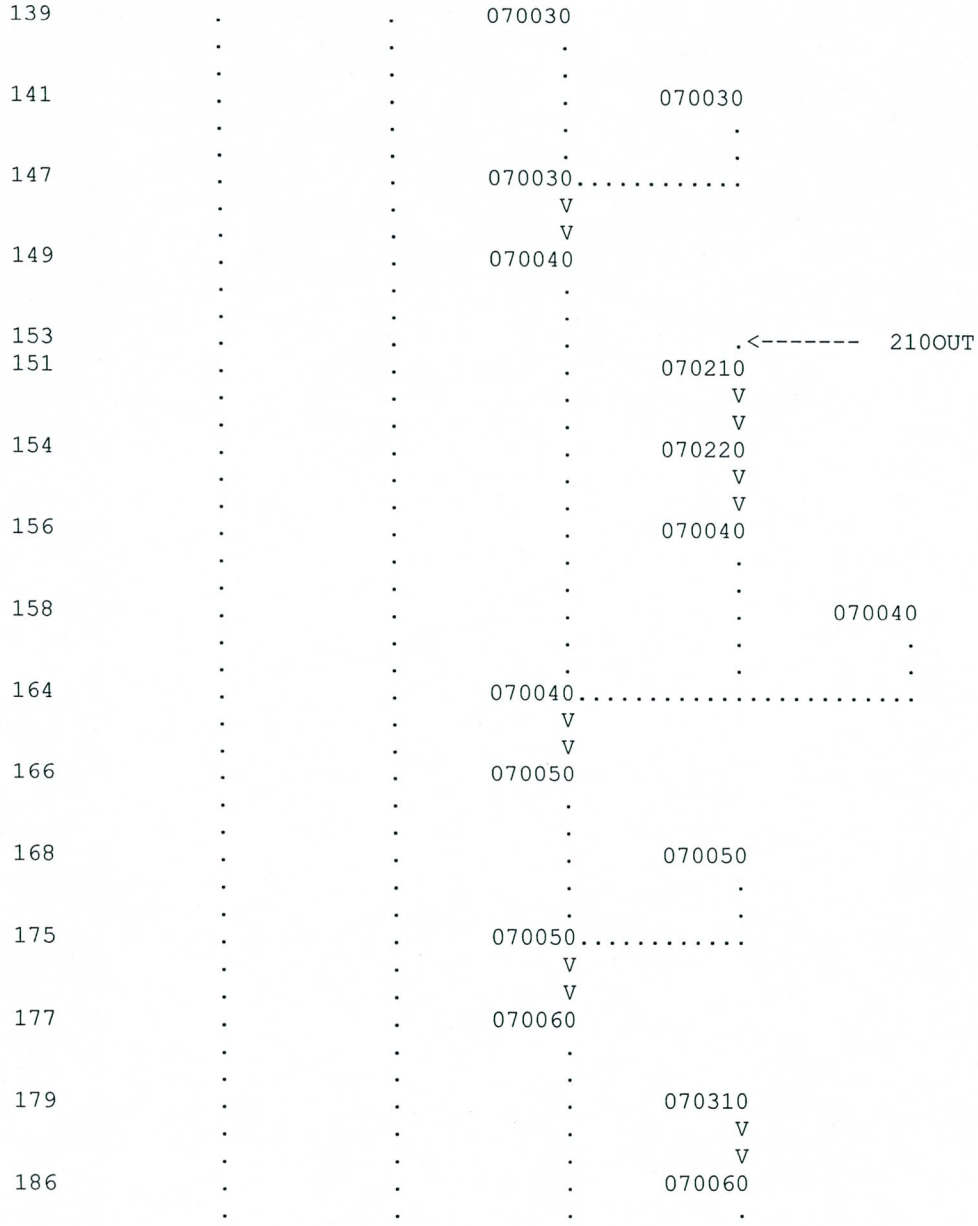
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070310
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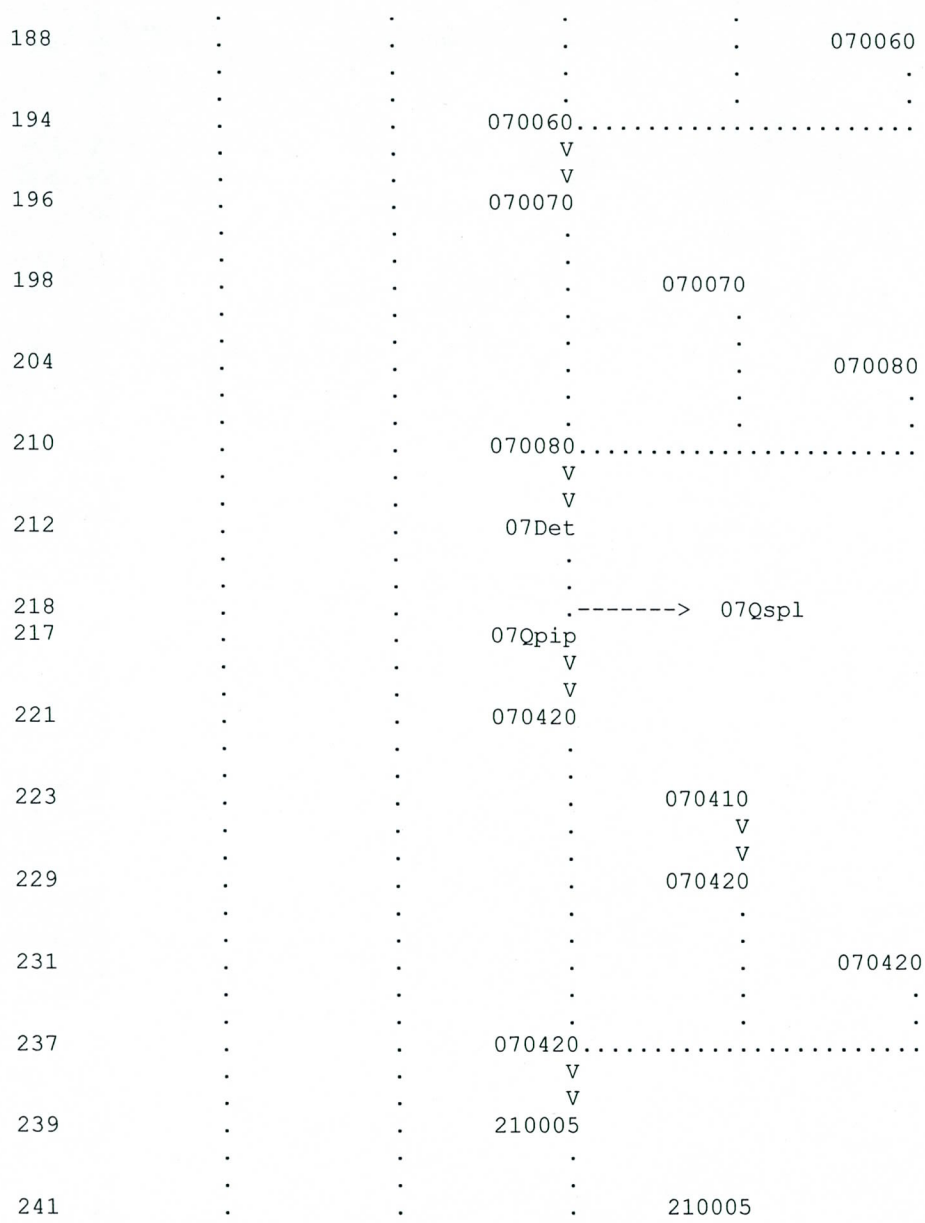
070060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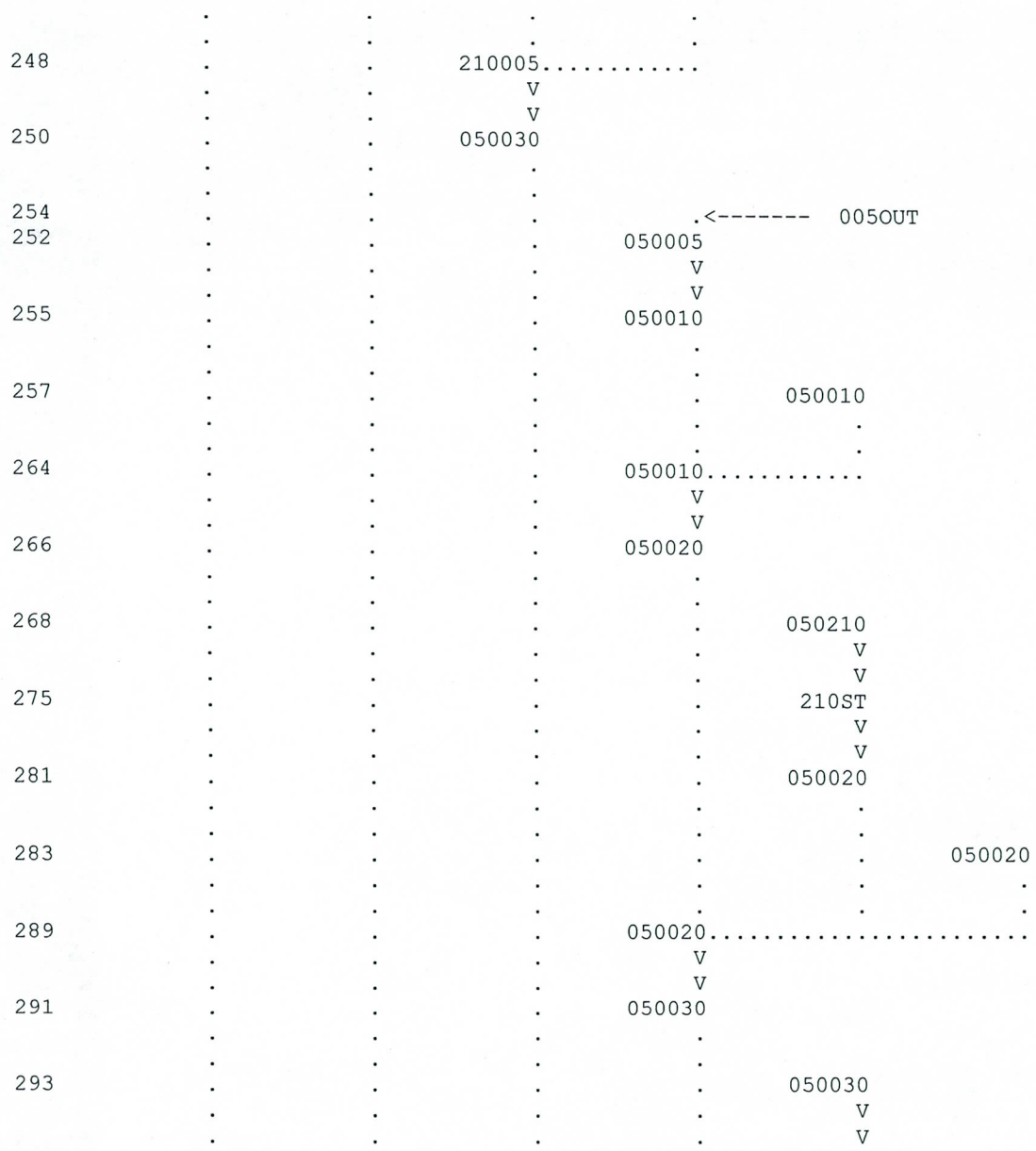
210005
241
210005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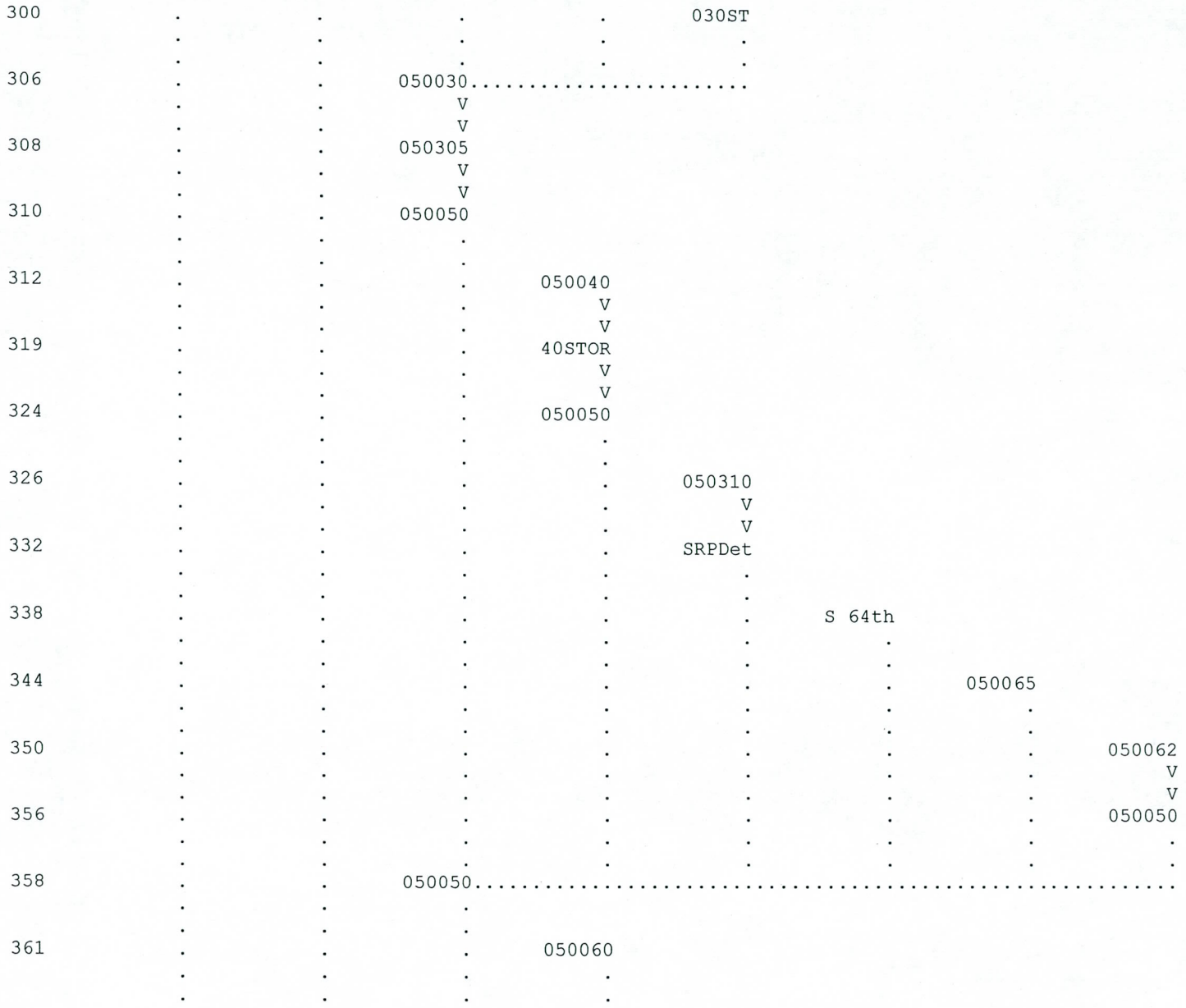
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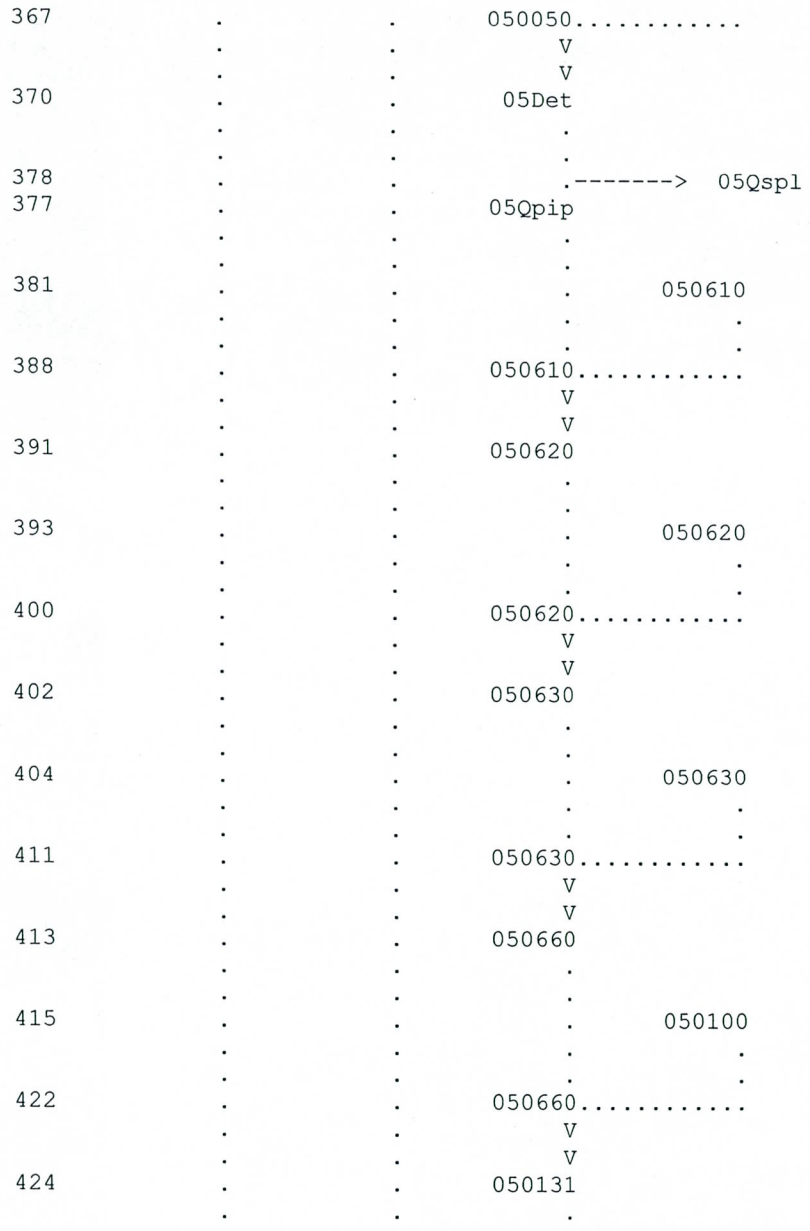
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402
050630
404
050630
411
050630
413
050660
415
050100
422
050660
424
050131

```
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                .           .           V           .
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                .           .           .           .
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                .           .           V           .
                .           .           V           .
  446           .           .      051420
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *               MAY   1991              *
 *            VERSION 4.0.1E             *
 *     Lahey F77L-EM/32 version 5.01     *
 *       Dodson & Associates, Inc.       *
 *  RUN DATE  05/05/99  TIME  07:15:45   *
 *****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 551-1748              *
*                                       *
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STP-PAPAGO REGIONAL FLOOD CONTROL PROJECT
SCOTTSDALE - TEMPE - PHOENIX
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Kimley-Horn and Associates, Inc.
KVL Consultants, Inc.

10-Year, 6-Hour Storm Event
10/97

PARSONS BRINCKERHOFF MODIFICATIONS TO ORIGINAL KIMLEY HORN MODEL
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PARSONS BRINCKERHOFF FILE NAME: PBALTD.DAT
ALTERNATIVE D- OSBORN TO 71ST STREET TO EARLL TO INDIAN BEND WASH

FILE MODIFIED BY PARSONS BRINCKERHOFF TO BE USED IN DESIGN OF OSBORN OUTFALL
MODIFICATIONS:

1) SUBBASIN 050062 REROUTED DIRECTLY TO PAIUTE PARK- IMPROVEMENTS TO 64TH ST CONVEY FLOW TO DETENTION BASIN. AREA REDUCED TO 3.9 ACRES (0.0061 SM)
2) PAIUTE PARK STAGE/DISCHARGE CURVE ADJUSTED
3) SUBBASINS CONTRIBUTING TO 66" ADOT PIPE AND SCOTTSDALE ROAD SOUTH OF OSBORN ROAD REMOVED FROM MODEL (SUBBASINS 050710, 050720,058810, 050640, 050910, and 050650. FLOWS COLLECTED AND CONVEYED BY SCOTTSDALE ROAD STORM DRAIN.
4) REVISE AREA OF SUBBASIN 050310 FROM 0.041 SM TO 0.0063 SM.AND ROUTE TO EXISTING DETENTION BASIN. REMAINING AREA IS SRP PROPERTY WHICH DRAINS WEST.
   AREA REDUCTION DUE TO:
   REMOVE APARTMENTS AT THOMAS AND 64TH ST DUE TO ON-SITE RETENTION.
   REMOVE PORTION OF SRP SUBSTATION WHICH DRAINS EAST.
   COLLECT PAVEMENT FLOWS FROM 64TH ST (THOMAS TO PAIUTE PARK) IN LARGE PIPE
   COLLECT FLOWS FROM PAVED AREA BETWEEN SUBSTATION AND APARTMENTS IN LARGE PIPE.
5) REVISE HYDROGRAPH CARDS FOR SUBBASIN 050130. INSERT CONCENTRATION POINT AT EARLL AND CIVIC CENTER
6) REVISE HYDROGRAPH CARDS FOR SUBBASIN 050100. EARLL ALIGNMENT DIVIDES SUBBASIN. ROUTE FLOWS TO CONCENTRATION POINT AT EARLL AND SCOTTSDALE.
7) REVISE PIPE SIZES IN ROUTE CARDS TO REFLECT PB PRELIMINARY DESIGN

Parsons Brinckerhoff
Alan Humphrey
5/5/99

44 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN		2	MINUTES IN COMPUTATION INTERVAL
IDATE	1	0	STARTING DATE
ITIME		0000	STARTING TIME
NQ		300	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	1	0	ENDING DATE
NDTIME		0958	ENDING TIME
ICENT		19	CENTURY MARK

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                COMPUTATION INTERVAL     0.03 HOURS
                     TOTAL TIME BASE     9.97 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


               **************
               *            *
370 KK         *     05Det  *       Storage
               *            *
               **************

371 KO              OUTPUT CONTROL VARIABLES
                         IPRNT           2  PRINT CONTROL
                         IPLOT           0  PLOT CONTROL
                         QSCAL          0.  HYDROGRAPH PLOT SCALE

                    HYDROGRAPH ROUTING DATA

372 RS              STORAGE ROUTING
                         NSTPS           1  NUMBER OF SUBREACHES
                          ITYP        STOR  TYPE OF INITIAL CONDITION
                         RSVRIC       0.00  INITIAL CONDITION
                             X        0.00 WORKING R AND D COEFFICIENT

373 SA                   AREA         1.2       1.8       3.2       3.2       3.3       3.3       3.4       3.5

374 SE              ELEVATION       50.00     51.00     52.00     53.00     54.00     55.00     56.00     57.00

375 SQ              DISCHARGE         0.        20.       40.       60.       80.       100.      120.      140.

376 SE              ELEVATION       50.00     50.80     51.18     51.78     52.39     52.94     53.48     54.04

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COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	1.51	3.98	7.17	10.43	13.76	17.15	20.60
ELEVATION	50.00	51.00	52.00	53.00	54.00	55.00	56.00	57.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	1.15	1.51	1.86	3.32	3.98	5.22	6.98	7.17	8.73
OUTFLOW	0.00	20.00	30.53	40.00	60.00	67.21	80.00	100.00	102.22	120.00
ELEVATION	50.00	50.80	51.00	51.18	51.78	52.00	52.39	52.94	53.00	53.48

STORAGE	10.43	10.57	13.76	17.15	20.60
OUTFLOW	138.57	140.00	174.29	210.00	245.71
ELEVATION	54.00	54.04	55.00	56.00	57.00

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HYDROGRAPH AT STATION 05Det

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	0.0	50.0	*	1		0320	101	79.	5.1	52.4	*	1		0640	201	28.	1.4	50.9
1		0002	2	1.	0.1	50.0	*	1		0322	102	84.	5.6	52.5	*	1		0642	202	27.	1.4	50.9
1		0004	3	1.	0.1	50.0	*	1		0324	103	89.	6.0	52.6	*	1		0644	203	25.	1.3	50.9
1		0006	4	1.	0.1	50.0	*	1		0326	104	93.	6.4	52.7	*	1		0646	204	24.	1.3	50.9
1		0008	5	1.	0.1	50.0	*	1		0328	105	96.	6.7	52.8	*	1		0648	205	23.	1.3	50.9
1		0010	6	1.	0.0	50.0	*	1		0330	106	99.	6.9	52.9	*	1		0650	206	22.	1.2	50.8
1		0012	7	1.	0.0	50.0	*	1		0332	107	102.	7.2	53.0	*	1		0652	207	21.	1.2	50.8
1		0014	8	1.	0.0	50.0	*	1		0334	108	105.	7.4	53.1	*	1		0654	208	21.	1.2	50.8
1		0016	9	1.	0.0	50.0	*	1		0336	109	107.	7.6	53.1	*	1		0656	209	20.	1.1	50.8
1		0018	10	1.	0.0	50.0	*	1		0338	110	109.	7.7	53.2	*	1		0658	210	19.	1.1	50.8
1		0020	11	1.	0.0	50.0	*	1		0340	111	110.	7.9	53.2	*	1		0700	211	19.	1.1	50.8
1		0022	12	1.	0.0	50.0	*	1		0342	112	112.	8.0	53.3	*	1		0702	212	18.	1.1	50.7
1		0024	13	1.	0.0	50.0	*	1		0344	113	113.	8.1	53.3	*	1		0704	213	18.	1.0	50.7
1		0026	14	1.	0.0	50.0	*	1		0346	114	114.	8.2	53.3	*	1		0706	214	18.	1.0	50.7
1		0028	15	1.	0.0	50.0	*	1		0348	115	115.	8.3	53.3	*	1		0708	215	17.	1.0	50.7
1		0030	16	1.	0.0	50.0	*	1		0350	116	116.	8.4	53.4	*	1		0710	216	17.	1.0	50.7
1		0032	17	1.	0.0	50.0	*	1		0352	117	116.	8.4	53.4	*	1		0712	217	16.	0.9	50.7
1		0034	18	0.	0.0	50.0	*	1		0354	118	117.	8.4	53.4	*	1		0714	218	16.	0.9	50.6
1		0036	19	0.	0.0	50.0	*	1		0356	119	117.	8.5	53.4	*	1		0716	219	16.	0.9	50.6
1		0038	20	0.	0.0	50.0	*	1		0358	120	117.	8.5	53.4	*	1		0718	220	15.	0.9	50.6
1		0040	21	0.	0.0	50.0	*	1		0400	121	117.	8.5	53.4	*	1		0720	221	15.	0.9	50.6

1	0042	22	0.	0.0	50.0 * 1	0402 122	117.	8.5	53.4 * 1	0722 222	14.	0.8	50.6
1	0044	23	0.	0.0	50.0 * 1	0404 123	117.	8.5	53.4 * 1	0724 223	14.	0.8	50.6
1	0046	24	0.	0.0	50.0 * 1	0406 124	117.	8.5	53.4 * 1	0726 224	14.	0.8	50.5
1	0048	25	0.	0.0	50.0 * 1	0408 125	117.	8.4	53.4 * 1	0728 225	13.	0.8	50.5
1	0050	26	0.	0.0	50.0 * 1	0410 126	116.	8.4	53.4 * 1	0730 226	13.	0.7	50.5
1	0052	27	0.	0.0	50.0 * 1	0412 127	116.	8.4	53.4 * 1	0732 227	13.	0.7	50.5
1	0054	28	0.	0.0	50.0 * 1	0414 128	116.	8.3	53.4 * 1	0734 228	12.	0.7	50.5
1	0056	29	0.	0.0	50.0 * 1	0416 129	115.	8.3	53.3 * 1	0736 229	12.	0.7	50.5
1	0058	30	0.	0.0	50.0 * 1	0418 130	115.	8.3	53.3 * 1	0738 230	12.	0.7	50.5
1	0100	31	0.	0.0	50.0 * 1	0420 131	114.	8.2	53.3 * 1	0740 231	11.	0.7	50.5
1	0102	32	0.	0.0	50.0 * 1	0422 132	114.	8.2	53.3 * 1	0742 232	11.	0.6	50.4
1	0104	33	0.	0.0	50.0 * 1	0424 133	113.	8.1	53.3 * 1	0744 233	11.	0.6	50.4
1	0106	34	0.	0.0	50.0 * 1	0426 134	112.	8.1	53.3 * 1	0746 234	11.	0.6	50.4
1	0108	35	0.	0.0	50.0 * 1	0428 135	112.	8.0	53.3 * 1	0748 235	10.	0.6	50.4
1	0110	36	0.	0.0	50.0 * 1	0430 136	111.	8.0	53.2 * 1	0750 236	10.	0.6	50.4
1	0112	37	0.	0.0	50.0 * 1	0432 137	111.	7.9	53.2 * 1	0752 237	10.	0.6	50.4
1	0114	38	0.	0.0	50.0 * 1	0434 138	110.	7.8	53.2 * 1	0754 238	9.	0.5	50.4
1	0116	39	0.	0.0	50.0 * 1	0436 139	109.	7.8	53.2 * 1	0756 239	9.	0.5	50.4
1	0118	40	0.	0.0	50.0 * 1	0438 140	109.	7.7	53.2 * 1	0758 240	9.	0.5	50.4
1	0120	41	0.	0.0	50.0 * 1	0440 141	108.	7.7	53.2 * 1	0800 241	9.	0.5	50.4
1	0122	42	0.	0.0	50.0 * 1	0442 142	107.	7.6	53.1 * 1	0802 242	9.	0.5	50.3
1	0124	43	0.	0.0	50.0 * 1	0444 143	105.	7.4	53.1 * 1	0804 243	8.	0.5	50.3
1	0126	44	0.	0.0	50.0 * 1	0446 144	104.	7.3	53.0 * 1	0806 244	8.	0.5	50.3
1	0128	45	0.	0.0	50.0 * 1	0448 145	102.	7.2	53.0 * 1	0808 245	8.	0.5	50.3
1	0130	46	0.	0.0	50.0 * 1	0450 146	101.	7.1	53.0 * 1	0810 246	8.	0.4	50.3
1	0132	47	0.	0.0	50.0 * 1	0452 147	99.	6.9	52.9 * 1	0812 247	7.	0.4	50.3
1	0134	48	0.	0.0	50.0 * 1	0454 148	98.	6.8	52.9 * 1	0814 248	7.	0.4	50.3
1	0136	49	0.	0.0	50.0 * 1	0456 149	97.	6.7	52.8 * 1	0816 249	7.	0.4	50.3
1	0138	50	0.	0.0	50.0 * 1	0458 150	95.	6.5	52.8 * 1	0818 250	7.	0.4	50.3
1	0140	51	0.	0.0	50.0 * 1	0500 151	93.	6.4	52.8 * 1	0820 251	7.	0.4	50.3
1	0142	52	0.	0.0	50.0 * 1	0502 152	92.	6.3	52.7 * 1	0822 252	7.	0.4	50.3
1	0144	53	0.	0.0	50.0 * 1	0504 153	90.	6.1	52.7 * 1	0824 253	6.	0.4	50.3
1	0146	54	0.	0.0	50.0 * 1	0506 154	89.	6.0	52.6 * 1	0826 254	6.	0.4	50.2
1	0148	55	0.	0.0	50.0 * 1	0508 155	87.	5.9	52.6 * 1	0828 255	6.	0.4	50.2
1	0150	56	0.	0.0	50.0 * 1	0510 156	86.	5.7	52.5 * 1	0830 256	6.	0.3	50.2
1	0152	57	0.	0.0	50.0 * 1	0512 157	84.	5.6	52.5 * 1	0832 257	6.	0.3	50.2
1	0154	58	0.	0.0	50.0 * 1	0514 158	83.	5.5	52.5 * 1	0834 258	6.	0.3	50.2
1	0156	59	0.	0.0	50.0 * 1	0516 159	81.	5.3	52.4 * 1	0836 259	5.	0.3	50.2
1	0158	60	0.	0.0	50.0 * 1	0518 160	80.	5.2	52.4 * 1	0838 260	5.	0.3	50.2
1	0200	61	0.	0.0	50.0 * 1	0520 161	78.	5.1	52.3 * 1	0840 261	5.	0.3	50.2
1	0202	62	0.	0.0	50.0 * 1	0522 162	77.	4.9	52.3 * 1	0842 262	5.	0.3	50.2
1	0204	63	0.	0.0	50.0 * 1	0524 163	76.	4.8	52.3 * 1	0844 263	5.	0.3	50.2
1	0206	64	0.	0.0	50.0 * 1	0526 164	74.	4.7	52.2 * 1	0846 264	5.	0.3	50.2
1	0208	65	0.	0.0	50.0 * 1	0528 165	73.	4.5	52.2 * 1	0848 265	5.	0.3	50.2
1	0210	66	0.	0.0	50.0 * 1	0530 166	72.	4.4	52.1 * 1	0850 266	5.	0.3	50.2

1	0212	67	0.	0.0	50.0	*	1	0532	167	70.	4.3	52.1	*	1	0852	267	4.	0.3	50.2
1	0214	68	0.	0.0	50.0	*	1	0534	168	69.	4.2	52.1	*	1	0854	268	4.	0.3	50.2
1	0216	69	0.	0.0	50.0	*	1	0536	169	68.	4.1	52.0	*	1	0856	269	4.	0.2	50.2
1	0218	70	0.	0.0	50.0	*	1	0538	170	67.	3.9	52.0	*	1	0858	270	4.	0.2	50.2
1	0220	71	0.	0.0	50.0	*	1	0540	171	65.	3.8	51.9	*	1	0900	271	4.	0.2	50.2
1	0222	72	0.	0.0	50.0	*	1	0542	172	64.	3.7	51.9	*	1	0902	272	4.	0.2	50.2
1	0224	73	0.	0.0	50.0	*	1	0544	173	63.	3.6	51.9	*	1	0904	273	4.	0.2	50.2
1	0226	74	0.	0.0	50.0	*	1	0546	174	62.	3.5	51.8	*	1	0906	274	4.	0.2	50.1
1	0228	75	0.	0.0	50.0	*	1	0548	175	60.	3.4	51.8	*	1	0908	275	4.	0.2	50.1
1	0230	76	1.	0.0	50.0	*	1	0550	176	59.	3.3	51.8	*	1	0910	276	4.	0.2	50.1
1	0232	77	1.	0.0	50.0	*	1	0552	177	58.	3.2	51.7	*	1	0912	277	3.	0.2	50.1
1	0234	78	1.	0.0	50.0	*	1	0554	178	56.	3.1	51.7	*	1	0914	278	3.	0.2	50.1
1	0236	79	1.	0.0	50.0	*	1	0556	179	55.	3.0	51.6	*	1	0916	279	3.	0.2	50.1
1	0238	80	1.	0.0	50.0	*	1	0558	180	54.	2.9	51.6	*	1	0918	280	3.	0.2	50.1
1	0240	81	1.	0.1	50.0	*	1	0600	181	52.	2.8	51.6	*	1	0920	281	3.	0.2	50.1
1	0242	82	1.	0.1	50.0	*	1	0602	182	51.	2.7	51.5	*	1	0922	282	3.	0.2	50.1
1	0244	83	1.	0.1	50.1	*	1	0604	183	50.	2.6	51.5	*	1	0924	283	3.	0.2	50.1
1	0246	84	2.	0.1	50.1	*	1	0606	184	49.	2.5	51.4	*	1	0926	284	3.	0.2	50.1
1	0248	85	2.	0.1	50.1	*	1	0608	185	48.	2.4	51.4	*	1	0928	285	3.	0.2	50.1
1	0250	86	3.	0.1	50.1	*	1	0610	186	47.	2.3	51.4	*	1	0930	286	3.	0.2	50.1
1	0252	87	3.	0.2	50.1	*	1	0612	187	46.	2.3	51.3	*	1	0932	287	3.	0.2	50.1
1	0254	88	4.	0.2	50.2	*	1	0614	188	45.	2.2	51.3	*	1	0934	288	3.	0.2	50.1
1	0256	89	5.	0.3	50.2	*	1	0616	189	44.	2.1	51.3	*	1	0936	289	3.	0.1	50.1
1	0258	90	6.	0.4	50.3	*	1	0618	190	43.	2.0	51.3	*	1	0938	290	2.	0.1	50.1
1	0300	91	8.	0.5	50.3	*	1	0620	191	42.	2.0	51.2	*	1	0940	291	2.	0.1	50.1
1	0302	92	11.	0.7	50.5	*	1	0622	192	41.	1.9	51.2	*	1	0942	292	2.	0.1	50.1
1	0304	93	16.	0.9	50.6	*	1	0624	193	39.	1.8	51.2	*	1	0944	293	2.	0.1	50.1
1	0306	94	23.	1.3	50.9	*	1	0626	194	38.	1.8	51.1	*	1	0946	294	2.	0.1	50.1
1	0308	95	34.	1.6	51.1	*	1	0628	195	36.	1.7	51.1	*	1	0948	295	2.	0.1	50.1
1	0310	96	44.	2.1	51.3	*	1	0630	196	35.	1.7	51.1	*	1	0950	296	2.	0.1	50.1
1	0312	97	52.	2.7	51.5	*	1	0632	197	33.	1.6	51.0	*	1	0952	297	2.	0.1	50.1
1	0314	98	61.	3.4	51.8	*	1	0634	198	32.	1.6	51.0	*	1	0954	298	2.	0.1	50.1
1	0316	99	68.	4.0	52.0	*	1	0636	199	30.	1.5	51.0	*	1	0956	299	2.	0.1	50.1
1	0318	100	74.	4.6	52.2	*	1	0638	200	29.	1.5	51.0	*	1	0958	300	2.	0.1	50.1
						*							*						

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	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	9.97-HR
+	(CFS)	(HR)					
			(CFS)				
+	117.	4.00		54.	33.	33.	33.
			(INCHES)	1.074	1.090	1.090	1.090
			(AC-FT)	27.	27.	27.	27.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	9.97-HR
8.	4.00	3.	2.	2.	2.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	9.97-HR
53.41	4.00	51.62	51.00	51.00	51.00

CUMULATIVE AREA = 0.46 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	070808	12.	3.43	2.	1.	1.	0.02		
DIVERSION TO	808OUT	0.	3.43	0.	0.	0.	0.02		
HYDROGRAPH AT	808PP	12.	3.43	2.	1.	1.	0.02		
ROUTED TO	070610	12.	3.43	2.	1.	1.	0.02		
HYDROGRAPH AT	070610	5.	3.43	1.	0.	0.	0.01		
DIVERSION TO	610OUT	0.	3.40	0.	0.	0.	0.01		
HYDROGRAPH AT	610PP	5.	3.40	1.	0.	0.	0.01		
2 COMBINED AT	070610	17.	3.43	3.	2.	2.	0.02		

	ROUTED TO						
+		070508	17.	3.43	3.	2.	2.	0.02
	HYDROGRAPH AT						
+		070508	4.	3.50	1.	0.	0.	0.01
	DIVERSION TO						
+		508OUT	0.	3.50	0.	0.	0.	0.01
	HYDROGRAPH AT						
+		508PP	4.	3.50	1.	0.	0.	0.01
	2 COMBINED AT						
+		070508	21.	3.47	3.	2.	2.	0.03
	ROUTED TO						
+		070010	21.	3.47	3.	2.	2.	0.03
	HYDROGRAPH AT						
+		070010	7.	3.43	1.	1.	1.	0.01
	DIVERSION TO						
+		010OUT	0.	3.43	0.	0.	0.	0.01
	HYDROGRAPH AT						
+		010PP	6.	3.43	1.	1.	1.	0.01
	2 COMBINED AT						
+		070010	27.	3.47	4.	3.	3.	0.04
	ROUTED TO						
+		070210	27.	3.47	4.	3.	3.	0.04
	HYDROGRAPH AT						
+		070209	12.	3.47	2.	1.	1.	0.02
	ROUTED TO						
+		070210	12.	3.47	2.	1.	1.	0.02
	HYDROGRAPH AT						
+		070210	5.	3.47	1.	0.	0.	0.01
	2 COMBINED AT						
+		070210	17.	3.47	3.	2.	2.	0.03

	DIVERSION TO						
+	210OUT	0.	3.43	0.	0.	0.	0.03
	HYDROGRAPH AT						
+	210PP	17.	3.43	3.	2.	2.	0.03
	2 COMBINED AT						
+	070210	44.	3.47	7.	4.	4.	0.07
	ROUTED TO						
+	050005	44.	3.47	7.	4.	4.	0.07
	HYDROGRAPH AT						
+	050005	21.	3.53	3.	2.	2.	0.04
	DIVERSION TO						
+	005OUT	0.	3.53	0.	0.	0.	0.04
	HYDROGRAPH AT						
+	005PP	21.	3.53	3.	2.	2.	0.04
	HYDROGRAPH AT						
+	070010	0.	3.37	0.	0.	0.	0.00
	ROUTED TO						
+	070020	0.	3.47	0.	0.	0.	0.00
	ROUTED TO						
+	070030	0.	3.67	0.	0.	0.	0.00
	HYDROGRAPH AT						
+	070030	5.	3.07	1.	0.	0.	0.00
	2 COMBINED AT						
+	070030	5.	3.07	1.	0.	0.	0.00
	ROUTED TO						
+	070040	5.	3.10	1.	0.	0.	0.00
	HYDROGRAPH AT						
+	070210	0.	3.47	0.	0.	0.	0.00
	ROUTED TO						
+	070220	0.	3.47	0.	0.	0.	0.00

	ROUTED TO						
+		070040	0.	3.77	0.	0.	0.	0.00
	HYDROGRAPH AT						
+		070040	5.	3.20	1.	0.	0.	0.01
	3 COMBINED AT						
+		070040	9.	3.13	1.	1.	1.	0.01
	ROUTED TO						
+		070050	9.	3.17	1.	1.	1.	0.01
	HYDROGRAPH AT						
+		070050	23.	3.07	2.	1.	1.	0.02
	2 COMBINED AT						
+		070050	30.	3.10	4.	2.	2.	0.03
	ROUTED TO						
+		070060	30.	3.13	4.	2.	2.	0.03
	HYDROGRAPH AT						
+		070310	30.	3.07	3.	2.	2.	0.02
	ROUTED TO						
+		070060	30.	3.10	3.	2.	2.	0.02
	HYDROGRAPH AT						
+		070060	26.	3.10	3.	2.	2.	0.02
	3 COMBINED AT						
+		070060	83.	3.10	9.	6.	6.	0.07
	ROUTED TO						
+		070070	82.	3.13	9.	6.	6.	0.07
	HYDROGRAPH AT						
+		070070	43.	3.07	4.	3.	3.	0.03
	HYDROGRAPH AT						
+		070080	52.	3.13	4.	2.	2.	0.02
	3 COMBINED AT						
+		070080	168.	3.13	17.	10.	10.	0.12

	ROUTED TO								
+		07Det	46.	3.67	17.	10.	10.	0.12	
+									69.95 3.67
	DIVERSION TO								
+		07Qspl	0.	3.67	0.	0.	0.	0.12	
	HYDROGRAPH AT								
+		07Qpip	46.	3.67	17.	10.	10.	0.12	
	ROUTED TO								
+		070420	46.	3.67	17.	10.	10.	0.12	
	HYDROGRAPH AT								
+		070410	17.	3.13	2.	1.	1.	0.01	
	ROUTED TO								
+		070420	17.	3.13	2.	1.	1.	0.01	
	HYDROGRAPH AT								
+		070420	5.	3.20	0.	0.	0.	0.00	
	3 COMBINED AT								
+		070420	59.	3.20	19.	12.	12.	0.14	
	ROUTED TO								
+		210005	59.	3.20	19.	12.	12.	0.14	
	HYDROGRAPH AT								
+		210005	13.	3.23	1.	1.	1.	0.01	
	2 COMBINED AT								
+		210005	72.	3.23	20.	12.	12.	0.15	
	ROUTED TO								
+		050030	72.	3.23	20.	12.	12.	0.15	
	HYDROGRAPH AT								
+		050005	0.	3.40	0.	0.	0.	0.00	
	ROUTED TO								
+		050010	0.	4.63	0.	0.	0.	0.00	
	HYDROGRAPH AT								
+		050010	96.	3.13	8.	5.	5.	0.07	

	2 COMBINED AT								
+		050010	96.	3.13	8.	5.	5.	0.07	
	ROUTED TO								
+		050020	93.	3.17	8.	5.	5.	0.07	
	HYDROGRAPH AT								
+		050210	100.	3.13	8.	5.	5.	0.05	
	ROUTED TO								
+		210ST	0.	5.53	0.	0.	0.	0.05	
+									0.55 9.97
	ROUTED TO								
+		050020	0.	4.73	0.	0.	0.	0.05	
	HYDROGRAPH AT								
+		050020	13.	3.17	1.	1.	1.	0.01	
	3 COMBINED AT								
+		050020	105.	3.17	10.	6.	6.	0.13	
	ROUTED TO								
+		050030	103.	3.20	10.	6.	6.	0.13	
	HYDROGRAPH AT								
+		050030	54.	3.10	3.	2.	2.	0.02	
	ROUTED TO								
+		030ST	20.	3.27	2.	1.	1.	0.02	
+									68.13 3.27
	3 COMBINED AT								
+		050030	190.	3.20	32.	20.	20.	0.30	
	ROUTED TO								
+		050305	188.	3.20	32.	20.	20.	0.30	
	ROUTED TO								
+		050050	186.	3.27	32.	20.	20.	0.30	
	HYDROGRAPH AT								
+		050040	105.	3.20	12.	7.	7.	0.10	

	ROUTED TO								
+		40STOR	37.	3.67	12.	7.	7.	0.10	
+								61.58	3.67
	ROUTED TO								
+		050050	37.	3.67	12.	7.	7.	0.10	
	HYDROGRAPH AT								
+		050310	11.	3.13	1.	1.	1.	0.01	
	ROUTED TO								
+		SRPDet	5.	3.37	1.	1.	1.	0.01	
+								54.43	3.37
	HYDROGRAPH AT								
+		S 64th	7.	3.30	1.	0.	0.	0.01	
	HYDROGRAPH AT								
+		050065	37.	3.07	2.	1.	1.	0.01	
	HYDROGRAPH AT								
+		050062	16.	3.10	1.	1.	1.	0.01	
	ROUTED TO								
+		050050	15.	3.13	1.	1.	1.	0.01	
	6 COMBINED AT								
+		050050	254.	3.23	49.	30.	30.	0.43	
	HYDROGRAPH AT								
+		050060	53.	3.17	5.	3.	3.	0.03	
	2 COMBINED AT								
+		050050	302.	3.23	54.	33.	33.	0.46	
	ROUTED TO								
+		05Det	117.	4.00	54.	33.	33.	0.46	
+								53.41	4.00
	DIVERSION TO								
+		05Qspl	0.	4.00	0.	0.	0.	0.46	
	HYDROGRAPH AT								
+		05Qpip	117.	4.00	54.	33.	33.	0.46	

	HYDROGRAPH AT							
+		050610	99.	3.17	10.	6.	6.	0.08
	2 COMBINED AT							
+		050610	143.	3.17	63.	38.	38.	0.54
	ROUTED TO							
+		050620	142.	3.20	63.	38.	38.	0.54
	HYDROGRAPH AT							
+		050620	110.	3.17	12.	7.	7.	0.10
	2 COMBINED AT							
+		050620	249.	3.20	74.	45.	45.	0.64
	ROUTED TO							
+		050630	249.	3.20	74.	45.	45.	0.64
	HYDROGRAPH AT							
+		050630	120.	3.13	9.	6.	6.	0.06
	2 COMBINED AT							
+		050630	343.	3.20	84.	51.	51.	0.70
	ROUTED TO							
+		050660	341.	3.23	84.	51.	51.	0.70
	HYDROGRAPH AT							
+		050100	79.	3.17	6.	4.	4.	0.03
	2 COMBINED AT							
+		050660	405.	3.23	90.	55.	55.	0.74
	ROUTED TO							
+		050131	400.	3.23	90.	55.	55.	0.74
	HYDROGRAPH AT							
+		050131	55.	3.13	4.	3.	3.	0.02
	2 COMBINED AT							
+		050131	438.	3.23	94.	57.	57.	0.76
	ROUTED TO							
+		051410	435.	3.27	94.	57.	57.	0.76

	HYDROGRAPH AT						
+	051410	178.	3.13	13.	8.	8.	0.07
	2 COMBINED AT						
+	051410	547.	3.23	107.	65.	65.	0.83
	ROUTED TO						
+	051420	544.	3.27	107.	65.	65.	0.83

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING

SUMMARIES REMOVED FOR PRINTOUT- SEE ELECTRONIC FILE

1

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 210ST
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	0.00	1.00	1.00
STORAGE	0.	8.	8.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	0.55	0.00	4.	0.	0.00	9.97	0.00

1

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 030ST
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	65.00	68.00	68.00
STORAGE	0.	1.	1.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	68.13	0.13	1.	20.	6.87	3.27	0.00

*** NORMAL END OF HEC-1 ***

Paiute Park
Stage/Storage/Discharge Curve Calculations

HEC-1 Model-

PBOsb.DAT

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               MAY   1991              *
*            VERSION 4.0.1E             *
*      Lahey F77L-EM/32 version 5.01    *
*         Dodson & Associates, Inc.     *
*  RUN DATE  06/30/99  TIME  09:22:54   *
*****************************************
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*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*    HYDROLOGIC ENGINEERING CENTER  *
*          609 SECOND STREET        *
*        DAVIS, CALIFORNIA 95616    *
*            (916) 551-1748         *
*                                   *
*************************************
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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
                * ************************************************************************
                * This is ALTERNATIVE A hydrology for Change Order #2
                *
                * - This model is based on the Recommended Plan - Part A for the Osborn Road
                *     Outfall with the following changes:
                *        Osborn Road Outfall has been modified to include a junction structure
                *        at Miller Road.  The junction conveys excess runoff across Osborn Road
                *        into Osborn Park located between old Osborn Road and new Osborn Road.
                *        The outfall structure(s) for the park have been augmented to handle the
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*        excess runoff.  The primary runoff continues east along Osborn Road and
*        outfalls to Indian Bend Wash.
*
ID    ************************************************************************
ID    STP-PAPAGO REGIONAL FLOOD CONTROL PROJECT
ID    SCOTTSDALE - TEMPE - PHOENIX
ID    ************************************************************************
ID
ID    Kimley-Horn and Associates, Inc.
ID    KVL Consultants, Inc.
ID
ID    10-Year, 6-Hour Storm Event
ID    10/97
ID
ID    FILE MODIFIED BY PARSONS BRINCKERHOFF TO BE USED IN DESIGN OF OSBORN OUTFALL
ID    MODIFICATIONS:
ID    1) SUBBASIN 050062 REROUTED DIRECTLY TO PAIUTE PARK- IMPROVEMENTS TO 64TH ST
ID       CONVEY FLOW TO DETENTION BASIN. AREA REDUCED TO 3.9 ACRES (0.0061 SM)
ID    2) PAIUTE PARK STAGE/DISCHARGE CURVE ADJUSTED
ID    3) SUBBASINS CONTRIBUTING TO 66" ADOT PIPE AND CONCENTRATION POINT 051510
ID       (BROWN ROAD) ROUTED OUT OF PROPOSED PIPE (SUBBASINS 050710, 050720,
ID       051510 AND 050810)
ID    4) REVISE AREA OF SUBBASIN 050130 FROM 0.041 SM TO 0.0063 SM.AND ROUTE TO
ID       EXISTING DETENTION BASIN. REMAINING AREA IS SRP PROPERTY WHICH DRAINS
ID       WEST.
ID       AREA REDUCTION DUE TO:
ID       REMOVE APARTMENTS AT THOMAS AND 64TH ST DUE TO ON-SITE RETENTION.
ID       REMOVE PORTION OF SRP SUBSTATION WHICH DRAINS EAST.
ID       COLLECT PAVEMENT FLOWS FROM 64TH ST (THOMAS TO PAIUTE PARK) IN LARGE PIPE
ID       COLLECT FLOWS FROM PAVED AREA BETWEEN SUBSTATION AND APARTMENTS IN LARGE
ID       PIPE
ID    Parsons Brinckerhoff
ID    Alan Humphrey
ID    3/15/99
*
*DIAGRAM
IT       2                    300
IO       5

KK  070808   BASIN
BA   0.017
PH       0       0    0.50    0.97    1.61    1.76    1.86    2.05
LS       0      88       0       0      98       0
UK     300  0.0100    0.20      99
UK     100  0.0100    0.10       1
RK    1600   0.214    0.03            TRAP       2     3.5
*
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* The 10 year flows are diverted into a proposed storm drain along Oak Street.
* In storm events greater than the 10 yr, the remaining flow will follow its
* natural course across and sheet flow across Oak Street to the north.
*
1                                    HEC-1 INPUT                                    PAGE  2

LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   41     KK   808PP  Divert 10-year flows into storm drain
   42     DT  808OUT
   43     DI       0      12      13      15      50     100
   44     DQ       0    0.01       1       3      38      88

   45     KK  070610 FROM  070808
   46     RK     240  0.0066   0.013            CIRC    3.00

   47     KK  070610   BASIN
   48     BA   0.007
   49     LS       0      88       0       0      98       0
   50     UK     300  0.0100    0.20      99
   51     UK     100  0.0100    0.10       1
   52     RK     500   0.054    0.03            TRAP       2     3.5

   53     KK   610PP  Divert 10-year flows into storm drain
   54     DT  610OUT
   55     DI       0       5       6      10      50     100
   56     DQ       0     .01       1       5      45      95

   57     KK  070610 COMBINE
   58     HC       2

   59     KK  070508    FROM  070610
   60     RK     420  0.0066   0.013            CIRC    3.00

   61     KK  070508   BASIN
   62     BA   0.008
   63     LS       0      85       0       0      98       0
   64     UK     300  0.0100    0.20      99
   65     UK     100  0.0100    0.10       1
   66     RK     600   0.048    0.03            TRAP       9     1.0

   67     KK   508PP  Divert 10-year flows into storm drain
   68     DT  508OUT
   69     DI       0       4       5      15      50     100
   70     DQ       0     .01       1      11      46      96
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 71          KK  070508 COMBINE
 72          HC       2

 73          KK  070010    FROM  070508
 74          RK     270  0.0066   0.013            CIRC    3.00

 75          KK  070010   BASIN
 76          BA   0.009
 77          LS       0      88       0       0      98       0
 78          UK     300  0.0100    0.20      99
 79          UK     100  0.0100    0.10       1
 80          RK    1200   0.042    0.03            TRAP       2     3.5
1                                      HEC-1 INPUT                                                PAGE  3

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 81          KK   010PP  Divert 10-year flows into storm drain
 82          DT  010OUT
 83          DI       0       7      10      15      50     100
 84          DQ       0     .01       3       8      43      93

 85          KK  070010 COMBINE
 86          HC       2

 87          KK  070210    FROM  070010
 88          RK     120  0.0033   0.013            CIRC    3.00

 89          KK  070209   BASIN
 90          BA   0.018
 91          LS       0      87       0       0      98       0
 92          UK     300  0.0100    0.20      99
 93          UK     100  0.0100    0.10       1
 94          RK    1200   0.252    0.03            TRAP       2     3.5

 95          KK  070210    FROM  070209
 96          RK     750   0.252   0.013            TRAP      10       1

 97          KK  070210   BASIN
 98          BA   0.008
 99          LS       0      87       0       0      98       0
100          UK     300  0.0100    0.20      99
101          UK     100  0.0100    0.10       1
102          RK     600   0.043    0.03            TRAP       2     3.5

103          KK  070210 COMBINE
104          HC       2
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105          KK   210PP  Divert 10-year flows into storm drain
106          DT  210OUT
107          DI        0       17       20       30       50      100
108          DQ        0      .01        3       13       33       83

109          KK  070210 COMBINE
110          HC        2

111          KK  050005   FROM 070210
112          RK      950   0.008   0.013            CIRC    3.00

113          KK  050005   BASIN
114          BA   0.038
115          LS        0       85        0        0       98        0
116          UK      300  0.0100     0.20       99
117          UK      100  0.0100     0.10        1
118          RK     1650    0.09     0.03             TRAP       30     1.0
1                                      HEC-1 INPUT                                                    PAGE  4

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

119          KK   005PP  Divert 10-year flows into storm drain
120          DT  005OUT
121          DI        0       21       22      100      150      200
122          DQ        0      .01        1       79      129      179
             *
             * The start of the Osborn Road outfall hydrology
             *

123          KK  070010
124          KM    Retrieve overland flows at CP 070010
125          DR  010OUT

126          KK  070020    FROM  070010
127          RK      178  0.0131   0.013            CIRC     1.0

128          KK  070030    FROM  070020
129          RK      520  0.0146   0.025            TRAP     9.0       1

130          KK  070030   BASIN
131          BA   0.004
132          LS        0       85        0        0       98        0
133          UK      150  0.0100     0.30       65
134          UK       50  0.0100     0.10       35
135          RK      522  0.0146     0.03             TRAP       2     3.5
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136          KK  070030 COMBINE
137          HC       2

138          KK  070040    FROM  070030
139          RK     177  0.0146   0.017            TRAP    54.8       1

140          KK  070210
141          KM    Retrieve overland flows at CP 070210
142          DR  210OUT

143          KK  070220    FROM  070210
144          RK     164  0.0131   0.013            CIRC     1.0

145          KK  070040    FROM  070220
146          RK     723  0.0146   0.017            TRAP    54.8       1

147          KK  070040   BASIN
148          BA   0.006
149          LS       0      86       0       0      98        0
150          UK     181  0.0100    0.28      72
151          UK      60  0.0100    0.10      28
152          RK    1946  0.0146    0.02            TRAP      30     1.0

153          KK  070040 COMBINE
154          HC       3
1                                        HEC-1 INPUT                                        PAGE  5

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

155          KK  070050    FROM  070040
156          RK     878  0.0146   0.025            TRAP    20.0     1.0

157          KK  070050   BASIN
158          BA   0.018
159          LS       0      86       0       0      98        0
160          UK     150  0.0100    0.30      65
161          UK      50  0.0100    0.10      35
162          RK     290  0.0058    0.02            TRAP      11     1.0
163          RK     981  0.0146    0.02            TRAP      11     1.0

164          KK  070050 COMBINE
165          HC       2

166          KK  070060    FROM  070050
167          RK     872  0.0058   0.025            TRAP     1.0     1.0
```

```
 168          KK  070310   BASIN
 169          BA   0.023
 170          LS       0      86       0       0      98       0
 171          UK     150  0.0100    0.30      65
 172          UK      50  0.0100    0.10      35
 173          RK     278  0.0058    0.02            TRAP      11     1.0
 174          RK     986  0.0146    0.02            TRAP      11     1.0

 175          KK  070060    FROM  070310
 176          RK     745  0.0058   0.025            TRAP     1.0     1.0

 177          KK  070060   BASIN
 178          BA   0.020
 179          LS       0      86       0       0      98       0
 180          UK     150  0.0100    0.30      65
 181          UK      50  0.0100    0.10      35
 182          RK    1096  0.0058    0.03            TRAP       2     1.0

 183          KK  070060 COMBINE
 184          HC       3

 185          KK  070070    FROM  070060
 186          RK     726  0.0146   0.025            TRAP    30.0     1.0

 187          KK  070070   BASIN
 188          BA   0.032
 189          LS       0      86       0       0      98       0
 190          UK     150  0.0100    0.30      65
 191          UK      50  0.0100    0.10      35
 192          RK    1209  0.0146    0.03            TRAP       2     1.0

 193          KK  070080   BASIN
 194          BA   0.021
 195          LS       0      83       0       0      98       0
 196          UK      29  0.0100    0.39       9
 197          UK     189  0.0100    0.10      91
 198          RK    1257  0.0058    0.02            TRAP      30     1.0
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 199          KK  070080 COMBINE
 200          HC       3

 201          KK   07Det   Detention basin at Marriott's Brighton Gardens
```

```
202         RS       1    STOR
203         SV       0    0.78    1.64    2.65    3.84    5.21    6.77    6.77
204         SE      66      67      68      69      70      71      72      73
205         SQ       0      12      36      42      46      48      52     355
            *
            * Marriott's Brighton Gardens outfall - 07Qpip is the outflow in the storm drain
            * 07Qspl is the flow overtopping the basin
            *

206         KK  07Qpip
207         DT  07Qspl
208         DI       0      71     112     172     245     329     420     518     623
209         DQ       0     0.1      26      72     132     204     285     374     471

210         KK  070420   FROM 07Qpip
211         RK    1000   0.005   0.013           CIRC     3.0

212         KK  070410   BASIN
213         BA   0.011
214         LS       0      84       0       0      98       0
215         UK     144  0.0100    0.32      44
216         UK     121  0.0100    0.10      56
217         RK    1816  0.0146    0.02            TRAP      23     1.0

218         KK  070420    FROM  070410
219         RK     183  0.0058   0.017           TRAP    52.5       1

220         KK  070420   BASIN
221         BA   0.003
222         LS       0      79       0       0      98       0
223         UK     177  0.0100    0.31      25
224         UK     200  0.0100    0.10      75
225         RK    1046  0.0058    0.02            TRAP      49     1.0

226         KK  070420 COMBINE
227         HC       3

228         KK  210005  FROM 070420
229         RK     450   0.005   0.013           CIRC     3.5

230         KK  210005   BASIN
231         BA   0.008
232         LS       0      79       0       0      98       0
233         UK      94  0.0100    0.34      26
234         UK     116  0.0100    0.10      74
235         RK     523  0.0032    0.02            TRAP      38     1.0
236         RK    1250  0.0020    0.02            TRAP      45     1.0
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  237     KK  210005 COMBINE
  238     HC       2

  239     KK  050030   FROM 210005
  240     RK    1600   0.005   0.013            CIRC       4

  241     KK  050005
  242     KM    Retrieve overland flows at CP 050005
  243     DR  005OUT

  244     KK  050010   FROM 050005
  245     RK    1300   0.015    0.02            TRAP      35       1

  246     KK  050010   BASIN
  247     BA   0.066
  248     LS       0      81       0       0      98       0
  249     UK     144  0.0100    0.30      52
  250     UK      57  0.0100    0.10      48
  251     RK    1189  0.0033    0.02            TRAP      30     1.0
  252     RK    1197  0.0038    0.02            TRAP      60     1.0

  253     KK  050010   COMBINE
  254     HC       2

  255     KK  050020    FROM  050010
  256     RK    1370  0.0038   0.017            TRAP    37.5       1

  257     KK  050210   BASIN
  258     BA   0.054
  259     LS       0      79       0       0      98       0
  260     UK     200  0.0100    0.30      28
  261     UK     200  0.0100    0.10      72
  262     RK     564  0.0038    0.02            TRAP      23     1.0
  263     RK    1199  0.0033    0.02            TRAP      23     1.0

  264     KK   210ST STORAGE
  265     RS       1    STOR
  266     SV    0.00    7.72    7.72
  267     SE    0.00    1.00    2.00
  268     SQ    0.00    0.01    0.01
  269     ST     1.0     500     3.0     1.5
```

```
270          KK  050020    FROM  050210
271          RK     278  0.0033   0.017            TRAP    60.0       1

272          KK  050020   BASIN
273          BA   0.009
274          LS       0      79       0       0      98       0
275          UK     166  0.0100    0.30      39
276          UK      98  0.0100    0.10      61
277          RK    1304  0.0038    0.02            TRAP      60     1.0
1                                          HEC-1 INPUT                                                PAGE  8

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

278          KK  050020 COMBINE
279          HC       3

280          KK  050030    FROM  050020
281          RK     347  0.0038   0.017            TRAP    37.5       1

282          KK  050030   BASIN
283          BA   0.020
284          LS       0      79       0       0      98       0
285          UK     150  0.0100    0.30      15
286          UK      50  0.0100    0.10      85
287          RK     278  0.0038    0.02            TRAP       9     1.0
288          RK    1468  0.0033    0.02            TRAP       9     1.0
             *
             * Scottsdale Executive Villas natural storage in parking lot
             *

289          KK   030ST STORAGE
290          RS       1    STOR
291          SV       0    0.01    0.06    0.62    2.72    2.72
292          SE      65      66      67      68      69      70
293          SQ    0.00    0.01    0.01    0.01    0.01    0.01
294          ST      68     150     3.0     1.5

295          KK  050030 COMBINE
296          HC       3

297          KK  050305   FROM 050030
298          RK     150   0.002   0.013            CIRC     5.5

299          KK  050050   FROM 050305
300          RK    1500   0.001   0.013            TRAP       9     1.0
```

```
301          KK  050040   BASIN
302          BA   0.102
303          LS       0      79       0       0      98       0
304          UK     150  0.0100    0.30      57
305          UK      50  0.0100    0.10      43
306          RK    2230  0.0038    0.02            TRAP      38     1.0
307          RK    2654  0.0038    0.02            TRAP      38     1.0

308          KK  40STOR  Storage on west side of cross-cut canal
309          RS       1
310          SV       0       0       0       0     2.6    13.5    13.5
311          SE      58      59      60      61      62      63      64
312          SQ       0      10      22      32      40      50      55

313          KK  050050    FROM  050040
314          RK     491  0.0334   0.013           CIRC     2.5
             * ********************************************************************
             * PB Modification:
             * Reduce Area of Subbasin 050310 to 4.0 Acres (0.0063 SM)
             * Remaining area is west side of SRP substation
             * Remove one routing card for internal flows- this reduces route
             * length.
             * Add storage route through existing detention basin
             * Flows from other areas of original subbasin retained on-site or
             * collected by large pipe in 64th St.
             * ********************************************************************
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

315          KK  050310   BASIN
             * BA 0.041
316          BA   0.0063
317          LS       0      79       0       0      98       0
318          UK     200  0.0100    0.30      28
319          UK     200  0.0100    0.10      72
320          RK     816  0.0033    0.02            TRAP      30     1.0
             * RK   848  0.0038    0.02            TRAP      30     1.0

321          KK  SRPDet
322          KO       2
323          RS       1    STOR
324          SA   0.152   0.207   0.207
325          SE    53.4      56      57
326          SQ       0       2       4       5       8      10      20      40
327          SE    53.4    54.0    54.3    54.5    54.9    55.1   53.48      57
```

```
* ***************************************************************
* PB Modification:
* Add subbasin to represent flows from pavement of 64th St south
* of Paiute Park and paved area between SRP substation and new
* apartments. Area to be collected by large pipe in 64th St.

KK  S 64th   BASIN
BA   0.011
LS       0      79       0       0      83       0
UK     100   0.004     0.1      53
UK     100   0.008     0.1      47
RK    1430   0.004   0.015            TRAP      35       1

KK  050065   BASIN
BA   0.014
LS       0      79       0       0      98       0
UK     100    0.01     0.1      15
UK     100    0.01     0.1      85
RK     500   0.005   0.012            TRAP      60       1
*
* ***************************************************************
* PB Modification
* Relocate hydrograph and subsequent route for Basin 050060
* Combine separately to get peak flow in main pipe
* KK050060   BASIN
* BA 0.029
* LS     0      79       0       0      98       0
* UK   105    0.01     0.3      20
* UK   160    0.01     0.1      80
* RK  1300  0.0038    0.03            TRAP     100     1.0
*
* ***************************************************************
* PB Modification
* Relocate hydrograph and subsequent route for Basin 050062
* Modify pipe length to reflect storm drain route on 64th St
* Insert hydrographs at this location
* Revise basin area to 3.8 acres (0.0061 square miles)
* ***************************************************************
```



```
LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK  050062   BASIN
BA   0.0061
* Original KH model had 2 BA cards. The 0.006 card was first, leaving
* the 0.014 card to be used in the model.
```

```
          * BA 0.006
          * BA 0.014
342       LS       0      79       0       0      98       0
343       UK     100    0.01     0.3      15
344       UK      50    0.01     0.1      85
345       RK     900   0.005   0.012            TRAP      60       1

346       KK  050050   FROM 050062
347       KO       2
348       RK    1000   0.002   0.013            CIRC     2.5       1
          *
          * Flows combined from 050040, 050305, revised 050310 and 050065
          * into main pipe above Paiute Park. PB- Add 050062 and S 64th
          *

349       KK  050050 COMBINE
350       KM   Peak flow in main pipe above Paiute Park
351       KO       2
352       HC       6
          * Revise Hydrograph combine count from 5 to 6
          * Move Subbasin 050060 (Paiute Park) to combine here.

353       KK  050060   BASIN
354       BA   0.029
355       LS       0      79       0       0      98       0
356       UK     105    0.01     0.3      20
357       UK     160    0.01     0.1      80
358       RK    1300  0.0038    0.03            TRAP     100     1.0

359       KK  050050 COMBINE
360       KM   Paiute Park inflow
361       HC       2
          * ********************************************************************
          * PB Modification:
          * Revise Kimley-Horn stage/storage/discharge curve
          * Revisions based on iterative calculations which included effect of
          * Paiute Park discharges on downstream pipe system.
          * ********************************************************************

362       KK   05Det
363       KO       2
          * Original KH Curve
          * RS     1    STOR
          * SV     0    0.64    2.37    5.14    8.40    11.7    15.1    18.5    22.1
          *    22.1S
          * SE    49      50      51      52      53      54      55      56      57
          *       58
```

```
                * SQ   4.5      22      37      47      56      65      73      81      88
                *      156
                * Revised PB Curve
1                                          HEC-1 INPUT                                    PAGE 11

LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  364           RS       1    STOR
  365           SA    1.20    1.84    3.17    3.21    3.31    3.35    3.42    3.49
  366           SE      50      51      52      53      54      55      56      57
  367           SQ       0      20      40      60      80     100     120     140
  368           SE      50    50.8   51.18   51.78   52.39   52.94   53.48   54.04
                *
                * Paiute Park outfall - 05Qpip is the outflow in the storm drain
                * 05Qspl is the flow overtopping the basin
                *
                *
                * Overflows to CP 050060
                *

  369           KK  05Qpip
  370           KO       2
  371           DT  05Qspl
  372           DI       0     160     382     780    1292    1897
  373           DQ       0    0.01     212     600    1102    1697
                *
                * Begin storm drain system in Osborn Road
                *
                * ********************************************************************
                * PB Modification
                * Relocate hydrograph and subsequent route for Basin 050062
                * Remove hydrographs from this location
                * ********************************************************************
                * KK050062   BASIN
                * BA 0.006
                * BA 0.014
                * LS      0      79       0       0      98       0
                * UK    100    0.01     0.3      15
                * UK     50    0.01     0.1      85
                * RK    900   0.005   0.012            TRAP      60       1
                * KK050610   FROM 050062
                * RK   1500   0.003   0.013            TRAP      60       1

  374           KK  050610   BASIN
  375           BA   0.081
  376           LS       0      79       0       0      98       0
  377           UK     130  0.0100    0.32      56
```

```
378          UK      70  0.0100    0.10      44
379          RK    1450  0.0038    0.02            TRAP      45     1.0
380          RK    1240  0.0033    0.02            TRAP      60     1.0
             * ****************************************************************
             * PB Modification
             * Revise combine operation from 3 to 2 hydrographs due to hydrograph
             * relocation.
             * ****************************************************************

381          KK  050610    COMBINE
382          KM   OSBORN & PINTO
383          KO       2
384          HC       2
1                                        HEC-1 INPUT                                        PAGE 12

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


385          KK  050620    FROM  050610
386          RK    1050  0.0037   0.013            CIRC       6

387          KK  050620   BASIN
388          BA   0.099
389          LS       0      79       0       0      98       0
390          UK     147  0.0100    0.30      56
391          UK      53  0.0100    0.10      44
392          RK     940  0.0033    0.02            TRAP      41     1.0
393          RK    2545  0.0038    0.02            TRAP      60     1.0

394          KK  050620 COMBINE
395          KM   OSBORN & 68TH ST
396          KO       2
397          HC       2

398          KK  050630    FROM  050620
399          RK    1440  0.0028   0.013            CIRC       7

400          KK  050630   BASIN
401          BA   0.062
402          LS       0      79       0       0      98       0
403          UK     138  0.0100    0.31      33
404          UK      64  0.0100    0.10      67
405          RK    1205  0.0038    0.02            TRAP      41     1.0
406          RK    1348  0.0033    0.02            TRAP      60     1.0

407          KK  050630 COMBINE
408          KM   OSBORN & 70TH ST
```

```
409          KO       2
410          HC       2

411          KK  050640    FROM  050630
412          RK    1150  0.0024   0.013            CIRC       8
             * ****************************************************************
             * PB Modification:
             * ADOT 66" pipe- Flows to exit model via Scottsdale Road storm drain
             * Remove hydrograph and subsequent routes for Basins 050710 and 050720
             * Flows do not reenter model. Adjust by removing basins and revising HC card.
             * Remove hydrographs from this location
             * ****************************************************************
             * KK050710   BASIN
             * BA 0.005
             * LS     0      79       0       0      98       0
             * UK    21  0.0100    0.40      15
             * UK   200  0.0100    0.10      85
             * RK   610  0.0038    0.02            TRAP      55     1.0
             * KK050720    FROM  050710
             * RK   316  0.0045   0.013            CIRC     5.5
             * KK050720   BASIN
             * BA 0.028
             * LS     0      79       0       0      98       0
             * UK    57  0.0100    0.38      17
             * UK   188  0.0100    0.10      83
             * RK   580  0.0038    0.02            TRAP      45     1.0
             * RK  1594  0.0033    0.02            TRAP      55     1.0
             * KK050720   COMBINE
             * HC     2
             * KK050640    FROM  050720
             * RK   422  0.0045   0.013            CIRC     5.5
1                                      HEC-1 INPUT                                    PAGE 13

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

413          KK  050640   BASIN
414          BA   0.032
415          LS       0      79       0       0      98       0
416          UK      64  0.0100    0.37      15
417          UK     149  0.0100    0.10      85
418          RK    1605  0.0038    0.02            TRAP      41     1.0
419          RK    1168  0.0033    0.02            TRAP      60     1.0
             * ****************************************************************
             * PB Modification
             * Revise combine operation from 3 to 2 hydrographs due to hydrograph
             * deletion.
```

```
                * ********************************************************************
420             KK  050640 COMBINE
421             KM   OSBORN & SCOTTSDALE
422             KO       2
423             HC       2

424             KK  051510   FROM 050640
425             RK     700  0.0044   0.013           CIRC     9.5
                * ********************************************************************
                * PB Modification:
                * Brown Road - flows to exit model via Scottsdale Road Storm Drain
                * Remove hydrograph and subsequent routes for Basins 050810 and 050510
                * Flows do not reenter model. Adjust by removing basin, route and HC cards.
                * Remove hydrographs from this location
                * ********************************************************************
                * KK050810   BASIN
                * BA 0.013
                * LS     0      79       0       0      98       0
                * UK    88  0.0100    0.36      20
                * UK   200  0.0100    0.10      80
                * RK   164  0.0033    0.02            TRAP      28     1.0
                * RK  1031  0.0038    0.02            TRAP      55     1.0
                * KK051510    FROM  050810
                * RK   705  0.0025   0.013           CIRC     4.0
                * KK051510   BASIN
                * BA 0.010
                * LS     0      79       0       0      98       0
                * UK    59  0.0100    0.38      18
                * UK   200  0.0100    0.10      82
                * RK   139  0.0038    0.02            TRAP      41     1.0
                * RK   521  0.0033    0.02            TRAP      71     1.0
                * KK051510    COMBINE
                * HC     3

426             KK  051520    FROM  051510
427             RK     680  0.0028   0.013           CIRC     9.5
1                                      HEC-1 INPUT                                    PAGE 14

LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

428             KK  051610   BASIN
429             BA   0.021
430             LS       0      79       0       0      98       0
431             UK     165  0.0100    0.32      25
432             UK     200  0.0100    0.10      75
```

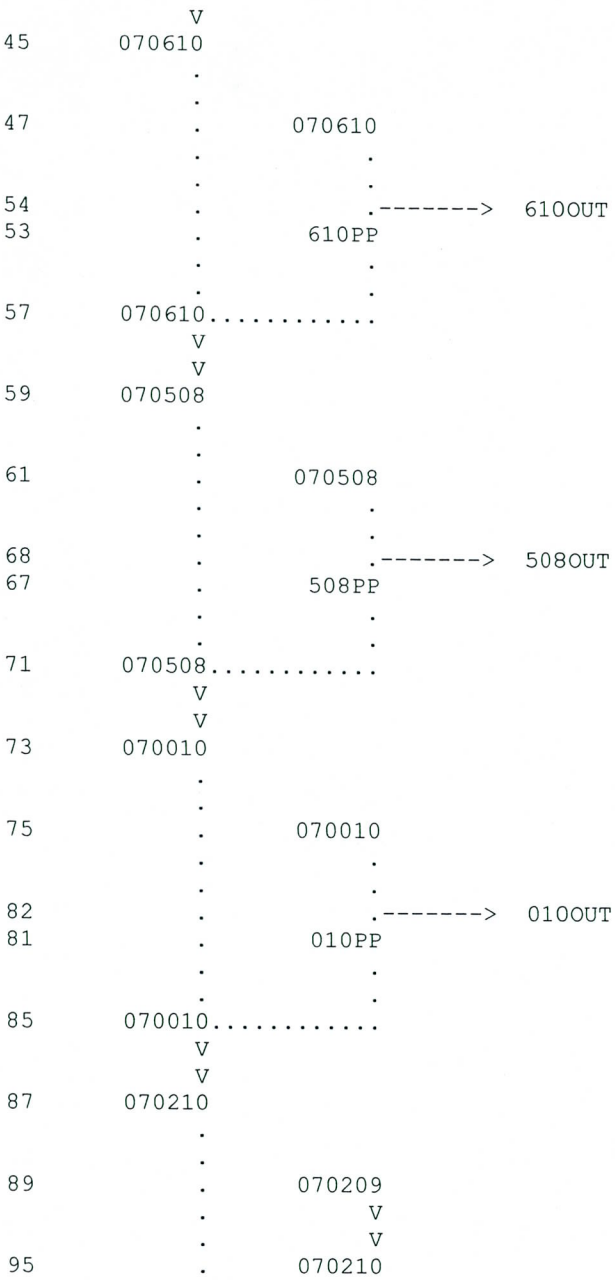
```
433          RK     624  0.0038    0.02           TRAP      41     1.0
434          RK     792  0.0033    0.02           TRAP      60     1.0

435          KK  051520    FROM  051610
436          RK     601  0.0047   0.013           CIRC     5.0

437          KK  051710   BASIN
438          BA   0.004
439          LS       0      79       0       0      98       0
440          UK     146  0.0100    0.33      24
441          UK     200  0.0100    0.10      76
442          RK     515  0.0038    0.02           TRAP      30     1.0
443          RK     287  0.0033    0.02           TRAP      30     1.0

444          KK  051520    FROM  051710
445          RK     567  0.0032   0.013           CIRC     4.0

446          KK  051520   BASIN
447          BA   0.023
448          LS       0      79       0       0      98       0
449          UK     179  0.0100    0.31      26
450          UK     198  0.0100    0.10      74
451          RK     473  0.0038    0.02           TRAP      60     1.0
452          RK     704  0.0033    0.02           TRAP      71     1.0

453          KK  051520 COMBINE
454          HC       4

455          KK  051530    FROM  051520
456          RK     926   0.001   0.013           CIRC     9.5

457          KK  051530   BASIN
458          BA   0.041
459          LS       0      79       0       0      98       0
460          UK      26  0.0100    0.40      15
461          UK     193  0.0100    0.10      85
462          RK     889  0.0038    0.02           TRAP      38     1.0
463          RK     860  0.0033    0.02           TRAP      60     1.0

464          KK  051530 COMBINE
465          HC       2

466          KK  051540    FROM  051530
467          RK     360   0.001   0.013           CIRC     9.5
```



```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
```

```
468          KK  051810   BASIN
469          BA   0.005
470          LS       0      79       0       0      98       0
471          UK      23  0.0100    0.40      16
472          UK     196  0.0100    0.10      84
473          RK     272  0.0033    0.02            TRAP      19     1.0
474          RK     272  0.0038    0.02            TRAP      30     1.0

475          KK  051540    FROM  051810
476          RK     218  0.0045   0.013            CIRC     4.5

477          KK  051540   BASIN
478          BA   0.004
479          LS       0      79       0       0      98       0
480          UK      44  0.0100    0.38      16
481          UK     172  0.0100    0.10      84
482          RK     233  0.0038    0.02            TRAP      12     1.0
483          RK     265  0.0033    0.02            TRAP      60     1.0

484          KK  051540 COMBINE
485          HC       3

486          KK  051550    FROM  051540
487          RK     273   0.001   0.013            TRAP     8.0     1.0

488          KK    05EX
489          DT   05PRK
490          DI       0   246.1    1000
491          DQ       0     246     246

492          KK  051560    FROM  051550
493          RK     800  0.0038   0.013            CIRC     7.0
             *
             * Osborn Rd outfall to Indian Bend Wash
             *

494          KK  051570    FROM  051560
495          RK     228   0.003   0.013            CIRC     7.0
             *
             * Osborn Park Storage and Outflow to IBW
             *

496          KK  051550
497          DR   05PRK
```

```
498          KK  051560    BASIN
499          BA   0.008
500          LS        0       79        0        0       98        0
501          UK      116   0.0100     0.33       47
502          UK       89   0.0100     0.10       53
503          RK     1126   0.0033     0.02             TRAP       60      1.0
1                                          HEC-1 INPUT                                                    PAGE 16

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


504          KK      PRK
505          HC        2

506          KK  05PKST    STORAGE
507          RS        1     STOR
508          SV        0     0.08     0.31     0.69     1.20     1.92     3.01     3.01
509          SE     1224     1225     1226     1227     1228     1229     1230     1231
510          SQ        0     0.01       62      111      167      218      262      600
             *
             * New CP 051565 located at the outfall from Osborn Park to IBW
             *

511          KK  051565     FROM   05PRK
512          RK      130    0.003    0.013             TRAP        7
             *
             * Notice:
             * This document, together with the concepts and designs presented herein, as an
             * instrument of service, is intended for the specific purpose and client for
             * which it was prepared.  Reuse of and improper reliance on this document
             * without written authorization and adaptation by Kimley-Horn and Associates,
             * Inc. shall be without liability to Kimley-Horn and Associates, Inc.
             *
513          ZZ
1
                  SCHEMATIC DIAGRAM OF STREAM NETWORK

 INPUT
  LINE       (V) ROUTING           (--->) DIVERSION OR PUMP FLOW

   NO.       (.) CONNECTOR         (<---) RETURN OF DIVERTED OR PUMPED FLOW

    34       070808
                  .
                  .
    42            .-------->  808OUT
    41        808PP
                  V
```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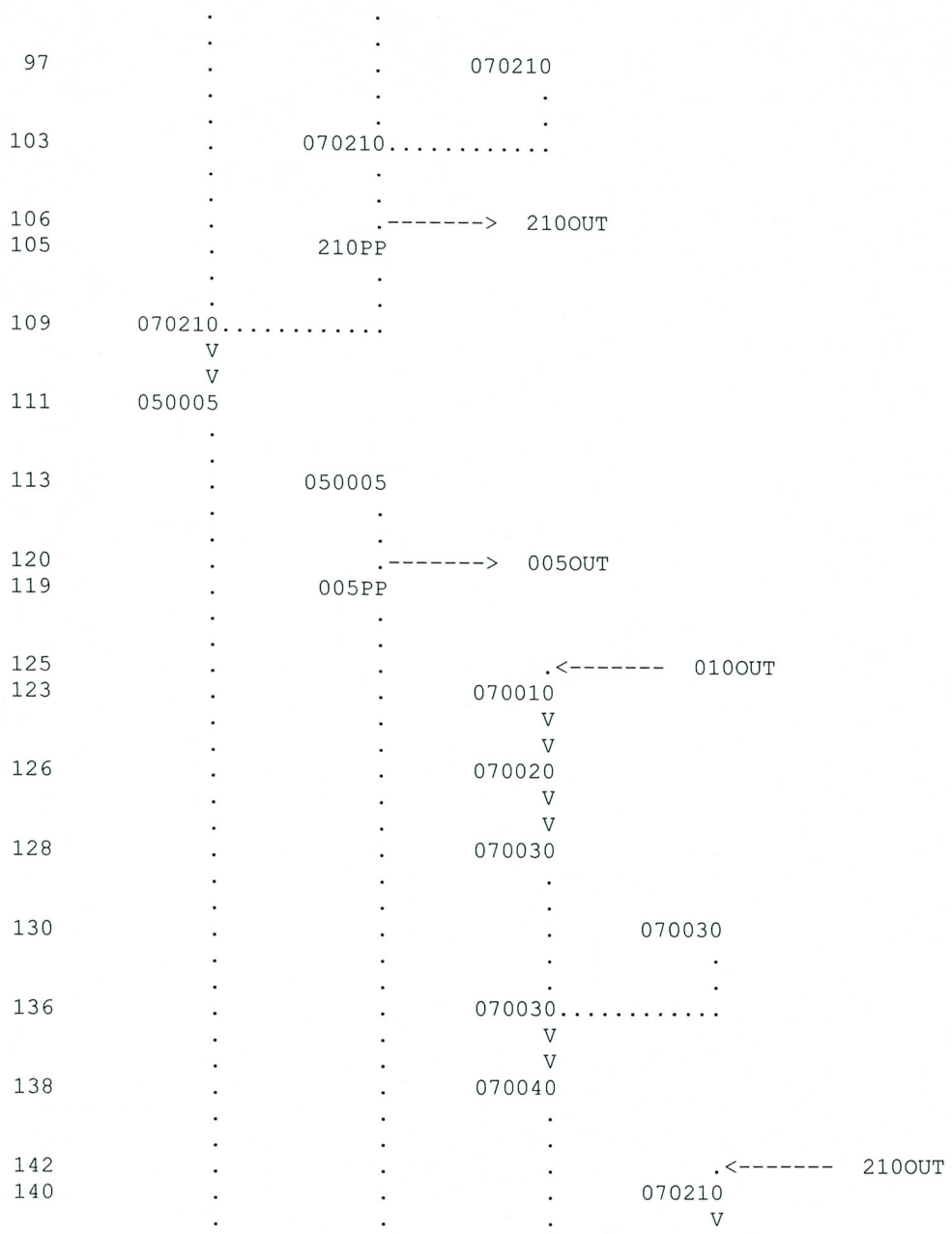
47 070610
54 .-------> 610OUT
53 610PP
57 070610
59 070508
61 070508
68 .-------> 508OUT
67 508PP
71 070508
73 070010
75 070010
82 .-------> 010OUT
81 010PP
85 070010
87 070210
89 070209
95 070210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103
070210
106
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105
210PP
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070210
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050005
113
050005
120
005OUT
119
005PP
125
010OUT
123
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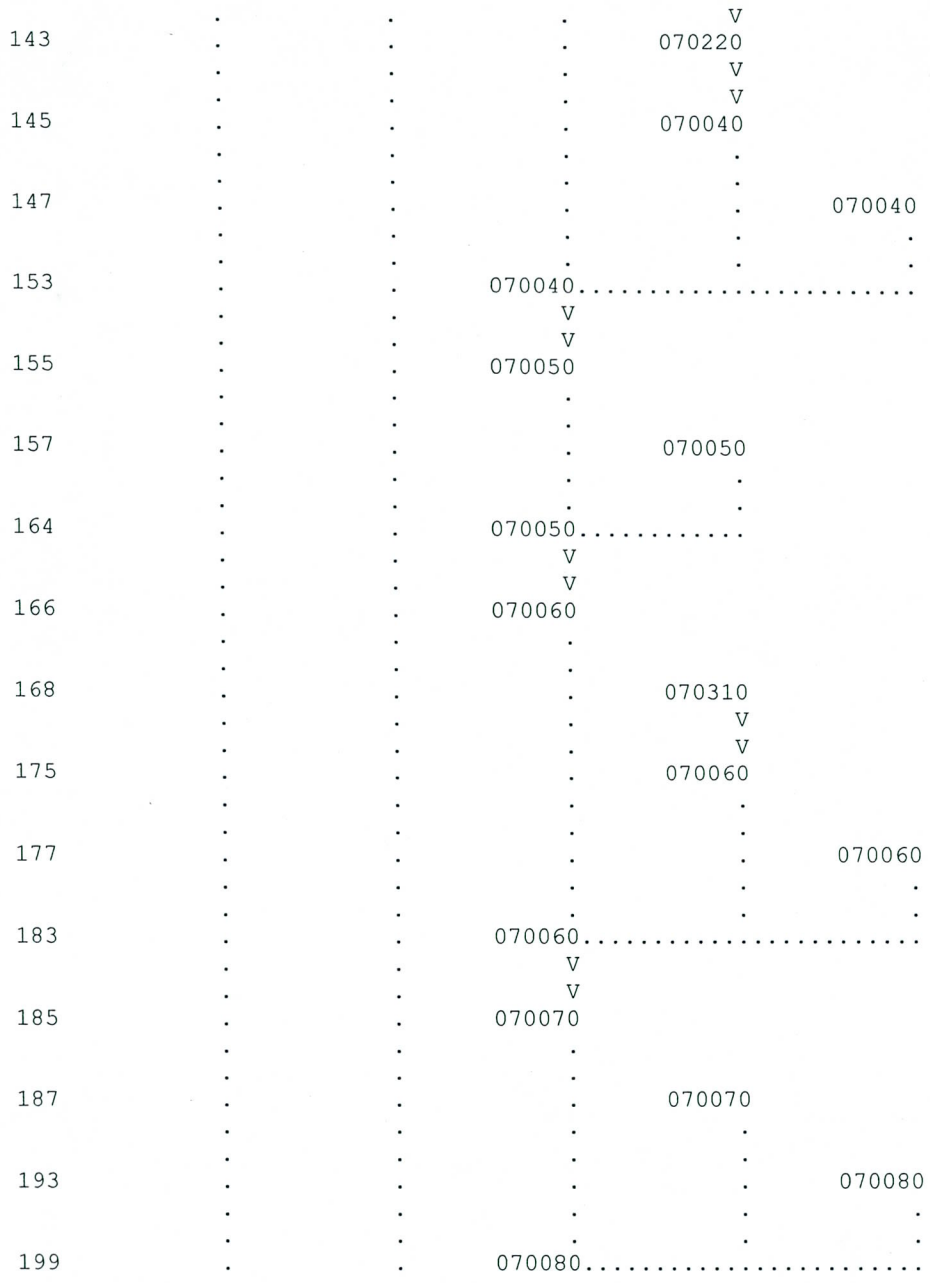
126
070020
128
070030
130
070030
136
070030
138
070040
142
210OUT
140
070210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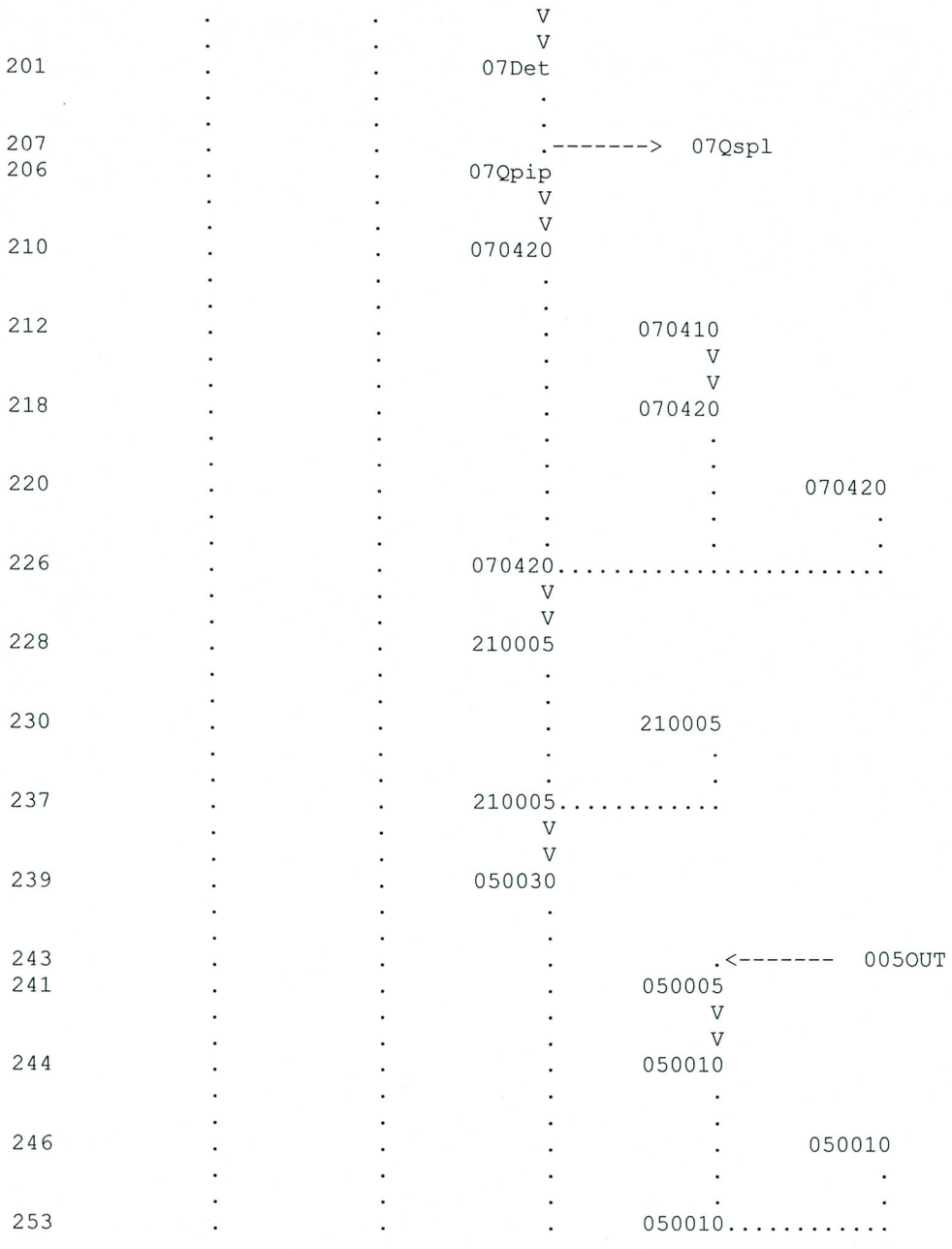
199
070080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07Det
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07Qspl
206
07Qpip
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070410
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070420
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070420
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230
210005
237
210005
239
050030
243
005OUT
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050005
244
050010
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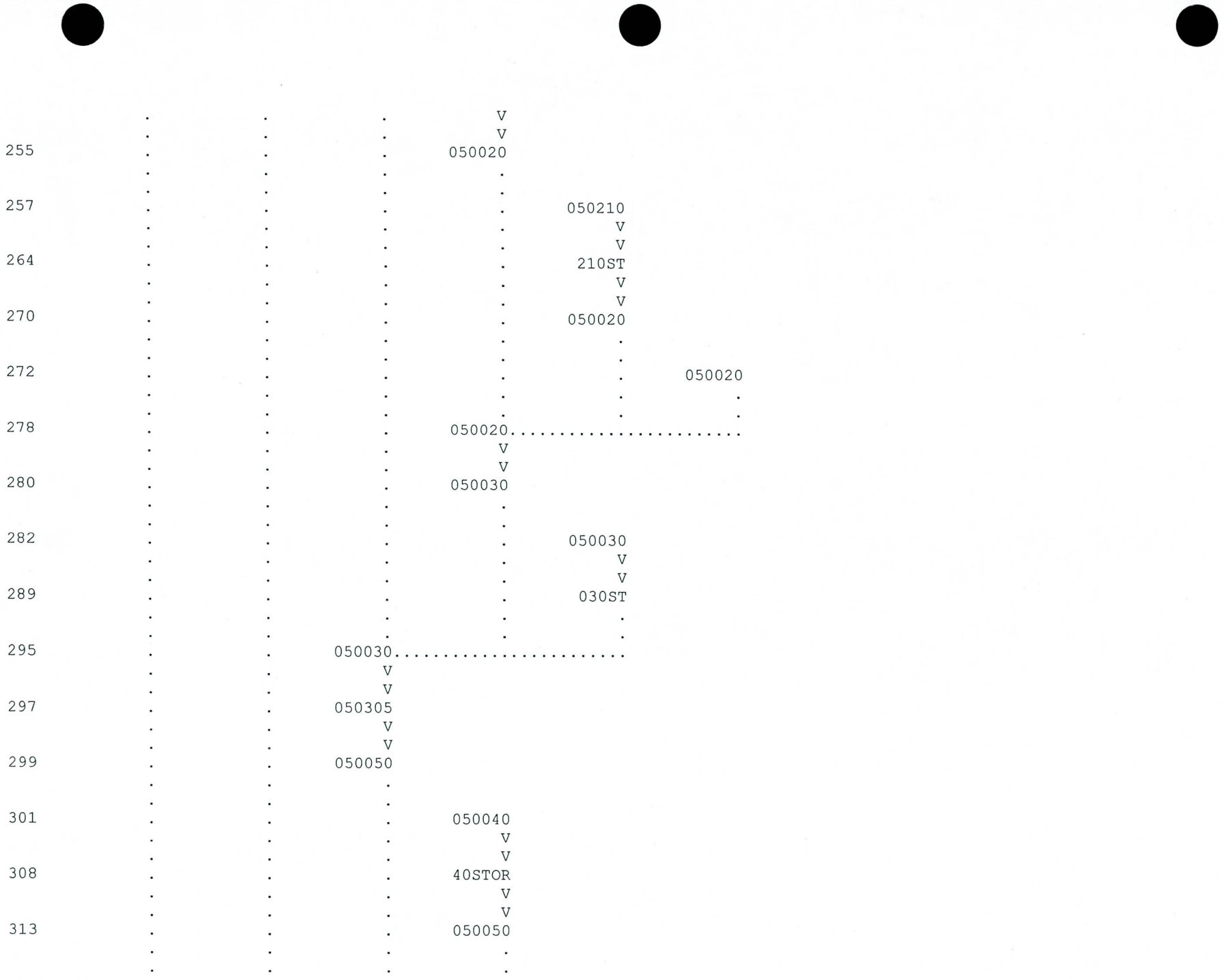
050010
253
050010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050030
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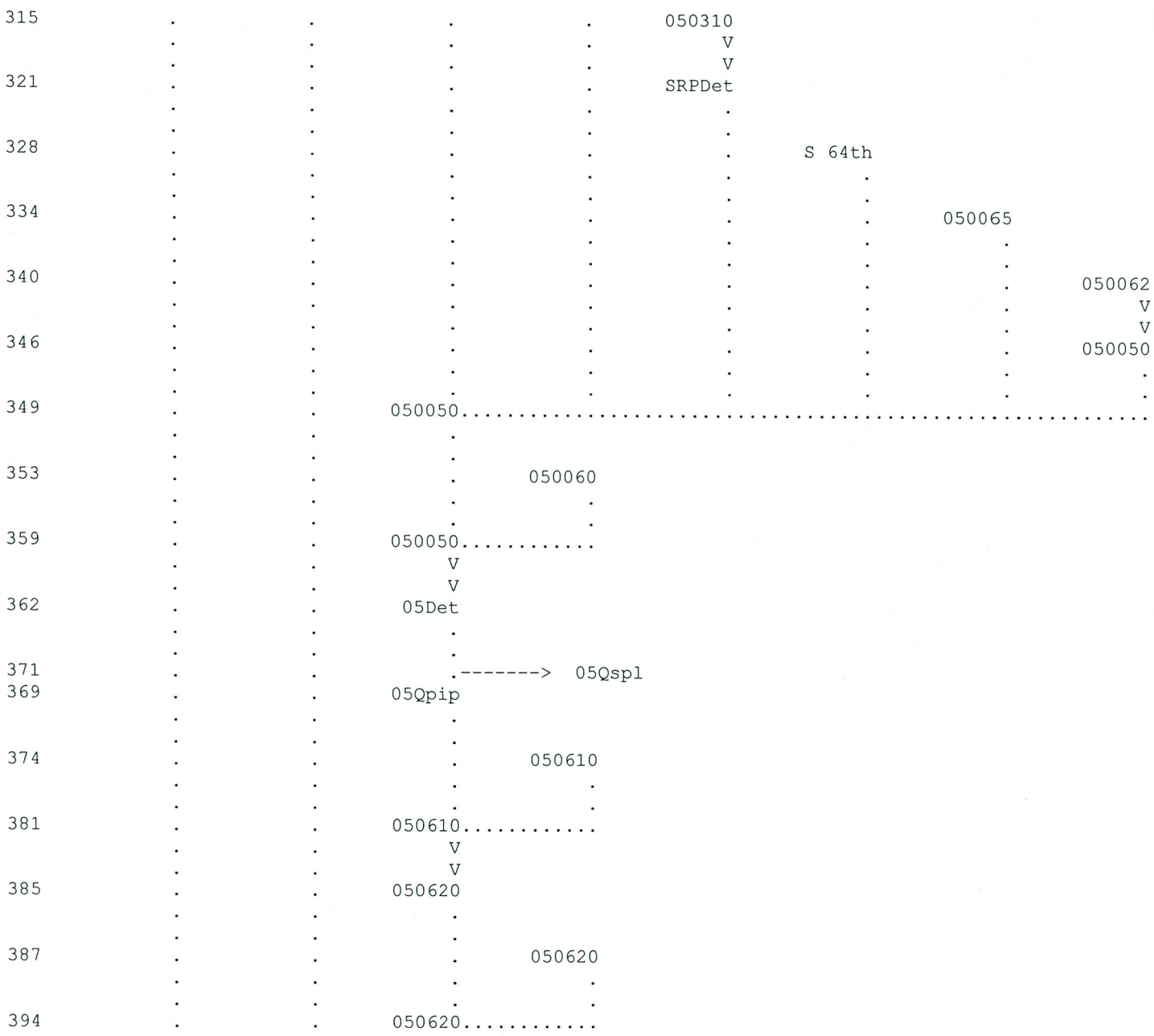
050040
40STOR
050050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S 64th
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050062
V
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353
050060
359
050050
V
V
362
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V
V
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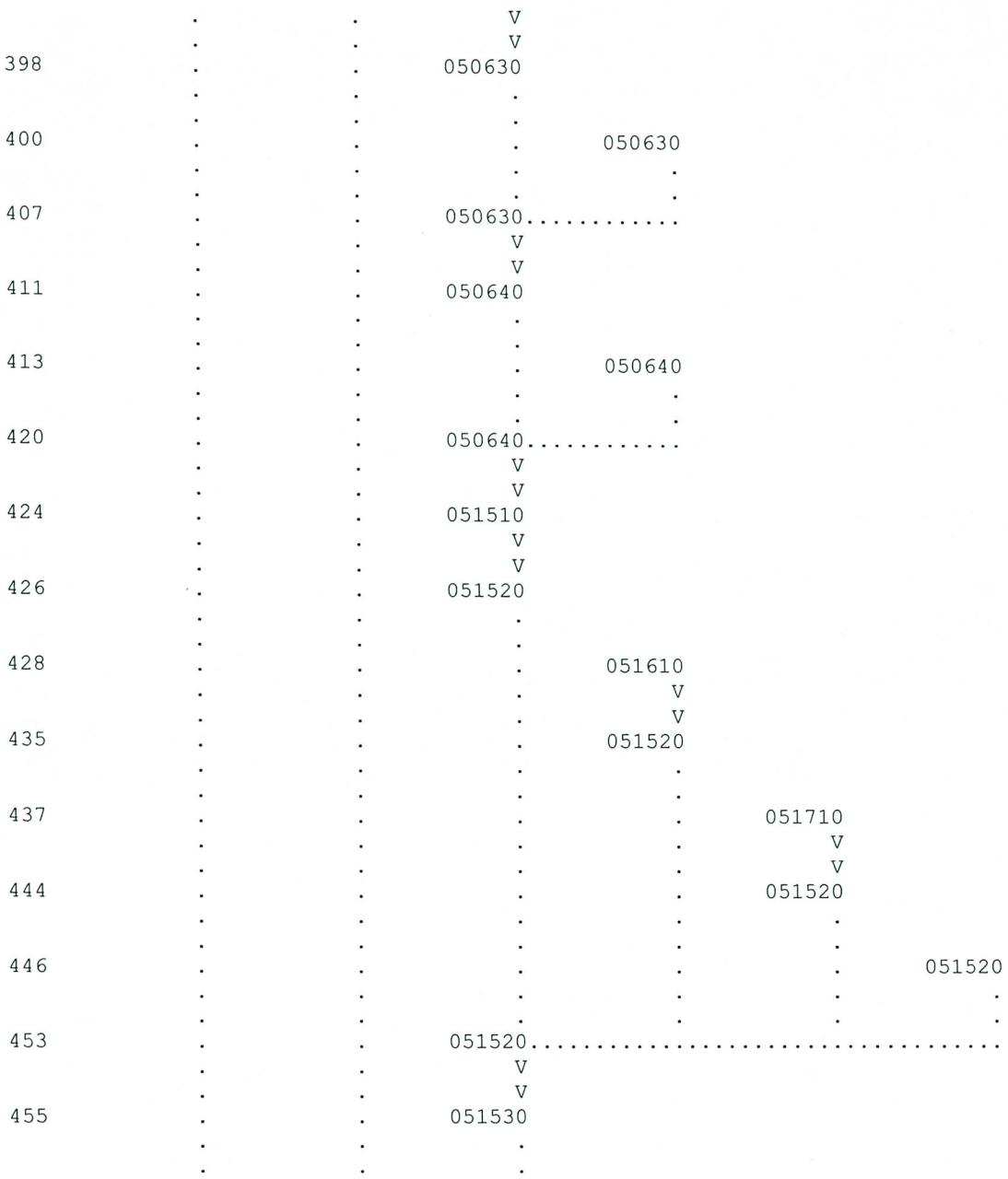
050620
394
050620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051710
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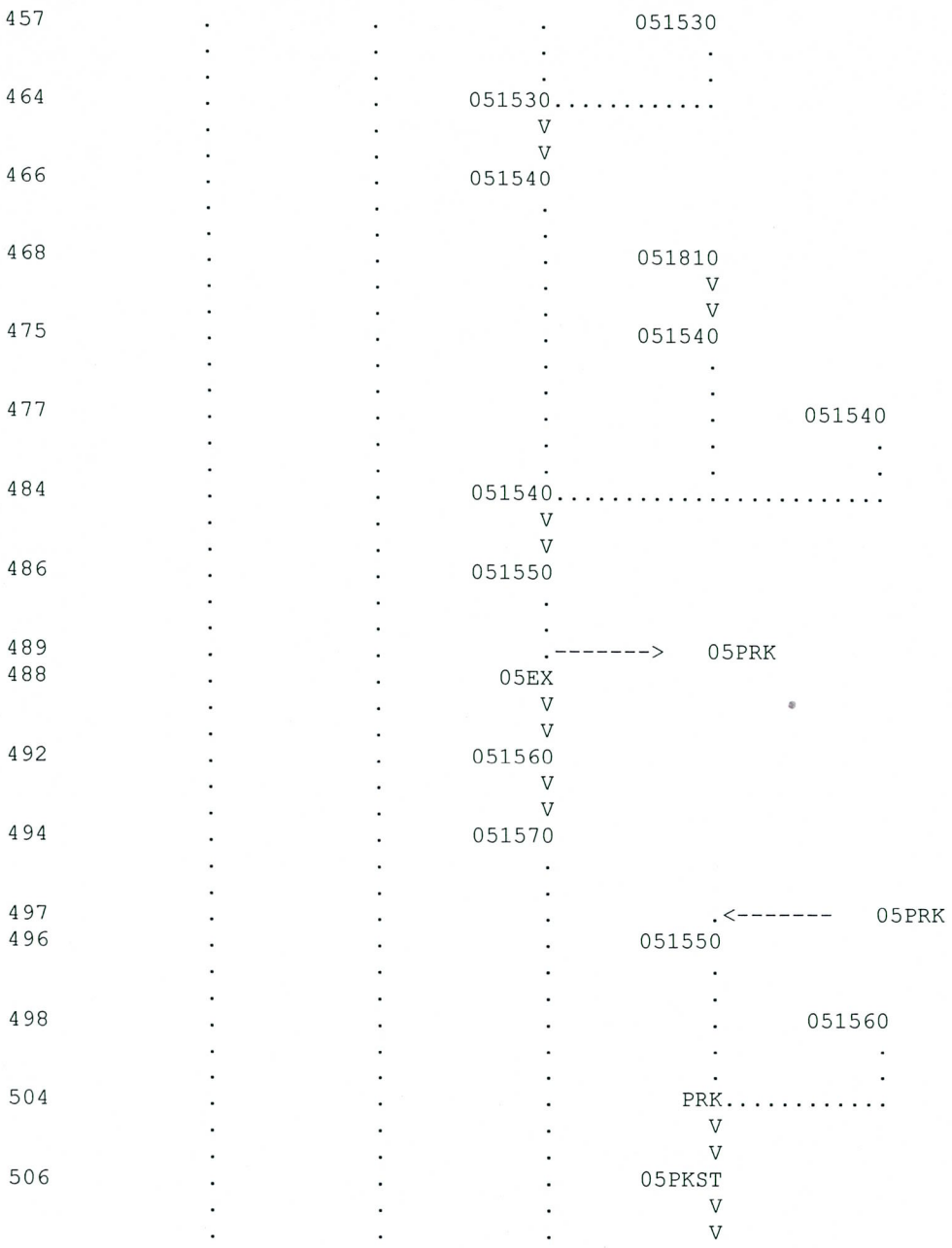
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051540
V
V
486
051550
489
05PRK
488
05EX
V
V
492
051560
V
V
494
051570
497
05PRK
496
051550
498
051560
504
PRK
V
V
506
05PKST
V
V

511 . . . 051565

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               MAY   1991              *
*            VERSION 4.0.1E             *
*     Lahey F77L-EM/32 version 5.01     *
*       Dodson & Associates, Inc.       *
*  RUN DATE  06/30/99  TIME  09:22:54   *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 551-1748              *
*                                       *
*****************************************
```

****
STP-PAPAGO REGIONAL FLOOD CONTROL PROJECT
SCOTTSDALE - TEMPE - PHOENIX
****

Kimley-Horn and Associates, Inc.
KVL Consultants, Inc.

10-Year, 6-Hour Storm Event
10/97

FILE MODIFIED BY PARSONS BRINCKERHOFF TO BE USED IN DESIGN OF OSBORN OUTFALL MODIFICATIONS:

1) SUBBASIN 050062 REROUTED DIRECTLY TO PAIUTE PARK- IMPROVEMENTS TO 64TH ST CONVEY FLOW TO DETENTION BASIN. AREA REDUCED TO 3.9 ACRES (0.0061 SM)
2) PAIUTE PARK STAGE/DISCHARGE CURVE ADJUSTED
3) SUBBASINS CONTRIBUTING TO 66" ADOT PIPE AND CONCENTRATION POINT 051510 (BROWN ROAD) ROUTED OUT OF PROPOSED PIPE (SUBBASINS 050710, 050720, 051510 AND 050810)
4) REVISE AREA OF SUBBASIN 050130 FROM 0.041 SM TO 0.0063 SM.AND ROUTE TO EXISTING DETENTION BASIN. REMAINING AREA IS SRP PROPERTY WHICH DRAINS WEST.
   AREA REDUCTION DUE TO:
   REMOVE APARTMENTS AT THOMAS AND 64TH ST DUE TO ON-SITE RETENTION.
   REMOVE PORTION OF SRP SUBSTATION WHICH DRAINS EAST.
   COLLECT PAVEMENT FLOWS FROM 64TH ST (THOMAS TO PAIUTE PARK) IN LARGE PIPE
   COLLECT FLOWS FROM PAVED AREA BETWEEN SUBSTATION AND APARTMENTS IN LARGE PIPE

Parsons Brinckerhoff
Alan Humphrey

3/15/99

```
 33 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           2  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1    0  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      1    0  ENDING DATE
                     NDTIME        0958  ENDING TIME
                      ICENT          19  CENTURY MARK

                  COMPUTATION INTERVAL     0.03 HOURS
                       TOTAL TIME BASE     9.97 HOURS

         ENGLISH UNITS
              DRAINAGE AREA          SQUARE MILES
              PRECIPITATION DEPTH    INCHES
              LENGTH, ELEVATION      FEET
              FLOW                   CUBIC FEET PER SECOND
              STORAGE VOLUME         ACRE-FEET
              SURFACE AREA           ACRES
              TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 321 KK     *    SRPDet  *
            *            *
            **************

 322 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           2  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

                HYDROGRAPH ROUTING DATA

 323 RS          STORAGE ROUTING
```

		NSTPS	1	NUMBER OF SUBREACHES					
		ITYP	STOR	TYPE OF INITIAL CONDITION					
		RSVRIC	0.00	INITIAL CONDITION					
		X	0.00	WORKING R AND D COEFFICIENT					
324	SA	AREA	0.2	0.2	0.2				
325	SE	ELEVATION	53.40	56.00	57.00				
326	SQ	DISCHARGE	0.	2.	4.	5.	8.	10.	20.	40.
327	SE	ELEVATION	53.40	54.00	54.30	54.50	54.90	55.10	53.48	57.00

***

COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	0.46	0.67
ELEVATION	53.40	56.00	57.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	0.09	0.14	0.18	0.25	0.29	0.46	0.67
OUTFLOW	0.00	2.00	4.00	5.00	8.00	10.00	34.32	40.00
ELEVATION	53.40	54.00	54.30	54.50	54.90	55.10	56.00	57.00

****

HYDROGRAPH AT STATION SRPDet

****

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	0.0	53.4	*	1		0320	101	5.	0.2	54.4	*	1		0640	201	0.	0.0	53.5
1		0002	2	0.	0.0	53.4	*	1		0322	102	5.	0.2	54.4	*	1		0642	202	0.	0.0	53.5
1		0004	3	0.	0.0	53.4	*	1		0324	103	5.	0.2	54.4	*	1		0644	203	0.	0.0	53.5
1		0006	4	0.	0.0	53.4	*	1		0326	104	5.	0.2	54.4	*	1		0646	204	0.	0.0	53.5
1		0008	5	0.	0.0	53.4	*	1		0328	105	5.	0.2	54.4	*	1		0648	205	0.	0.0	53.5
1		0010	6	0.	0.0	53.4	*	1		0330	106	4.	0.2	54.4	*	1		0650	206	0.	0.0	53.5
1		0012	7	0.	0.0	53.4	*	1		0332	107	4.	0.2	54.4	*	1		0652	207	0.	0.0	53.5
1		0014	8	0.	0.0	53.4	*	1		0334	108	4.	0.2	54.3	*	1		0654	208	0.	0.0	53.5
1		0016	9	0.	0.0	53.4	*	1		0336	109	4.	0.1	54.3	*	1		0656	209	0.	0.0	53.5
1		0018	10	0.	0.0	53.4	*	1		0338	110	4.	0.1	54.3	*	1		0658	210	0.	0.0	53.5
1		0020	11	0.	0.0	53.4	*	1		0340	111	4.	0.1	54.3	*	1		0700	211	0.	0.0	53.4
1		0022	12	0.	0.0	53.4	*	1		0342	112	4.	0.1	54.2	*	1		0702	212	0.	0.0	53.4
1		0024	13	0.	0.0	53.4	*	1		0344	113	3.	0.1	54.2	*	1		0704	213	0.	0.0	53.4

1	0026	14	0.	0.0	53.4	*	1	0346	114	3.	0.1	54.2	*	1	0706	214	0.	0.0	53.4
1	0028	15	0.	0.0	53.4	*	1	0348	115	3.	0.1	54.2	*	1	0708	215	0.	0.0	53.4
1	0030	16	0.	0.0	53.4	*	1	0350	116	3.	0.1	54.1	*	1	0710	216	0.	0.0	53.4
1	0032	17	0.	0.0	53.4	*	1	0352	117	3.	0.1	54.1	*	1	0712	217	0.	0.0	53.4
1	0034	18	0.	0.0	53.4	*	1	0354	118	3.	0.1	54.1	*	1	0714	218	0.	0.0	53.4
1	0036	19	0.	0.0	53.4	*	1	0356	119	2.	0.1	54.1	*	1	0716	219	0.	0.0	53.4
1	0038	20	0.	0.0	53.4	*	1	0358	120	2.	0.1	54.0	*	1	0718	220	0.	0.0	53.4
1	0040	21	0.	0.0	53.4	*	1	0400	121	2.	0.1	54.0	*	1	0720	221	0.	0.0	53.4
1	0042	22	0.	0.0	53.4	*	1	0402	122	2.	0.1	54.0	*	1	0722	222	0.	0.0	53.4
1	0044	23	0.	0.0	53.4	*	1	0404	123	2.	0.1	54.0	*	1	0724	223	0.	0.0	53.4
1	0046	24	0.	0.0	53.4	*	1	0406	124	2.	0.1	54.0	*	1	0726	224	0.	0.0	53.4
1	0048	25	0.	0.0	53.4	*	1	0408	125	2.	0.1	54.0	*	1	0728	225	0.	0.0	53.4
1	0050	26	0.	0.0	53.4	*	1	0410	126	2.	0.1	53.9	*	1	0730	226	0.	0.0	53.4
1	0052	27	0.	0.0	53.4	*	1	0412	127	2.	0.1	53.9	*	1	0732	227	0.	0.0	53.4
1	0054	28	0.	0.0	53.4	*	1	0414	128	2.	0.1	53.9	*	1	0734	228	0.	0.0	53.4
1	0056	29	0.	0.0	53.4	*	1	0416	129	2.	0.1	53.9	*	1	0736	229	0.	0.0	53.4
1	0058	30	0.	0.0	53.4	*	1	0418	130	2.	0.1	53.9	*	1	0738	230	0.	0.0	53.4
1	0100	31	0.	0.0	53.4	*	1	0420	131	1.	0.1	53.8	*	1	0740	231	0.	0.0	53.4
1	0102	32	0.	0.0	53.4	*	1	0422	132	1.	0.1	53.8	*	1	0742	232	0.	0.0	53.4
1	0104	33	0.	0.0	53.4	*	1	0424	133	1.	0.1	53.8	*	1	0744	233	0.	0.0	53.4
1	0106	34	0.	0.0	53.4	*	1	0426	134	1.	0.1	53.8	*	1	0746	234	0.	0.0	53.4
1	0108	35	0.	0.0	53.4	*	1	0428	135	1.	0.1	53.8	*	1	0748	235	0.	0.0	53.4
1	0110	36	0.	0.0	53.4	*	1	0430	136	1.	0.1	53.8	*	1	0750	236	0.	0.0	53.4
1	0112	37	0.	0.0	53.4	*	1	0432	137	1.	0.1	53.8	*	1	0752	237	0.	0.0	53.4
1	0114	38	0.	0.0	53.4	*	1	0434	138	1.	0.1	53.8	*	1	0754	238	0.	0.0	53.4
1	0116	39	0.	0.0	53.4	*	1	0436	139	1.	0.1	53.7	*	1	0756	239	0.	0.0	53.4
1	0118	40	0.	0.0	53.4	*	1	0438	140	1.	0.1	53.7	*	1	0758	240	0.	0.0	53.4
1	0120	41	0.	0.0	53.4	*	1	0440	141	1.	0.0	53.7	*	1	0800	241	0.	0.0	53.4
1	0122	42	0.	0.0	53.4	*	1	0442	142	1.	0.0	53.7	*	1	0802	242	0.	0.0	53.4
1	0124	43	0.	0.0	53.4	*	1	0444	143	1.	0.0	53.7	*	1	0804	243	0.	0.0	53.4
1	0126	44	0.	0.0	53.4	*	1	0446	144	1.	0.0	53.7	*	1	0806	244	0.	0.0	53.4
1	0128	45	0.	0.0	53.4	*	1	0448	145	1.	0.0	53.7	*	1	0808	245	0.	0.0	53.4
1	0130	46	0.	0.0	53.4	*	1	0450	146	1.	0.0	53.7	*	1	0810	246	0.	0.0	53.4
1	0132	47	0.	0.0	53.4	*	1	0452	147	1.	0.0	53.7	*	1	0812	247	0.	0.0	53.4
1	0134	48	0.	0.0	53.4	*	1	0454	148	1.	0.0	53.7	*	1	0814	248	0.	0.0	53.4
1	0136	49	0.	0.0	53.4	*	1	0456	149	1.	0.0	53.6	*	1	0816	249	0.	0.0	53.4
1	0138	50	0.	0.0	53.4	*	1	0458	150	1.	0.0	53.6	*	1	0818	250	0.	0.0	53.4
1	0140	51	0.	0.0	53.4	*	1	0500	151	1.	0.0	53.6	*	1	0820	251	0.	0.0	53.4
1	0142	52	0.	0.0	53.4	*	1	0502	152	1.	0.0	53.6	*	1	0822	252	0.	0.0	53.4
1	0144	53	0.	0.0	53.4	*	1	0504	153	1.	0.0	53.6	*	1	0824	253	0.	0.0	53.4
1	0146	54	0.	0.0	53.4	*	1	0506	154	1.	0.0	53.6	*	1	0826	254	0.	0.0	53.4
1	0148	55	0.	0.0	53.4	*	1	0508	155	1.	0.0	53.6	*	1	0828	255	0.	0.0	53.4
1	0150	56	0.	0.0	53.4	*	1	0510	156	1.	0.0	53.6	*	1	0830	256	0.	0.0	53.4
1	0152	57	0.	0.0	53.4	*	1	0512	157	1.	0.0	53.6	*	1	0832	257	0.	0.0	53.4
1	0154	58	0.	0.0	53.4	*	1	0514	158	1.	0.0	53.6	*	1	0834	258	0.	0.0	53.4
1	0156	59	0.	0.0	53.4	*	1	0516	159	1.	0.0	53.6	*	1	0836	259	0.	0.0	53.4
1	0158	60	0.	0.0	53.4	*	1	0518	160	1.	0.0	53.6	*	1	0838	260	0.	0.0	53.4

1	0200	61	0.	0.0	53.4	*	1	0520	161	1.	0.0	53.6	*	1	0840	261	0.	0.0	53.4
1	0202	62	0.	0.0	53.4	*	1	0522	162	1.	0.0	53.6	*	1	0842	262	0.	0.0	53.4
1	0204	63	0.	0.0	53.4	*	1	0524	163	1.	0.0	53.6	*	1	0844	263	0.	0.0	53.4
1	0206	64	0.	0.0	53.4	*	1	0526	164	1.	0.0	53.6	*	1	0846	264	0.	0.0	53.4
1	0208	65	0.	0.0	53.4	*	1	0528	165	1.	0.0	53.6	*	1	0848	265	0.	0.0	53.4
1	0210	66	0.	0.0	53.4	*	1	0530	166	0.	0.0	53.5	*	1	0850	266	0.	0.0	53.4
1	0212	67	0.	0.0	53.4	*	1	0532	167	0.	0.0	53.5	*	1	0852	267	0.	0.0	53.4
1	0214	68	0.	0.0	53.4	*	1	0534	168	0.	0.0	53.5	*	1	0854	268	0.	0.0	53.4
1	0216	69	0.	0.0	53.4	*	1	0536	169	0.	0.0	53.5	*	1	0856	269	0.	0.0	53.4
1	0218	70	0.	0.0	53.4	*	1	0538	170	0.	0.0	53.5	*	1	0858	270	0.	0.0	53.4
1	0220	71	0.	0.0	53.4	*	1	0540	171	0.	0.0	53.5	*	1	0900	271	0.	0.0	53.4
1	0222	72	0.	0.0	53.4	*	1	0542	172	0.	0.0	53.5	*	1	0902	272	0.	0.0	53.4
1	0224	73	0.	0.0	53.4	*	1	0544	173	0.	0.0	53.5	*	1	0904	273	0.	0.0	53.4
1	0226	74	0.	0.0	53.4	*	1	0546	174	0.	0.0	53.5	*	1	0906	274	0.	0.0	53.4
1	0228	75	0.	0.0	53.4	*	1	0548	175	0.	0.0	53.5	*	1	0908	275	0.	0.0	53.4
1	0230	76	0.	0.0	53.4	*	1	0550	176	0.	0.0	53.5	*	1	0910	276	0.	0.0	53.4
1	0232	77	0.	0.0	53.4	*	1	0552	177	0.	0.0	53.5	*	1	0912	277	0.	0.0	53.4
1	0234	78	0.	0.0	53.4	*	1	0554	178	0.	0.0	53.5	*	1	0914	278	0.	0.0	53.4
1	0236	79	0.	0.0	53.4	*	1	0556	179	0.	0.0	53.5	*	1	0916	279	0.	0.0	53.4
1	0238	80	0.	0.0	53.4	*	1	0558	180	0.	0.0	53.5	*	1	0918	280	0.	0.0	53.4
1	0240	81	0.	0.0	53.4	*	1	0600	181	0.	0.0	53.5	*	1	0920	281	0.	0.0	53.4
1	0242	82	0.	0.0	53.4	*	1	0602	182	0.	0.0	53.5	*	1	0922	282	0.	0.0	53.4
1	0244	83	0.	0.0	53.4	*	1	0604	183	0.	0.0	53.5	*	1	0924	283	0.	0.0	53.4
1	0246	84	0.	0.0	53.4	*	1	0606	184	0.	0.0	53.5	*	1	0926	284	0.	0.0	53.4
1	0248	85	0.	0.0	53.4	*	1	0608	185	0.	0.0	53.5	*	1	0928	285	0.	0.0	53.4
1	0250	86	0.	0.0	53.4	*	1	0610	186	0.	0.0	53.5	*	1	0930	286	0.	0.0	53.4
1	0252	87	0.	0.0	53.5	*	1	0612	187	0.	0.0	53.5	*	1	0932	287	0.	0.0	53.4
1	0254	88	0.	0.0	53.5	*	1	0614	188	0.	0.0	53.5	*	1	0934	288	0.	0.0	53.4
1	0256	89	0.	0.0	53.5	*	1	0616	189	0.	0.0	53.5	*	1	0936	289	0.	0.0	53.4
1	0258	90	0.	0.0	53.5	*	1	0618	190	0.	0.0	53.5	*	1	0938	290	0.	0.0	53.4
1	0300	91	1.	0.0	53.6	*	1	0620	191	0.	0.0	53.5	*	1	0940	291	0.	0.0	53.4
1	0302	92	1.	0.0	53.6	*	1	0622	192	0.	0.0	53.5	*	1	0942	292	0.	0.0	53.4
1	0304	93	1.	0.0	53.7	*	1	0624	193	0.	0.0	53.5	*	1	0944	293	0.	0.0	53.4
1	0306	94	1.	0.1	53.8	*	1	0626	194	0.	0.0	53.5	*	1	0946	294	0.	0.0	53.4
1	0308	95	2.	0.1	54.0	*	1	0628	195	0.	0.0	53.5	*	1	0948	295	0.	0.0	53.4
1	0310	96	3.	0.1	54.1	*	1	0630	196	0.	0.0	53.5	*	1	0950	296	0.	0.0	53.4
1	0312	97	4.	0.1	54.2	*	1	0632	197	0.	0.0	53.5	*	1	0952	297	0.	0.0	53.4
1	0314	98	4.	0.1	54.3	*	1	0634	198	0.	0.0	53.5	*	1	0954	298	0.	0.0	53.4
1	0316	99	4.	0.2	54.4	*	1	0636	199	0.	0.0	53.5	*	1	0956	299	0.	0.0	53.4
1	0318	100	5.	0.2	54.4	*	1	0638	200	0.	0.0	53.5	*	1	0958	300	0.	0.0	53.4
						*							*						

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	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
+	(CFS)	(HR)				
			(CFS)			

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+        5.      3.37                     1.          1.          1.           1.
                          (INCHES)     1.446       1.456       1.456        1.456
                           (AC-FT)        0.          0.          0.           0.

 PEAK STORAGE    TIME                          MAXIMUM AVERAGE STORAGE
                                        6-HR       24-HR       72-HR      9.97-HR
+  (AC-FT)       (HR)
       0.        3.37                     0.          0.          0.           0.

  PEAK STAGE     TIME                           MAXIMUM AVERAGE STAGE
                                        6-HR       24-HR       72-HR      9.97-HR
+   (FEET)       (HR)
     54.43       3.37                  53.64       53.55       53.55        53.55

                          CUMULATIVE AREA =     0.01 SQ MI


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
  346 KK    *    050050  *        FROM 050062
            *            *
            **************

  347 KO        OUTPUT CONTROL VARIABLES
                      IPRNT            2  PRINT CONTROL
                      IPLOT            0  PLOT CONTROL
                      QSCAL           0.  HYDROGRAPH PLOT SCALE

              HYDROGRAPH ROUTING DATA

  348 RK        KINEMATIC WAVE STREAM ROUTING
                          L        1000.  CHANNEL LENGTH
                          S       0.0020  SLOPE
                          N        0.013  CHANNEL ROUGHNESS COEFFICIENT
                         CA         0.00  CONTRIBUTING AREA
                      SHAPE         CIRC  CHANNEL SHAPE
                         WD         2.50  BOTTOM WIDTH OR DIAMETER
                          Z         1.00  SIDE SLOPE
                     NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS

                                                                ***
                                    COMPUTED KINEMATIC PARAMETERS
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VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
MAIN	3.22	1.25	1.07	333.33	15.56	187.40	1.64	5.53

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5227E+00 EXCESS=0.0000E+00 OUTFLOW=0.5236E+00 BASIN STORAGE=0.4824E-04 PERCENT ERROR= -0.2

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	3.22	1.25	2.00		15.38	188.00	1.64	

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HYDROGRAPH AT STATION 050050

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DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0230	76	0.	1		0500	151	0.	1		0730	226	0.
1		0002	2	0.	1		0232	77	0.	1		0502	152	0.	1		0732	227	0.
1		0004	3	0.	1		0234	78	0.	1		0504	153	0.	1		0734	228	0.
1		0006	4	0.	1		0236	79	0.	1		0506	154	0.	1		0736	229	0.
1		0008	5	0.	1		0238	80	0.	1		0508	155	0.	1		0738	230	0.
1		0010	6	0.	1		0240	81	0.	1		0510	156	0.	1		0740	231	0.
1		0012	7	0.	1		0242	82	1.	1		0512	157	0.	1		0742	232	0.
1		0014	8	0.	1		0244	83	1.	1		0514	158	0.	1		0744	233	0.
1		0016	9	0.	1		0246	84	1.	1		0516	159	0.	1		0746	234	0.
1		0018	10	0.	1		0248	85	1.	1		0518	160	0.	1		0748	235	0.
1		0020	11	0.	1		0250	86	1.	1		0520	161	0.	1		0750	236	0.
1		0022	12	0.	1		0252	87	2.	1		0522	162	0.	1		0752	237	0.
1		0024	13	0.	1		0254	88	2.	1		0524	163	0.	1		0754	238	0.
1		0026	14	0.	1		0256	89	2.	1		0526	164	0.	1		0756	239	0.
1		0028	15	0.	1		0258	90	3.	1		0528	165	0.	1		0758	240	0.
1		0030	16	0.	1		0300	91	4.	1		0530	166	0.	1		0800	241	0.
1		0032	17	0.	1		0302	92	7.	1		0532	167	0.	1		0802	242	0.
1		0034	18	0.	1		0304	93	11.	1		0534	168	0.	1		0804	243	0.
1		0036	19	0.	1		0306	94	15.	1		0536	169	0.	1		0806	244	0.
1		0038	20	0.	1		0308	95	15.	1		0538	170	0.	1		0808	245	0.
1		0040	21	0.	1		0310	96	14.	1		0540	171	0.	1		0810	246	0.

1	0042	22	0.	*	1	0312	97	11.	*	1	0542	172	0.	*	1	0812	247	0.	
1	0044	23	0.	*	1	0314	98	9.	*	1	0544	173	0.	*	1	0814	248	0.	
1	0046	24	0.	*	1	0316	99	7.	*	1	0546	174	0.	*	1	0816	249	0.	
1	0048	25	0.	*	1	0318	100	6.	*	1	0548	175	0.	*	1	0818	250	0.	
1	0050	26	0.	*	1	0320	101	5.	*	1	0550	176	0.	*	1	0820	251	0.	
1	0052	27	0.	*	1	0322	102	5.	*	1	0552	177	0.	*	1	0822	252	0.	
1	0054	28	0.	*	1	0324	103	4.	*	1	0554	178	0.	*	1	0824	253	0.	
1	0056	29	0.	*	1	0326	104	4.	*	1	0556	179	0.	*	1	0826	254	0.	
1	0058	30	0.	*	1	0328	105	3.	*	1	0558	180	0.	*	1	0828	255	0.	
1	0100	31	0.	*	1	0330	106	3.	*	1	0600	181	0.	*	1	0830	256	0.	
1	0102	32	0.	*	1	0332	107	3.	*	1	0602	182	0.	*	1	0832	257	0.	
1	0104	33	0.	*	1	0334	108	3.	*	1	0604	183	0.	*	1	0834	258	0.	
1	0106	34	0.	*	1	0336	109	2.	*	1	0606	184	0.	*	1	0836	259	0.	
1	0108	35	0.	*	1	0338	110	2.	*	1	0608	185	0.	*	1	0838	260	0.	
1	0110	36	0.	*	1	0340	111	2.	*	1	0610	186	0.	*	1	0840	261	0.	
1	0112	37	0.	*	1	0342	112	2.	*	1	0612	187	0.	*	1	0842	262	0.	
1	0114	38	0.	*	1	0344	113	2.	*	1	0614	188	0.	*	1	0844	263	0.	
1	0116	39	0.	*	1	0346	114	1.	*	1	0616	189	0.	*	1	0846	264	0.	
1	0118	40	0.	*	1	0348	115	1.	*	1	0618	190	0.	*	1	0848	265	0.	
1	0120	41	0.	*	1	0350	116	1.	*	1	0620	191	0.	*	1	0850	266	0.	
1	0122	42	0.	*	1	0352	117	1.	*	1	0622	192	0.	*	1	0852	267	0.	
1	0124	43	0.	*	1	0354	118	1.	*	1	0624	193	0.	*	1	0854	268	0.	
1	0126	44	0.	*	1	0356	119	1.	*	1	0626	194	0.	*	1	0856	269	0.	
1	0128	45	0.	*	1	0358	120	1.	*	1	0628	195	0.	*	1	0858	270	0.	
1	0130	46	0.	*	1	0400	121	1.	*	1	0630	196	0.	*	1	0900	271	0.	
1	0132	47	0.	*	1	0402	122	1.	*	1	0632	197	0.	*	1	0902	272	0.	
1	0134	48	0.	*	1	0404	123	1.	*	1	0634	198	0.	*	1	0904	273	0.	
1	0136	49	0.	*	1	0406	124	1.	*	1	0636	199	0.	*	1	0906	274	0.	
1	0138	50	0.	*	1	0408	125	1.	*	1	0638	200	0.	*	1	0908	275	0.	
1	0140	51	0.	*	1	0410	126	1.	*	1	0640	201	0.	*	1	0910	276	0.	
1	0142	52	0.	*	1	0412	127	1.	*	1	0642	202	0.	*	1	0912	277	0.	
1	0144	53	0.	*	1	0414	128	1.	*	1	0644	203	0.	*	1	0914	278	0.	
1	0146	54	0.	*	1	0416	129	1.	*	1	0646	204	0.	*	1	0916	279	0.	
1	0148	55	0.	*	1	0418	130	0.	*	1	0648	205	0.	*	1	0918	280	0.	
1	0150	56	0.	*	1	0420	131	0.	*	1	0650	206	0.	*	1	0920	281	0.	
1	0152	57	0.	*	1	0422	132	0.	*	1	0652	207	0.	*	1	0922	282	0.	
1	0154	58	0.	*	1	0424	133	0.	*	1	0654	208	0.	*	1	0924	283	0.	
1	0156	59	0.	*	1	0426	134	0.	*	1	0656	209	0.	*	1	0926	284	0.	
1	0158	60	0.	*	1	0428	135	0.	*	1	0658	210	0.	*	1	0928	285	0.	
1	0200	61	0.	*	1	0430	136	0.	*	1	0700	211	0.	*	1	0930	286	0.	
1	0202	62	0.	*	1	0432	137	0.	*	1	0702	212	0.	*	1	0932	287	0.	
1	0204	63	0.	*	1	0434	138	0.	*	1	0704	213	0.	*	1	0934	288	0.	
1	0206	64	0.	*	1	0436	139	0.	*	1	0706	214	0.	*	1	0936	289	0.	
1	0208	65	0.	*	1	0438	140	0.	*	1	0708	215	0.	*	1	0938	290	0.	
1	0210	66	0.	*	1	0440	141	0.	*	1	0710	216	0.	*	1	0940	291	0.	
1	0212	67	0.	*	1	0442	142	0.	*	1	0712	217	0.	*	1	0942	292	0.	
1	0214	68	0.	*	1	0444	143	0.	*	1	0714	218	0.	*	1	0944	293	0.	

1	0216	69	0.	*	1	0446	144	0.	*	1	0716	219	0.	*	1	0946	294	0.
1	0218	70	0.	*	1	0448	145	0.	*	1	0718	220	0.	*	1	0948	295	0.
1	0220	71	0.	*	1	0450	146	0.	*	1	0720	221	0.	*	1	0950	296	0.
1	0222	72	0.	*	1	0452	147	0.	*	1	0722	222	0.	*	1	0952	297	0.
1	0224	73	0.	*	1	0454	148	0.	*	1	0724	223	0.	*	1	0954	298	0.
1	0226	74	0.	*	1	0456	149	0.	*	1	0726	224	0.	*	1	0956	299	0.
1	0228	75	0.	*	1	0458	150	0.	*	1	0728	225	0.	*	1	0958	300	0.
				*					*					*						

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
+ (CFS)	(HR)					
		(CFS)				
+ 15.	3.13		1.	1.	1.	1.
		(INCHES)	1.631	1.636	1.636	1.636
		(AC-FT)	1.	1.	1.	1.

CUMULATIVE AREA = 0.01 SQ MI

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          **************
          *            *
349 KK    *    050050  *      COMBINE
          *            *
          **************

351 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           2  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

352 HC          HYDROGRAPH COMBINATION
                      ICOMP           6  NUMBER OF HYDROGRAPHS TO COMBINE

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HYDROGRAPH AT STATION 050050
SUM OF 6 HYDROGRAPHS

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	32.	1		0230	76	1.	1		0500	151	43.	1		0730	226	6.
1		0002	2	6.	1		0232	77	2.	1		0502	152	41.	1		0732	227	6.
1		0004	3	0.	1		0234	78	2.	1		0504	153	40.	1		0734	228	5.
1		0006	4	0.	1		0236	79	2.	1		0506	154	38.	1		0736	229	5.
1		0008	5	0.	1		0238	80	3.	1		0508	155	36.	1		0738	230	5.
1		0010	6	0.	1		0240	81	4.	1		0510	156	35.	1		0740	231	5.
1		0012	7	0.	1		0242	82	4.	1		0512	157	34.	1		0742	232	5.
1		0014	8	0.	1		0244	83	6.	1		0514	158	33.	1		0744	233	5.
1		0016	9	0.	1		0246	84	7.	1		0516	159	31.	1		0746	234	5.
1		0018	10	0.	1		0248	85	9.	1		0518	160	30.	1		0748	235	4.
1		0020	11	0.	1		0250	86	11.	1		0520	161	29.	1		0750	236	4.
1		0022	12	0.	1		0252	87	14.	1		0522	162	28.	1		0752	237	4.
1		0024	13	0.	1		0254	88	18.	1		0524	163	27.	1		0754	238	4.
1		0026	14	0.	1		0256	89	23.	1		0526	164	26.	1		0756	239	4.
1		0028	15	0.	1		0258	90	32.	1		0528	165	26.	1		0758	240	4.
1		0030	16	0.	1		0300	91	49.	1		0530	166	25.	1		0800	241	4.
1		0032	17	0.	1		0302	92	74.	1		0532	167	24.	1		0802	242	4.
1		0034	18	0.	1		0304	93	100.	1		0534	168	23.	1		0804	243	4.
1		0036	19	0.	1		0306	94	117.	1		0536	169	23.	1		0806	244	3.
1		0038	20	0.	1		0308	95	140.	1		0538	170	22.	1		0808	245	3.
1		0040	21	0.	1		0310	96	187.	1		0540	171	22.	1		0810	246	3.
1		0042	22	0.	1		0312	97	235.	1		0542	172	22.	1		0812	247	3.
1		0044	23	0.	1		0314	98	254.	1		0544	173	21.	1		0814	248	3.
1		0046	24	0.	1		0316	99	252.	1		0546	174	21.	1		0816	249	3.
1		0048	25	0.	1		0318	100	240.	1		0548	175	20.	1		0818	250	3.
1		0050	26	0.	1		0320	101	225.	1		0550	176	20.	1		0820	251	3.
1		0052	27	0.	1		0322	102	211.	1		0552	177	20.	1		0822	252	3.
1		0054	28	0.	1		0324	103	198.	1		0554	178	19.	1		0824	253	3.
1		0056	29	0.	1		0326	104	189.	1		0556	179	19.	1		0826	254	3.
1		0058	30	0.	1		0328	105	180.	1		0558	180	19.	1		0828	255	3.
1		0100	31	0.	1		0330	106	173.	1		0600	181	18.	1		0830	256	3.
1		0102	32	0.	1		0332	107	167.	1		0602	182	18.	1		0832	257	2.
1		0104	33	0.	1		0334	108	161.	1		0604	183	18.	1		0834	258	2.
1		0106	34	0.	1		0336	109	157.	1		0606	184	17.	1		0836	259	2.
1		0108	35	0.	1		0338	110	152.	1		0608	185	17.	1		0838	260	2.
1		0110	36	0.	1		0340	111	148.	1		0610	186	17.	1		0840	261	2.
1		0112	37	0.	1		0342	112	144.	1		0612	187	16.	1		0842	262	2.
1		0114	38	0.	1		0344	113	140.	1		0614	188	16.	1		0844	263	2.
1		0116	39	0.	1		0346	114	136.	1		0616	189	16.	1		0846	264	2.
1		0118	40	0.	1		0348	115	131.	1		0618	190	16.	1		0848	265	2.
1		0120	41	0.	1		0350	116	127.	1		0620	191	15.	1		0850	266	2.
1		0122	42	0.	1		0352	117	124.	1		0622	192	15.	1		0852	267	2.
1		0124	43	0.	1		0354	118	120.	1		0624	193	15.	1		0854	268	2.

1	0126	44	0.	*	1	0356	119	117.	*	1	0626	194	14.	*	1	0856	269	2.
1	0128	45	0.	*	1	0358	120	114.	*	1	0628	195	14.	*	1	0858	270	2.
1	0130	46	0.	*	1	0400	121	112.	*	1	0630	196	14.	*	1	0900	271	2.
1	0132	47	0.	*	1	0402	122	109.	*	1	0632	197	13.	*	1	0902	272	2.
1	0134	48	0.	*	1	0404	123	107.	*	1	0634	198	13.	*	1	0904	273	2.
1	0136	49	0.	*	1	0406	124	105.	*	1	0636	199	13.	*	1	0906	274	2.
1	0138	50	0.	*	1	0408	125	103.	*	1	0638	200	12.	*	1	0908	275	2.
1	0140	51	0.	*	1	0410	126	102.	*	1	0640	201	12.	*	1	0910	276	2.
1	0142	52	0.	*	1	0412	127	100.	*	1	0642	202	12.	*	1	0912	277	2.
1	0144	53	0.	*	1	0414	128	98.	*	1	0644	203	11.	*	1	0914	278	2.
1	0146	54	0.	*	1	0416	129	97.	*	1	0646	204	11.	*	1	0916	279	1.
1	0148	55	0.	*	1	0418	130	96.	*	1	0648	205	11.	*	1	0918	280	1.
1	0150	56	0.	*	1	0420	131	94.	*	1	0650	206	10.	*	1	0920	281	1.
1	0152	57	0.	*	1	0422	132	93.	*	1	0652	207	10.	*	1	0922	282	1.
1	0154	58	0.	*	1	0424	133	92.	*	1	0654	208	10.	*	1	0924	283	1.
1	0156	59	0.	*	1	0426	134	91.	*	1	0656	209	9.	*	1	0926	284	1.
1	0158	60	0.	*	1	0428	135	90.	*	1	0658	210	9.	*	1	0928	285	1.
1	0200	61	0.	*	1	0430	136	88.	*	1	0700	211	9.	*	1	0930	286	1.
1	0202	62	0.	*	1	0432	137	87.	*	1	0702	212	9.	*	1	0932	287	1.
1	0204	63	0.	*	1	0434	138	86.	*	1	0704	213	8.	*	1	0934	288	1.
1	0206	64	0.	*	1	0436	139	85.	*	1	0706	214	8.	*	1	0936	289	1.
1	0208	65	0.	*	1	0438	140	84.	*	1	0708	215	8.	*	1	0938	290	1.
1	0210	66	0.	*	1	0440	141	83.	*	1	0710	216	8.	*	1	0940	291	1.
1	0212	67	1.	*	1	0442	142	62.	*	1	0712	217	7.	*	1	0942	292	1.
1	0214	68	1.	*	1	0444	143	56.	*	1	0714	218	7.	*	1	0944	293	1.
1	0216	69	1.	*	1	0446	144	55.	*	1	0716	219	7.	*	1	0946	294	1.
1	0218	70	1.	*	1	0448	145	54.	*	1	0718	220	7.	*	1	0948	295	1.
1	0220	71	1.	*	1	0450	146	53.	*	1	0720	221	7.	*	1	0950	296	1.
1	0222	72	1.	*	1	0452	147	51.	*	1	0722	222	6.	*	1	0952	297	1.
1	0224	73	1.	*	1	0454	148	49.	*	1	0724	223	6.	*	1	0954	298	1.
1	0226	74	1.	*	1	0456	149	47.	*	1	0726	224	6.	*	1	0956	299	1.
1	0228	75	1.	*	1	0458	150	45.	*	1	0728	225	6.	*	1	0958	300	1.
				*					*					*				

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
+ (CFS)	(HR)					
		(CFS)				
+ 254.	3.23		49.	30.	30.	30.
		(INCHES)	1.051	1.064	1.064	1.064
		(AC-FT)	24.	25.	25.	25.

CUMULATIVE AREA = 0.43 SQ MI

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          *            *
362 KK    *     05Det  *
          *            *
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363 KO OUTPUT CONTROL VARIABLES

IPRNT	2	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

364 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	STOR	TYPE OF INITIAL CONDITION
RSVRIC	0.00	INITIAL CONDITION
X	0.00	WORKING R AND D COEFFICIENT

365 SA	AREA	1.2	1.8	3.2	3.2	3.3	3.3	3.4	3.5
366 SE	ELEVATION	50.00	51.00	52.00	53.00	54.00	55.00	56.00	57.00
367 SQ	DISCHARGE	0.	20.	40.	60.	80.	100.	120.	140.
368 SE	ELEVATION	50.00	50.80	51.18	51.78	52.39	52.94	53.48	54.04

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COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	1.51	3.98	7.17	10.43	13.76	17.15	20.60
ELEVATION	50.00	51.00	52.00	53.00	54.00	55.00	56.00	57.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	1.15	1.51	1.86	3.32	3.98	5.22	6.98	7.17	8.73
OUTFLOW	0.00	20.00	30.53	40.00	60.00	67.21	80.00	100.00	102.22	120.00
ELEVATION	50.00	50.80	51.00	51.18	51.78	52.00	52.39	52.94	53.00	53.48

STORAGE	10.43	10.57	13.76	17.15	20.60
OUTFLOW	138.57	140.00	174.29	210.00	245.71
ELEVATION	54.00	54.04	55.00	56.00	57.00

HYDROGRAPH AT STATION 05Det

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	0.0	50.0	1		0320	101	79.	5.2	52.4	1		0640	201	28.	1.4	50.9
1		0002	2	1.	0.1	50.0	1		0322	102	84.	5.6	52.5	1		0642	202	27.	1.4	50.9
1		0004	3	1.	0.1	50.0	1		0324	103	89.	6.0	52.6	1		0644	203	25.	1.3	50.9
1		0006	4	1.	0.1	50.0	1		0326	104	93.	6.4	52.7	1		0646	204	24.	1.3	50.9
1		0008	5	1.	0.1	50.0	1		0328	105	96.	6.7	52.8	1		0648	205	23.	1.3	50.9
1		0010	6	1.	0.0	50.0	1		0330	106	100.	6.9	52.9	1		0650	206	22.	1.2	50.8
1		0012	7	1.	0.0	50.0	1		0332	107	102.	7.2	53.0	1		0652	207	21.	1.2	50.8
1		0014	8	1.	0.0	50.0	1		0334	108	105.	7.4	53.1	1		0654	208	21.	1.2	50.8
1		0016	9	1.	0.0	50.0	1		0336	109	107.	7.6	53.1	1		0656	209	20.	1.1	50.8
1		0018	10	1.	0.0	50.0	1		0338	110	109.	7.8	53.2	1		0658	210	19.	1.1	50.8
1		0020	11	1.	0.0	50.0	1		0340	111	111.	7.9	53.2	1		0700	211	19.	1.1	50.8
1		0022	12	1.	0.0	50.0	1		0342	112	112.	8.0	53.3	1		0702	212	18.	1.1	50.7
1		0024	13	1.	0.0	50.0	1		0344	113	113.	8.1	53.3	1		0704	213	18.	1.0	50.7
1		0026	14	1.	0.0	50.0	1		0346	114	114.	8.2	53.3	1		0706	214	18.	1.0	50.7
1		0028	15	1.	0.0	50.0	1		0348	115	115.	8.3	53.4	1		0708	215	17.	1.0	50.7
1		0030	16	1.	0.0	50.0	1		0350	116	116.	8.4	53.4	1		0710	216	17.	1.0	50.7
1		0032	17	1.	0.0	50.0	1		0352	117	116.	8.4	53.4	1		0712	217	16.	0.9	50.7
1		0034	18	0.	0.0	50.0	1		0354	118	117.	8.4	53.4	1		0714	218	16.	0.9	50.6
1		0036	19	0.	0.0	50.0	1		0356	119	117.	8.5	53.4	1		0716	219	16.	0.9	50.6
1		0038	20	0.	0.0	50.0	1		0358	120	117.	8.5	53.4	1		0718	220	15.	0.9	50.6
1		0040	21	0.	0.0	50.0	1		0400	121	117.	8.5	53.4	1		0720	221	15.	0.9	50.6
1		0042	22	0.	0.0	50.0	1		0402	122	117.	8.5	53.4	1		0722	222	14.	0.8	50.6
1		0044	23	0.	0.0	50.0	1		0404	123	117.	8.5	53.4	1		0724	223	14.	0.8	50.6
1		0046	24	0.	0.0	50.0	1		0406	124	117.	8.5	53.4	1		0726	224	14.	0.8	50.5
1		0048	25	0.	0.0	50.0	1		0408	125	117.	8.4	53.4	1		0728	225	13.	0.8	50.5
1		0050	26	0.	0.0	50.0	1		0410	126	116.	8.4	53.4	1		0730	226	13.	0.7	50.5
1		0052	27	0.	0.0	50.0	1		0412	127	116.	8.4	53.4	1		0732	227	13.	0.7	50.5
1		0054	28	0.	0.0	50.0	1		0414	128	116.	8.3	53.4	1		0734	228	12.	0.7	50.5
1		0056	29	0.	0.0	50.0	1		0416	129	115.	8.3	53.3	1		0736	229	12.	0.7	50.5
1		0058	30	0.	0.0	50.0	1		0418	130	115.	8.3	53.3	1		0738	230	12.	0.7	50.5
1		0100	31	0.	0.0	50.0	1		0420	131	114.	8.2	53.3	1		0740	231	11.	0.7	50.5
1		0102	32	0.	0.0	50.0	1		0422	132	114.	8.2	53.3	1		0742	232	11.	0.6	50.4
1		0104	33	0.	0.0	50.0	1		0424	133	113.	8.1	53.3	1		0744	233	11.	0.6	50.4
1		0106	34	0.	0.0	50.0	1		0426	134	112.	8.1	53.3	1		0746	234	11.	0.6	50.4
1		0108	35	0.	0.0	50.0	1		0428	135	112.	8.0	53.3	1		0748	235	10.	0.6	50.4
1		0110	36	0.	0.0	50.0	1		0430	136	111.	8.0	53.2	1		0750	236	10.	0.6	50.4
1		0112	37	0.	0.0	50.0	1		0432	137	111.	7.9	53.2	1		0752	237	10.	0.6	50.4
1		0114	38	0.	0.0	50.0	1		0434	138	110.	7.8	53.2	1		0754	238	9.	0.5	50.4

1	0116	39	0.	0.0	50.0	*	1	0436	139	109.	7.8	53.2	*	1	0756	239	9.	0.5	50.4
1	0118	40	0.	0.0	50.0	*	1	0438	140	108.	7.7	53.2	*	1	0758	240	9.	0.5	50.4
1	0120	41	0.	0.0	50.0	*	1	0440	141	108.	7.7	53.2	*	1	0800	241	9.	0.5	50.4
1	0122	42	0.	0.0	50.0	*	1	0442	142	107.	7.6	53.1	*	1	0802	242	9.	0.5	50.3
1	0124	43	0.	0.0	50.0	*	1	0444	143	105.	7.4	53.1	*	1	0804	243	8.	0.5	50.3
1	0126	44	0.	0.0	50.0	*	1	0446	144	104.	7.3	53.0	*	1	0806	244	8.	0.5	50.3
1	0128	45	0.	0.0	50.0	*	1	0448	145	102.	7.2	53.0	*	1	0808	245	8.	0.5	50.3
1	0130	46	0.	0.0	50.0	*	1	0450	146	101.	7.1	53.0	*	1	0810	246	8.	0.4	50.3
1	0132	47	0.	0.0	50.0	*	1	0452	147	99.	6.9	52.9	*	1	0812	247	7.	0.4	50.3
1	0134	48	0.	0.0	50.0	*	1	0454	148	98.	6.8	52.9	*	1	0814	248	7.	0.4	50.3
1	0136	49	0.	0.0	50.0	*	1	0456	149	97.	6.7	52.8	*	1	0816	249	7.	0.4	50.3
1	0138	50	0.	0.0	50.0	*	1	0458	150	95.	6.5	52.8	*	1	0818	250	7.	0.4	50.3
1	0140	51	0.	0.0	50.0	*	1	0500	151	93.	6.4	52.8	*	1	0820	251	7.	0.4	50.3
1	0142	52	0.	0.0	50.0	*	1	0502	152	92.	6.3	52.7	*	1	0822	252	7.	0.4	50.3
1	0144	53	0.	0.0	50.0	*	1	0504	153	90.	6.1	52.7	*	1	0824	253	6.	0.4	50.3
1	0146	54	0.	0.0	50.0	*	1	0506	154	89.	6.0	52.6	*	1	0826	254	6.	0.4	50.2
1	0148	55	0.	0.0	50.0	*	1	0508	155	87.	5.9	52.6	*	1	0828	255	6.	0.4	50.2
1	0150	56	0.	0.0	50.0	*	1	0510	156	86.	5.7	52.5	*	1	0830	256	6.	0.3	50.2
1	0152	57	0.	0.0	50.0	*	1	0512	157	84.	5.6	52.5	*	1	0832	257	6.	0.3	50.2
1	0154	58	0.	0.0	50.0	*	1	0514	158	83.	5.5	52.5	*	1	0834	258	6.	0.3	50.2
1	0156	59	0.	0.0	50.0	*	1	0516	159	81.	5.3	52.4	*	1	0836	259	5.	0.3	50.2
1	0158	60	0.	0.0	50.0	*	1	0518	160	80.	5.2	52.4	*	1	0838	260	5.	0.3	50.2
1	0200	61	0.	0.0	50.0	*	1	0520	161	78.	5.1	52.3	*	1	0840	261	5.	0.3	50.2
1	0202	62	0.	0.0	50.0	*	1	0522	162	77.	4.9	52.3	*	1	0842	262	5.	0.3	50.2
1	0204	63	0.	0.0	50.0	*	1	0524	163	76.	4.8	52.3	*	1	0844	263	5.	0.3	50.2
1	0206	64	0.	0.0	50.0	*	1	0526	164	74.	4.7	52.2	*	1	0846	264	5.	0.3	50.2
1	0208	65	0.	0.0	50.0	*	1	0528	165	73.	4.5	52.2	*	1	0848	265	5.	0.3	50.2
1	0210	66	0.	0.0	50.0	*	1	0530	166	72.	4.4	52.1	*	1	0850	266	5.	0.3	50.2
1	0212	67	0.	0.0	50.0	*	1	0532	167	70.	4.3	52.1	*	1	0852	267	4.	0.3	50.2
1	0214	68	0.	0.0	50.0	*	1	0534	168	69.	4.2	52.1	*	1	0854	268	4.	0.2	50.2
1	0216	69	0.	0.0	50.0	*	1	0536	169	68.	4.0	52.0	*	1	0856	269	4.	0.2	50.2
1	0218	70	0.	0.0	50.0	*	1	0538	170	67.	3.9	52.0	*	1	0858	270	4.	0.2	50.2
1	0220	71	0.	0.0	50.0	*	1	0540	171	65.	3.8	51.9	*	1	0900	271	4.	0.2	50.2
1	0222	72	0.	0.0	50.0	*	1	0542	172	64.	3.7	51.9	*	1	0902	272	4.	0.2	50.2
1	0224	73	0.	0.0	50.0	*	1	0544	173	63.	3.6	51.9	*	1	0904	273	4.	0.2	50.2
1	0226	74	0.	0.0	50.0	*	1	0546	174	62.	3.5	51.8	*	1	0906	274	4.	0.2	50.1
1	0228	75	0.	0.0	50.0	*	1	0548	175	60.	3.4	51.8	*	1	0908	275	4.	0.2	50.1
1	0230	76	1.	0.0	50.0	*	1	0550	176	59.	3.3	51.8	*	1	0910	276	4.	0.2	50.1
1	0232	77	1.	0.0	50.0	*	1	0552	177	58.	3.2	51.7	*	1	0912	277	3.	0.2	50.1
1	0234	78	1.	0.0	50.0	*	1	0554	178	56.	3.1	51.7	*	1	0914	278	3.	0.2	50.1
1	0236	79	1.	0.0	50.0	*	1	0556	179	55.	3.0	51.6	*	1	0916	279	3.	0.2	50.1
1	0238	80	1.	0.0	50.0	*	1	0558	180	54.	2.9	51.6	*	1	0918	280	3.	0.2	50.1
1	0240	81	1.	0.1	50.0	*	1	0600	181	52.	2.8	51.6	*	1	0920	281	3.	0.2	50.1
1	0242	82	1.	0.1	50.0	*	1	0602	182	51.	2.7	51.5	*	1	0922	282	3.	0.2	50.1
1	0244	83	1.	0.1	50.1	*	1	0604	183	50.	2.6	51.5	*	1	0924	283	3.	0.2	50.1
1	0246	84	2.	0.1	50.1	*	1	0606	184	49.	2.5	51.4	*	1	0926	284	3.	0.2	50.1
1	0248	85	2.	0.1	50.1	*	1	0608	185	48.	2.4	51.4	*	1	0928	285	3.	0.2	50.1

1	0250	86	3.	0.1	50.1	*	1	0610	186	47.	2.3	51.4	*	1	0930	286	3.	0.2	50.1
1	0252	87	3.	0.2	50.1	*	1	0612	187	46.	2.3	51.3	*	1	0932	287	3.	0.2	50.1
1	0254	88	4.	0.2	50.2	*	1	0614	188	45.	2.2	51.3	*	1	0934	288	3.	0.2	50.1
1	0256	89	5.	0.3	50.2	*	1	0616	189	44.	2.1	51.3	*	1	0936	289	3.	0.1	50.1
1	0258	90	6.	0.4	50.3	*	1	0618	190	43.	2.0	51.3	*	1	0938	290	2.	0.1	50.1
1	0300	91	8.	0.5	50.3	*	1	0620	191	42.	2.0	51.2	*	1	0940	291	2.	0.1	50.1
1	0302	92	11.	0.7	50.5	*	1	0622	192	41.	1.9	51.2	*	1	0942	292	2.	0.1	50.1
1	0304	93	16.	0.9	50.6	*	1	0624	193	39.	1.8	51.2	*	1	0944	293	2.	0.1	50.1
1	0306	94	23.	1.3	50.9	*	1	0626	194	38.	1.8	51.1	*	1	0946	294	2.	0.1	50.1
1	0308	95	34.	1.7	51.1	*	1	0628	195	36.	1.7	51.1	*	1	0948	295	2.	0.1	50.1
1	0310	96	44.	2.1	51.3	*	1	0630	196	34.	1.7	51.1	*	1	0950	296	2.	0.1	50.1
1	0312	97	52.	2.7	51.5	*	1	0632	197	33.	1.6	51.0	*	1	0952	297	2.	0.1	50.1
1	0314	98	61.	3.4	51.8	*	1	0634	198	32.	1.6	51.0	*	1	0954	298	2.	0.1	50.1
1	0316	99	68.	4.0	52.0	*	1	0636	199	30.	1.5	51.0	*	1	0956	299	2.	0.1	50.1
1	0318	100	74.	4.6	52.2	*	1	0638	200	29.	1.5	51.0	*	1	0958	300	2.	0.1	50.1
						*							*						

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PEAK FLOW	TIME			MAXIMUM AVERAGE FLOW		
			6-HR	24-HR	72-HR	9.97-HR
+ (CFS)	(HR)					
		(CFS)				
+ 117.	4.00		54.	33.	33.	33.
		(INCHES)	1.075	1.090	1.090	1.090
		(AC-FT)	27.	27.	27.	27.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE		
		6-HR	24-HR	72-HR	9.97-HR
+ (AC-FT)	(HR)				
8.	4.00	3.	2.	2.	2.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE		
		6-HR	24-HR	72-HR	9.97-HR
+ (FEET)	(HR)				
53.41	4.00	51.62	51.00	51.00	51.00

CUMULATIVE AREA = 0.46 SQ MI

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           *            *
369 KK     *   05Qpip   *
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          *            *
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370 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           2  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

     DT           DIVERSION
                      ISTAD      05Qspl  DIVERSION HYDROGRAPH IDENTIFICATION

     DI              INFLOW        0.00    160.00    382.00    780.00   1292.00   1897.00

     DQ       DIVERTED FLOW        0.00      0.01    212.00    600.00   1102.00   1697.00

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DIVERSION HYDROGRAPH 05Qspl

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DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0230	76	0.	1		0500	151	0.	1		0730	226	0.
1		0002	2	0.	1		0232	77	0.	1		0502	152	0.	1		0732	227	0.
1		0004	3	0.	1		0234	78	0.	1		0504	153	0.	1		0734	228	0.
1		0006	4	0.	1		0236	79	0.	1		0506	154	0.	1		0736	229	0.
1		0008	5	0.	1		0238	80	0.	1		0508	155	0.	1		0738	230	0.
1		0010	6	0.	1		0240	81	0.	1		0510	156	0.	1		0740	231	0.
1		0012	7	0.	1		0242	82	0.	1		0512	157	0.	1		0742	232	0.
1		0014	8	0.	1		0244	83	0.	1		0514	158	0.	1		0744	233	0.
1		0016	9	0.	1		0246	84	0.	1		0516	159	0.	1		0746	234	0.
1		0018	10	0.	1		0248	85	0.	1		0518	160	0.	1		0748	235	0.
1		0020	11	0.	1		0250	86	0.	1		0520	161	0.	1		0750	236	0.
1		0022	12	0.	1		0252	87	0.	1		0522	162	0.	1		0752	237	0.
1		0024	13	0.	1		0254	88	0.	1		0524	163	0.	1		0754	238	0.
1		0026	14	0.	1		0256	89	0.	1		0526	164	0.	1		0756	239	0.
1		0028	15	0.	1		0258	90	0.	1		0528	165	0.	1		0758	240	0.
1		0030	16	0.	1		0300	91	0.	1		0530	166	0.	1		0800	241	0.
1		0032	17	0.	1		0302	92	0.	1		0532	167	0.	1		0802	242	0.
1		0034	18	0.	1		0304	93	0.	1		0534	168	0.	1		0804	243	0.
1		0036	19	0.	1		0306	94	0.	1		0536	169	0.	1		0806	244	0.
1		0038	20	0.	1		0308	95	0.	1		0538	170	0.	1		0808	245	0.
1		0040	21	0.	1		0310	96	0.	1		0540	171	0.	1		0810	246	0.
1		0042	22	0.	1		0312	97	0.	1		0542	172	0.	1		0812	247	0.

1	0044	23	0.	*	1	0314	98	0.	*	1	0544	173	0.	*	1	0814	248	0.
1	0046	24	0.	*	1	0316	99	0.	*	1	0546	174	0.	*	1	0816	249	0.
1	0048	25	0.	*	1	0318	100	0.	*	1	0548	175	0.	*	1	0818	250	0.
1	0050	26	0.	*	1	0320	101	0.	*	1	0550	176	0.	*	1	0820	251	0.
1	0052	27	0.	*	1	0322	102	0.	*	1	0552	177	0.	*	1	0822	252	0.
1	0054	28	0.	*	1	0324	103	0.	*	1	0554	178	0.	*	1	0824	253	0.
1	0056	29	0.	*	1	0326	104	0.	*	1	0556	179	0.	*	1	0826	254	0.
1	0058	30	0.	*	1	0328	105	0.	*	1	0558	180	0.	*	1	0828	255	0.
1	0100	31	0.	*	1	0330	106	0.	*	1	0600	181	0.	*	1	0830	256	0.
1	0102	32	0.	*	1	0332	107	0.	*	1	0602	182	0.	*	1	0832	257	0.
1	0104	33	0.	*	1	0334	108	0.	*	1	0604	183	0.	*	1	0834	258	0.
1	0106	34	0.	*	1	0336	109	0.	*	1	0606	184	0.	*	1	0836	259	0.
1	0108	35	0.	*	1	0338	110	0.	*	1	0608	185	0.	*	1	0838	260	0.
1	0110	36	0.	*	1	0340	111	0.	*	1	0610	186	0.	*	1	0840	261	0.
1	0112	37	0.	*	1	0342	112	0.	*	1	0612	187	0.	*	1	0842	262	0.
1	0114	38	0.	*	1	0344	113	0.	*	1	0614	188	0.	*	1	0844	263	0.
1	0116	39	0.	*	1	0346	114	0.	*	1	0616	189	0.	*	1	0846	264	0.
1	0118	40	0.	*	1	0348	115	0.	*	1	0618	190	0.	*	1	0848	265	0.
1	0120	41	0.	*	1	0350	116	0.	*	1	0620	191	0.	*	1	0850	266	0.
1	0122	42	0.	*	1	0352	117	0.	*	1	0622	192	0.	*	1	0852	267	0.
1	0124	43	0.	*	1	0354	118	0.	*	1	0624	193	0.	*	1	0854	268	0.
1	0126	44	0.	*	1	0356	119	0.	*	1	0626	194	0.	*	1	0856	269	0.
1	0128	45	0.	*	1	0358	120	0.	*	1	0628	195	0.	*	1	0858	270	0.
1	0130	46	0.	*	1	0400	121	0.	*	1	0630	196	0.	*	1	0900	271	0.
1	0132	47	0.	*	1	0402	122	0.	*	1	0632	197	0.	*	1	0902	272	0.
1	0134	48	0.	*	1	0404	123	0.	*	1	0634	198	0.	*	1	0904	273	0.
1	0136	49	0.	*	1	0406	124	0.	*	1	0636	199	0.	*	1	0906	274	0.
1	0138	50	0.	*	1	0408	125	0.	*	1	0638	200	0.	*	1	0908	275	0.
1	0140	51	0.	*	1	0410	126	0.	*	1	0640	201	0.	*	1	0910	276	0.
1	0142	52	0.	*	1	0412	127	0.	*	1	0642	202	0.	*	1	0912	277	0.
1	0144	53	0.	*	1	0414	128	0.	*	1	0644	203	0.	*	1	0914	278	0.
1	0146	54	0.	*	1	0416	129	0.	*	1	0646	204	0.	*	1	0916	279	0.
1	0148	55	0.	*	1	0418	130	0.	*	1	0648	205	0.	*	1	0918	280	0.
1	0150	56	0.	*	1	0420	131	0.	*	1	0650	206	0.	*	1	0920	281	0.
1	0152	57	0.	*	1	0422	132	0.	*	1	0652	207	0.	*	1	0922	282	0.
1	0154	58	0.	*	1	0424	133	0.	*	1	0654	208	0.	*	1	0924	283	0.
1	0156	59	0.	*	1	0426	134	0.	*	1	0656	209	0.	*	1	0926	284	0.
1	0158	60	0.	*	1	0428	135	0.	*	1	0658	210	0.	*	1	0928	285	0.
1	0200	61	0.	*	1	0430	136	0.	*	1	0700	211	0.	*	1	0930	286	0.
1	0202	62	0.	*	1	0432	137	0.	*	1	0702	212	0.	*	1	0932	287	0.
1	0204	63	0.	*	1	0434	138	0.	*	1	0704	213	0.	*	1	0934	288	0.
1	0206	64	0.	*	1	0436	139	0.	*	1	0706	214	0.	*	1	0936	289	0.
1	0208	65	0.	*	1	0438	140	0.	*	1	0708	215	0.	*	1	0938	290	0.
1	0210	66	0.	*	1	0440	141	0.	*	1	0710	216	0.	*	1	0940	291	0.
1	0212	67	0.	*	1	0442	142	0.	*	1	0712	217	0.	*	1	0942	292	0.
1	0214	68	0.	*	1	0444	143	0.	*	1	0714	218	0.	*	1	0944	293	0.
1	0216	69	0.	*	1	0446	144	0.	*	1	0716	219	0.	*	1	0946	294	0.

1	0218	70	0.	*	1	0448	145	0.	*	1	0718	220	0.	*	1	0948	295	0.
1	0220	71	0.	*	1	0450	146	0.	*	1	0720	221	0.	*	1	0950	296	0.
1	0222	72	0.	*	1	0452	147	0.	*	1	0722	222	0.	*	1	0952	297	0.
1	0224	73	0.	*	1	0454	148	0.	*	1	0724	223	0.	*	1	0954	298	0.
1	0226	74	0.	*	1	0456	149	0.	*	1	0726	224	0.	*	1	0956	299	0.
1	0228	75	0.	*	1	0458	150	0.	*	1	0728	225	0.	*	1	0958	300	0.

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
+ (CFS)	(HR)					
		(CFS)				
+ 0.	3.67		0.	0.	0.	0.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.46 SQ MI

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HYDROGRAPH AT STATION 05Qpip

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DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	*	1		0230	76	1.	*	1		0500	151	93.	*	1		0730	226	13.
1		0002	2	1.	*	1		0232	77	1.	*	1		0502	152	92.	*	1		0732	227	13.
1		0004	3	1.	*	1		0234	78	1.	*	1		0504	153	90.	*	1		0734	228	12.
1		0006	4	1.	*	1		0236	79	1.	*	1		0506	154	89.	*	1		0736	229	12.
1		0008	5	1.	*	1		0238	80	1.	*	1		0508	155	87.	*	1		0738	230	12.
1		0010	6	1.	*	1		0240	81	1.	*	1		0510	156	86.	*	1		0740	231	11.
1		0012	7	1.	*	1		0242	82	1.	*	1		0512	157	84.	*	1		0742	232	11.
1		0014	8	1.	*	1		0244	83	1.	*	1		0514	158	83.	*	1		0744	233	11.
1		0016	9	1.	*	1		0246	84	2.	*	1		0516	159	81.	*	1		0746	234	11.
1		0018	10	1.	*	1		0248	85	2.	*	1		0518	160	80.	*	1		0748	235	10.
1		0020	11	1.	*	1		0250	86	3.	*	1		0520	161	78.	*	1		0750	236	10.
1		0022	12	1.	*	1		0252	87	3.	*	1		0522	162	77.	*	1		0752	237	10.
1		0024	13	1.	*	1		0254	88	4.	*	1		0524	163	76.	*	1		0754	238	9.
1		0026	14	1.	*	1		0256	89	5.	*	1		0526	164	74.	*	1		0756	239	9.
1		0028	15	1.	*	1		0258	90	6.	*	1		0528	165	73.	*	1		0758	240	9.
1		0030	16	1.	*	1		0300	91	8.	*	1		0530	166	72.	*	1		0800	241	9.
1		0032	17	1.	*	1		0302	92	11.	*	1		0532	167	70.	*	1		0802	242	9.
1		0034	18	0.	*	1		0304	93	16.	*	1		0534	168	69.	*	1		0804	243	8.
1		0036	19	0.	*	1		0306	94	23.	*	1		0536	169	68.	*	1		0806	244	8.

1	0038	20	0.	*	1	0308	95	34.	*	1	0538	170	67.	*	1	0808	245	8.
1	0040	21	0.	*	1	0310	96	44.	*	1	0540	171	65.	*	1	0810	246	8.
1	0042	22	0.	*	1	0312	97	52.	*	1	0542	172	64.	*	1	0812	247	7.
1	0044	23	0.	*	1	0314	98	61.	*	1	0544	173	63.	*	1	0814	248	7.
1	0046	24	0.	*	1	0316	99	68.	*	1	0546	174	62.	*	1	0816	249	7.
1	0048	25	0.	*	1	0318	100	74.	*	1	0548	175	60.	*	1	0818	250	7.
1	0050	26	0.	*	1	0320	101	79.	*	1	0550	176	59.	*	1	0820	251	7.
1	0052	27	0.	*	1	0322	102	84.	*	1	0552	177	58.	*	1	0822	252	7.
1	0054	28	0.	*	1	0324	103	89.	*	1	0554	178	56.	*	1	0824	253	6.
1	0056	29	0.	*	1	0326	104	93.	*	1	0556	179	55.	*	1	0826	254	6.
1	0058	30	0.	*	1	0328	105	96.	*	1	0558	180	54.	*	1	0828	255	6.
1	0100	31	0.	*	1	0330	106	100.	*	1	0600	181	52.	*	1	0830	256	6.
1	0102	32	0.	*	1	0332	107	102.	*	1	0602	182	51.	*	1	0832	257	6.
1	0104	33	0.	*	1	0334	108	105.	*	1	0604	183	50.	*	1	0834	258	6.
1	0106	34	0.	*	1	0336	109	107.	*	1	0606	184	49.	*	1	0836	259	5.
1	0108	35	0.	*	1	0338	110	109.	*	1	0608	185	48.	*	1	0838	260	5.
1	0110	36	0.	*	1	0340	111	111.	*	1	0610	186	47.	*	1	0840	261	5.
1	0112	37	0.	*	1	0342	112	112.	*	1	0612	187	46.	*	1	0842	262	5.
1	0114	38	0.	*	1	0344	113	113.	*	1	0614	188	45.	*	1	0844	263	5.
1	0116	39	0.	*	1	0346	114	114.	*	1	0616	189	44.	*	1	0846	264	5.
1	0118	40	0.	*	1	0348	115	115.	*	1	0618	190	43.	*	1	0848	265	5.
1	0120	41	0.	*	1	0350	116	116.	*	1	0620	191	42.	*	1	0850	266	5.
1	0122	42	0.	*	1	0352	117	116.	*	1	0622	192	41.	*	1	0852	267	4.
1	0124	43	0.	*	1	0354	118	117.	*	1	0624	193	39.	*	1	0854	268	4.
1	0126	44	0.	*	1	0356	119	117.	*	1	0626	194	38.	*	1	0856	269	4.
1	0128	45	0.	*	1	0358	120	117.	*	1	0628	195	36.	*	1	0858	270	4.
1	0130	46	0.	*	1	0400	121	117.	*	1	0630	196	34.	*	1	0900	271	4.
1	0132	47	0.	*	1	0402	122	117.	*	1	0632	197	33.	*	1	0902	272	4.
1	0134	48	0.	*	1	0404	123	117.	*	1	0634	198	32.	*	1	0904	273	4.
1	0136	49	0.	*	1	0406	124	117.	*	1	0636	199	30.	*	1	0906	274	4.
1	0138	50	0.	*	1	0408	125	117.	*	1	0638	200	29.	*	1	0908	275	4.
1	0140	51	0.	*	1	0410	126	116.	*	1	0640	201	28.	*	1	0910	276	4.
1	0142	52	0.	*	1	0412	127	116.	*	1	0642	202	27.	*	1	0912	277	3.
1	0144	53	0.	*	1	0414	128	116.	*	1	0644	203	25.	*	1	0914	278	3.
1	0146	54	0.	*	1	0416	129	115.	*	1	0646	204	24.	*	1	0916	279	3.
1	0148	55	0.	*	1	0418	130	115.	*	1	0648	205	23.	*	1	0918	280	3.
1	0150	56	0.	*	1	0420	131	114.	*	1	0650	206	22.	*	1	0920	281	3.
1	0152	57	0.	*	1	0422	132	114.	*	1	0652	207	21.	*	1	0922	282	3.
1	0154	58	0.	*	1	0424	133	113.	*	1	0654	208	21.	*	1	0924	283	3.
1	0156	59	0.	*	1	0426	134	112.	*	1	0656	209	20.	*	1	0926	284	3.
1	0158	60	0.	*	1	0428	135	112.	*	1	0658	210	19.	*	1	0928	285	3.
1	0200	61	0.	*	1	0430	136	111.	*	1	0700	211	19.	*	1	0930	286	3.
1	0202	62	0.	*	1	0432	137	111.	*	1	0702	212	18.	*	1	0932	287	3.
1	0204	63	0.	*	1	0434	138	110.	*	1	0704	213	18.	*	1	0934	288	3.
1	0206	64	0.	*	1	0436	139	109.	*	1	0706	214	18.	*	1	0936	289	3.
1	0208	65	0.	*	1	0438	140	108.	*	1	0708	215	17.	*	1	0938	290	2.
1	0210	66	0.	*	1	0440	141	108.	*	1	0710	216	17.	*	1	0940	291	2.

1	0212	67	0.	*	1	0442	142	107.	*	1	0712	217	16.	*	1	0942	292	2.
1	0214	68	0.	*	1	0444	143	105.	*	1	0714	218	16.	*	1	0944	293	2.
1	0216	69	0.	*	1	0446	144	104.	*	1	0716	219	16.	*	1	0946	294	2.
1	0218	70	0.	*	1	0448	145	102.	*	1	0718	220	15.	*	1	0948	295	2.
1	0220	71	0.	*	1	0450	146	101.	*	1	0720	221	15.	*	1	0950	296	2.
1	0222	72	0.	*	1	0452	147	99.	*	1	0722	222	14.	*	1	0952	297	2.
1	0224	73	0.	*	1	0454	148	98.	*	1	0724	223	14.	*	1	0954	298	2.
1	0226	74	0.	*	1	0456	149	97.	*	1	0726	224	14.	*	1	0956	299	2.
1	0228	75	0.	*	1	0458	150	95.	*	1	0728	225	13.	*	1	0958	300	2.
				*					*					*				

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
+ (CFS)	(HR)					
		(CFS)				
+ 117.	4.00		54.	33.	33.	33.
		(INCHES)	1.074	1.090	1.090	1.090
		(AC-FT)	27.	27.	27.	27.

CUMULATIVE AREA = 0.46 SQ MI

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          *            *
381 KK    *   050610   *         COMBINE
          *            *
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383 KO        OUTPUT CONTROL VARIABLES
                    IPRNT            2   PRINT CONTROL
                    IPLOT            0   PLOT CONTROL
                    QSCAL           0.   HYDROGRAPH PLOT SCALE

384 HC        HYDROGRAPH COMBINATION
                    ICOMP            2   NUMBER OF HYDROGRAPHS TO COMBINE
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HYDROGRAPH AT STATION 050610

SUM OF 2 HYDROGRAPHS

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0230	76	1.	1		0500	151	98.	1		0730	226	14.
1		0002	2	1.	1		0232	77	1.	1		0502	152	96.	1		0732	227	13.
1		0004	3	1.	1		0234	78	2.	1		0504	153	94.	1		0734	228	13.
1		0006	4	1.	1		0236	79	2.	1		0506	154	93.	1		0736	229	13.
1		0008	5	1.	1		0238	80	2.	1		0508	155	91.	1		0738	230	12.
1		0010	6	1.	1		0240	81	3.	1		0510	156	90.	1		0740	231	12.
1		0012	7	1.	1		0242	82	3.	1		0512	157	88.	1		0742	232	12.
1		0014	8	1.	1		0244	83	4.	1		0514	158	86.	1		0744	233	11.
1		0016	9	1.	1		0246	84	5.	1		0516	159	85.	1		0746	234	11.
1		0018	10	1.	1		0248	85	6.	1		0518	160	83.	1		0748	235	11.
1		0020	11	1.	1		0250	86	7.	1		0520	161	82.	1		0750	236	10.
1		0022	12	1.	1		0252	87	10.	1		0522	162	80.	1		0752	237	10.
1		0024	13	1.	1		0254	88	12.	1		0524	163	79.	1		0754	238	10.
1		0026	14	1.	1		0256	89	16.	1		0526	164	78.	1		0756	239	10.
1		0028	15	1.	1		0258	90	22.	1		0528	165	76.	1		0758	240	9.
1		0030	16	1.	1		0300	91	30.	1		0530	166	75.	1		0800	241	9.
1		0032	17	1.	1		0302	92	46.	1		0532	167	74.	1		0802	242	9.
1		0034	18	0.	1		0304	93	71.	1		0534	168	72.	1		0804	243	9.
1		0036	19	0.	1		0306	94	103.	1		0536	169	71.	1		0806	244	8.
1		0038	20	0.	1		0308	95	133.	1		0538	170	70.	1		0808	245	8.
1		0040	21	0.	1		0310	96	143.	1		0540	171	68.	1		0810	246	8.
1		0042	22	0.	1		0312	97	141.	1		0542	172	67.	1		0812	247	8.
1		0044	23	0.	1		0314	98	138.	1		0544	173	66.	1		0814	248	8.
1		0046	24	0.	1		0316	99	134.	1		0546	174	65.	1		0816	249	7.
1		0048	25	0.	1		0318	100	131.	1		0548	175	63.	1		0818	250	7.
1		0050	26	0.	1		0320	101	131.	1		0550	176	62.	1		0820	251	7.
1		0052	27	0.	1		0322	102	131.	1		0552	177	60.	1		0822	252	7.
1		0054	28	0.	1		0324	103	132.	1		0554	178	59.	1		0824	253	7.
1		0056	29	0.	1		0326	104	133.	1		0556	179	58.	1		0826	254	7.
1		0058	30	0.	1		0328	105	134.	1		0558	180	56.	1		0828	255	6.
1		0100	31	0.	1		0330	106	135.	1		0600	181	55.	1		0830	256	6.
1		0102	32	0.	1		0332	107	136.	1		0602	182	54.	1		0832	257	6.
1		0104	33	0.	1		0334	108	138.	1		0604	183	53.	1		0834	258	6.
1		0106	34	0.	1		0336	109	138.	1		0606	184	51.	1		0836	259	6.
1		0108	35	0.	1		0338	110	138.	1		0608	185	50.	1		0838	260	6.
1		0110	36	0.	1		0340	111	138.	1		0610	186	49.	1		0840	261	5.
1		0112	37	0.	1		0342	112	137.	1		0612	187	48.	1		0842	262	5.
1		0114	38	0.	1		0344	113	137.	1		0614	188	47.	1		0844	263	5.
1		0116	39	0.	1		0346	114	136.	1		0616	189	46.	1		0846	264	5.
1		0118	40	0.	1		0348	115	135.	1		0618	190	45.	1		0848	265	5.
1		0120	41	0.	1		0350	116	134.	1		0620	191	44.	1		0850	266	5.

1	0122	42	0.	*	1	0352	117	133.	*	1	0622	192	43.	*	1	0852	267	5.
1	0124	43	0.	*	1	0354	118	132.	*	1	0624	193	41.	*	1	0854	268	5.
1	0126	44	0.	*	1	0356	119	132.	*	1	0626	194	40.	*	1	0856	269	4.
1	0128	45	0.	*	1	0358	120	131.	*	1	0628	195	38.	*	1	0858	270	4.
1	0130	46	0.	*	1	0400	121	130.	*	1	0630	196	36.	*	1	0900	271	4.
1	0132	47	0.	*	1	0402	122	129.	*	1	0632	197	35.	*	1	0902	272	4.
1	0134	48	0.	*	1	0404	123	128.	*	1	0634	198	33.	*	1	0904	273	4.
1	0136	49	0.	*	1	0406	124	127.	*	1	0636	199	32.	*	1	0906	274	4.
1	0138	50	0.	*	1	0408	125	127.	*	1	0638	200	31.	*	1	0908	275	4.
1	0140	51	0.	*	1	0410	126	126.	*	1	0640	201	29.	*	1	0910	276	4.
1	0142	52	0.	*	1	0412	127	125.	*	1	0642	202	28.	*	1	0912	277	4.
1	0144	53	0.	*	1	0414	128	124.	*	1	0644	203	27.	*	1	0914	278	4.
1	0146	54	0.	*	1	0416	129	123.	*	1	0646	204	26.	*	1	0916	279	3.
1	0148	55	0.	*	1	0418	130	123.	*	1	0648	205	25.	*	1	0918	280	3.
1	0150	56	0.	*	1	0420	131	122.	*	1	0650	206	24.	*	1	0920	281	3.
1	0152	57	0.	*	1	0422	132	121.	*	1	0652	207	23.	*	1	0922	282	3.
1	0154	58	0.	*	1	0424	133	120.	*	1	0654	208	22.	*	1	0924	283	3.
1	0156	59	0.	*	1	0426	134	119.	*	1	0656	209	21.	*	1	0926	284	3.
1	0158	60	0.	*	1	0428	135	118.	*	1	0658	210	20.	*	1	0928	285	3.
1	0200	61	0.	*	1	0430	136	118.	*	1	0700	211	20.	*	1	0930	286	3.
1	0202	62	0.	*	1	0432	137	117.	*	1	0702	212	19.	*	1	0932	287	3.
1	0204	63	0.	*	1	0434	138	116.	*	1	0704	213	19.	*	1	0934	288	3.
1	0206	64	0.	*	1	0436	139	115.	*	1	0706	214	19.	*	1	0936	289	3.
1	0208	65	0.	*	1	0438	140	114.	*	1	0708	215	18.	*	1	0938	290	3.
1	0210	66	0.	*	1	0440	141	113.	*	1	0710	216	18.	*	1	0940	291	3.
1	0212	67	0.	*	1	0442	142	112.	*	1	0712	217	17.	*	1	0942	292	3.
1	0214	68	0.	*	1	0444	143	110.	*	1	0714	218	17.	*	1	0944	293	2.
1	0216	69	0.	*	1	0446	144	109.	*	1	0716	219	16.	*	1	0946	294	2.
1	0218	70	1.	*	1	0448	145	107.	*	1	0718	220	16.	*	1	0948	295	2.
1	0220	71	1.	*	1	0450	146	106.	*	1	0720	221	15.	*	1	0950	296	2.
1	0222	72	1.	*	1	0452	147	104.	*	1	0722	222	15.	*	1	0952	297	2.
1	0224	73	1.	*	1	0454	148	103.	*	1	0724	223	15.	*	1	0954	298	2.
1	0226	74	1.	*	1	0456	149	101.	*	1	0726	224	14.	*	1	0956	299	2.
1	0228	75	1.	*	1	0458	150	99.	*	1	0728	225	14.	*	1	0958	300	2.
				*					*					*				

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
+ (CFS)	(HR)					
		(CFS)				
+ 143.	3.17		63.	38.	38.	38.
		(INCHES)	1.076	1.092	1.092	1.092
		(AC-FT)	31.	32.	32.	32.

CUMULATIVE AREA = 0.54 SQ MI

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          *            *
394 KK    *    050620  *      COMBINE
          *            *
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396 KO OUTPUT CONTROL VARIABLES

IPRNT	2	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

397 HC HYDROGRAPH COMBINATION

ICOMP	2	NUMBER OF HYDROGRAPHS TO COMBINE

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HYDROGRAPH AT STATION 050620
SUM OF 2 HYDROGRAPHS

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DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0230	76	2.	1		0500	151	104.	1		0730	226	15.
1		0002	2	0.	1		0232	77	2.	1		0502	152	102.	1		0732	227	14.
1		0004	3	1.	1		0234	78	2.	1		0504	153	101.	1		0734	228	14.
1		0006	4	1.	1		0236	79	3.	1		0506	154	99.	1		0736	229	14.
1		0008	5	1.	1		0238	80	3.	1		0508	155	97.	1		0738	230	13.
1		0010	6	1.	1		0240	81	4.	1		0510	156	95.	1		0740	231	13.
1		0012	7	1.	1		0242	82	5.	1		0512	157	94.	1		0742	232	13.
1		0014	8	1.	1		0244	83	6.	1		0514	158	92.	1		0744	233	12.
1		0016	9	1.	1		0246	84	7.	1		0516	159	90.	1		0746	234	12.
1		0018	10	1.	1		0248	85	9.	1		0518	160	89.	1		0748	235	12.
1		0020	11	1.	1		0250	86	12.	1		0520	161	87.	1		0750	236	11.
1		0022	12	1.	1		0252	87	15.	1		0522	162	86.	1		0752	237	11.
1		0024	13	1.	1		0254	88	19.	1		0524	163	84.	1		0754	238	11.
1		0026	14	1.	1		0256	89	26.	1		0526	164	83.	1		0756	239	11.
1		0028	15	1.	1		0258	90	33.	1		0528	165	81.	1		0758	240	10.
1		0030	16	1.	1		0300	91	49.	1		0530	166	80.	1		0800	241	10.

1	0032	17	1.	*	1	0302	92	73.	*	1	0532	167	78.	*	1	0802	242	10.
1	0034	18	1.	*	1	0304	93	114.	*	1	0534	168	77.	*	1	0804	243	9.
1	0036	19	0.	*	1	0306	94	167.	*	1	0536	169	76.	*	1	0806	244	9.
1	0038	20	0.	*	1	0308	95	220.	*	1	0538	170	74.	*	1	0808	245	9.
1	0040	21	0.	*	1	0310	96	249.	*	1	0540	171	73.	*	1	0810	246	9.
1	0042	22	0.	*	1	0312	97	249.	*	1	0542	172	71.	*	1	0812	247	9.
1	0044	23	0.	*	1	0314	98	236.	*	1	0544	173	70.	*	1	0814	248	8.
1	0046	24	0.	*	1	0316	99	221.	*	1	0546	174	69.	*	1	0816	249	8.
1	0048	25	0.	*	1	0318	100	207.	*	1	0548	175	68.	*	1	0818	250	8.
1	0050	26	0.	*	1	0320	101	197.	*	1	0550	176	66.	*	1	0820	251	8.
1	0052	27	0.	*	1	0322	102	190.	*	1	0552	177	65.	*	1	0822	252	8.
1	0054	28	0.	*	1	0324	103	185.	*	1	0554	178	63.	*	1	0824	253	7.
1	0056	29	0.	*	1	0326	104	182.	*	1	0556	179	62.	*	1	0826	254	7.
1	0058	30	0.	*	1	0328	105	180.	*	1	0558	180	60.	*	1	0828	255	7.
1	0100	31	0.	*	1	0330	106	179.	*	1	0600	181	59.	*	1	0830	256	7.
1	0102	32	0.	*	1	0332	107	178.	*	1	0602	182	58.	*	1	0832	257	7.
1	0104	33	0.	*	1	0334	108	177.	*	1	0604	183	57.	*	1	0834	258	6.
1	0106	34	0.	*	1	0336	109	176.	*	1	0606	184	55.	*	1	0836	259	6.
1	0108	35	0.	*	1	0338	110	175.	*	1	0608	185	54.	*	1	0838	260	6.
1	0110	36	0.	*	1	0340	111	172.	*	1	0610	186	53.	*	1	0840	261	6.
1	0112	37	0.	*	1	0342	112	170.	*	1	0612	187	52.	*	1	0842	262	6.
1	0114	38	0.	*	1	0344	113	167.	*	1	0614	188	50.	*	1	0844	263	6.
1	0116	39	0.	*	1	0346	114	164.	*	1	0616	189	49.	*	1	0846	264	6.
1	0118	40	0.	*	1	0348	115	161.	*	1	0618	190	48.	*	1	0848	265	5.
1	0120	41	0.	*	1	0350	116	159.	*	1	0620	191	47.	*	1	0850	266	5.
1	0122	42	0.	*	1	0352	117	156.	*	1	0622	192	46.	*	1	0852	267	5.
1	0124	43	0.	*	1	0354	118	154.	*	1	0624	193	45.	*	1	0854	268	5.
1	0126	44	0.	*	1	0356	119	152.	*	1	0626	194	43.	*	1	0856	269	5.
1	0128	45	0.	*	1	0358	120	150.	*	1	0628	195	41.	*	1	0858	270	5.
1	0130	46	0.	*	1	0400	121	148.	*	1	0630	196	40.	*	1	0900	271	5.
1	0132	47	0.	*	1	0402	122	146.	*	1	0632	197	38.	*	1	0902	272	5.
1	0134	48	0.	*	1	0404	123	144.	*	1	0634	198	37.	*	1	0904	273	4.
1	0136	49	0.	*	1	0406	124	142.	*	1	0636	199	35.	*	1	0906	274	4.
1	0138	50	0.	*	1	0408	125	141.	*	1	0638	200	34.	*	1	0908	275	4.
1	0140	51	0.	*	1	0410	126	139.	*	1	0640	201	32.	*	1	0910	276	4.
1	0142	52	0.	*	1	0412	127	138.	*	1	0642	202	31.	*	1	0912	277	4.
1	0144	53	0.	*	1	0414	128	136.	*	1	0644	203	29.	*	1	0914	278	4.
1	0146	54	0.	*	1	0416	129	135.	*	1	0646	204	28.	*	1	0916	279	4.
1	0148	55	0.	*	1	0418	130	134.	*	1	0648	205	27.	*	1	0918	280	4.
1	0150	56	0.	*	1	0420	131	132.	*	1	0650	206	26.	*	1	0920	281	4.
1	0152	57	0.	*	1	0422	132	131.	*	1	0652	207	25.	*	1	0922	282	4.
1	0154	58	0.	*	1	0424	133	130.	*	1	0654	208	24.	*	1	0924	283	3.
1	0156	59	0.	*	1	0426	134	129.	*	1	0656	209	23.	*	1	0926	284	3.
1	0158	60	0.	*	1	0428	135	128.	*	1	0658	210	22.	*	1	0928	285	3.
1	0200	61	0.	*	1	0430	136	126.	*	1	0700	211	22.	*	1	0930	286	3.
1	0202	62	0.	*	1	0432	137	125.	*	1	0702	212	21.	*	1	0932	287	3.
1	0204	63	0.	*	1	0434	138	124.	*	1	0704	213	21.	*	1	0934	288	3.

1	0206	64	0.	*	1	0436	139	123.	*	1	0706	214	20.	*	1	0936	289	3.		
1	0208	65	0.	*	1	0438	140	122.	*	1	0708	215	20.	*	1	0938	290	3.		
1	0210	66	0.	*	1	0440	141	121.	*	1	0710	216	19.	*	1	0940	291	3.		
1	0212	67	0.	*	1	0442	142	120.	*	1	0712	217	19.	*	1	0942	292	3.		
1	0214	68	0.	*	1	0444	143	118.	*	1	0714	218	18.	*	1	0944	293	3.		
1	0216	69	1.	*	1	0446	144	116.	*	1	0716	219	18.	*	1	0946	294	3.		
1	0218	70	1.	*	1	0448	145	114.	*	1	0718	220	17.	*	1	0948	295	3.		
1	0220	71	1.	*	1	0450	146	113.	*	1	0720	221	17.	*	1	0950	296	3.		
1	0222	72	1.	*	1	0452	147	111.	*	1	0722	222	16.	*	1	0952	297	2.		
1	0224	73	1.	*	1	0454	148	109.	*	1	0724	223	16.	*	1	0954	298	2.		
1	0226	74	1.	*	1	0456	149	107.	*	1	0726	224	16.	*	1	0956	299	2.		
1	0228	75	1.	*	1	0458	150	106.	*	1	0728	225	15.	*	1	0958	300	2.		

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
+ (CFS)	(HR)					
		(CFS)				
+ 249.	3.20		75.	45.	45.	45.
		(INCHES)	1.077	1.093	1.093	1.093
		(AC-FT)	37.	37.	37.	37.

CUMULATIVE AREA = 0.64 SQ MI

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          *            *
407 KK    *    050630  *      COMBINE
          *            *
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409 KO OUTPUT CONTROL VARIABLES

IPRNT	2	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

410 HC HYDROGRAPH COMBINATION

ICOMP	2	NUMBER OF HYDROGRAPHS TO COMBINE

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HYDROGRAPH AT STATION 050630
SUM OF 2 HYDROGRAPHS

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0230	76	2.	1		0500	151	109.	1		0730	226	16.
1		0002	2	0.	1		0232	77	3.	1		0502	152	107.	1		0732	227	15.
1		0004	3	0.	1		0234	78	3.	1		0504	153	105.	1		0734	228	15.
1		0006	4	0.	1		0236	79	4.	1		0506	154	103.	1		0736	229	14.
1		0008	5	0.	1		0238	80	4.	1		0508	155	101.	1		0738	230	14.
1		0010	6	1.	1		0240	81	5.	1		0510	156	100.	1		0740	231	14.
1		0012	7	1.	1		0242	82	6.	1		0512	157	98.	1		0742	232	13.
1		0014	8	1.	1		0244	83	8.	1		0514	158	96.	1		0744	233	13.
1		0016	9	1.	1		0246	84	10.	1		0516	159	94.	1		0746	234	13.
1		0018	10	1.	1		0248	85	13.	1		0518	160	93.	1		0748	235	12.
1		0020	11	1.	1		0250	86	16.	1		0520	161	91.	1		0750	236	12.
1		0022	12	1.	1		0252	87	21.	1		0522	162	89.	1		0752	237	12.
1		0024	13	1.	1		0254	88	26.	1		0524	163	88.	1		0754	238	11.
1		0026	14	1.	1		0256	89	35.	1		0526	164	86.	1		0756	239	11.
1		0028	15	1.	1		0258	90	48.	1		0528	165	85.	1		0758	240	11.
1		0030	16	1.	1		0300	91	66.	1		0530	166	83.	1		0800	241	11.
1		0032	17	1.	1		0302	92	100.	1		0532	167	82.	1		0802	242	10.
1		0034	18	1.	1		0304	93	158.	1		0534	168	81.	1		0804	243	10.
1		0036	19	1.	1		0306	94	235.	1		0536	169	79.	1		0806	244	10.
1		0038	20	1.	1		0308	95	304.	1		0538	170	78.	1		0808	245	10.
1		0040	21	1.	1		0310	96	342.	1		0540	171	76.	1		0810	246	9.
1		0042	22	0.	1		0312	97	344.	1		0542	172	75.	1		0812	247	9.
1		0044	23	0.	1		0314	98	323.	1		0544	173	74.	1		0814	248	9.
1		0046	24	0.	1		0316	99	297.	1		0546	174	72.	1		0816	249	9.
1		0048	25	0.	1		0318	100	273.	1		0548	175	71.	1		0818	250	8.
1		0050	26	0.	1		0320	101	253.	1		0550	176	70.	1		0820	251	8.
1		0052	27	0.	1		0322	102	238.	1		0552	177	68.	1		0822	252	8.
1		0054	28	0.	1		0324	103	227.	1		0554	178	67.	1		0824	253	8.
1		0056	29	0.	1		0326	104	220.	1		0556	179	65.	1		0826	254	8.
1		0058	30	0.	1		0328	105	214.	1		0558	180	64.	1		0828	255	7.
1		0100	31	0.	1		0330	106	210.	1		0600	181	62.	1		0830	256	7.
1		0102	32	0.	1		0332	107	207.	1		0602	182	61.	1		0832	257	7.
1		0104	33	0.	1		0334	108	204.	1		0604	183	60.	1		0834	258	7.
1		0106	34	0.	1		0336	109	202.	1		0606	184	58.	1		0836	259	7.
1		0108	35	0.	1		0338	110	199.	1		0608	185	57.	1		0838	260	6.
1		0110	36	0.	1		0340	111	195.	1		0610	186	56.	1		0840	261	6.
1		0112	37	0.	1		0342	112	191.	1		0612	187	55.	1		0842	262	6.
1		0114	38	0.	1		0344	113	187.	1		0614	188	53.	1		0844	263	6.

1	0116	39	0.	*	1	0346	114	182.	*	1	0616	189	52.	*	1	0846	264	6.
1	0118	40	0.	*	1	0348	115	178.	*	1	0618	190	51.	*	1	0848	265	6.
1	0120	41	0.	*	1	0350	116	174.	*	1	0620	191	50.	*	1	0850	266	6.
1	0122	42	0.	*	1	0352	117	170.	*	1	0622	192	49.	*	1	0852	267	5.
1	0124	43	0.	*	1	0354	118	167.	*	1	0624	193	48.	*	1	0854	268	5.
1	0126	44	0.	*	1	0356	119	164.	*	1	0626	194	46.	*	1	0856	269	5.
1	0128	45	0.	*	1	0358	120	161.	*	1	0628	195	45.	*	1	0858	270	5.
1	0130	46	0.	*	1	0400	121	158.	*	1	0630	196	43.	*	1	0900	271	5.
1	0132	47	0.	*	1	0402	122	156.	*	1	0632	197	41.	*	1	0902	272	5.
1	0134	48	0.	*	1	0404	123	153.	*	1	0634	198	39.	*	1	0904	273	5.
1	0136	49	0.	*	1	0406	124	151.	*	1	0636	199	38.	*	1	0906	274	5.
1	0138	50	0.	*	1	0408	125	149.	*	1	0638	200	36.	*	1	0908	275	4.
1	0140	51	0.	*	1	0410	126	147.	*	1	0640	201	35.	*	1	0910	276	4.
1	0142	52	0.	*	1	0412	127	145.	*	1	0642	202	33.	*	1	0912	277	4.
1	0144	53	0.	*	1	0414	128	144.	*	1	0644	203	32.	*	1	0914	278	4.
1	0146	54	0.	*	1	0416	129	142.	*	1	0646	204	30.	*	1	0916	279	4.
1	0148	55	0.	*	1	0418	130	140.	*	1	0648	205	29.	*	1	0918	280	4.
1	0150	56	0.	*	1	0420	131	139.	*	1	0650	206	28.	*	1	0920	281	4.
1	0152	57	0.	*	1	0422	132	137.	*	1	0652	207	27.	*	1	0922	282	4.
1	0154	58	0.	*	1	0424	133	136.	*	1	0654	208	26.	*	1	0924	283	4.
1	0156	59	0.	*	1	0426	134	135.	*	1	0656	209	25.	*	1	0926	284	4.
1	0158	60	0.	*	1	0428	135	133.	*	1	0658	210	24.	*	1	0928	285	4.
1	0200	61	0.	*	1	0430	136	132.	*	1	0700	211	23.	*	1	0930	286	3.
1	0202	62	0.	*	1	0432	137	131.	*	1	0702	212	22.	*	1	0932	287	3.
1	0204	63	0.	*	1	0434	138	129.	*	1	0704	213	22.	*	1	0934	288	3.
1	0206	64	0.	*	1	0436	139	128.	*	1	0706	214	21.	*	1	0936	289	3.
1	0208	65	0.	*	1	0438	140	127.	*	1	0708	215	21.	*	1	0938	290	3.
1	0210	66	1.	*	1	0440	141	126.	*	1	0710	216	20.	*	1	0940	291	3.
1	0212	67	1.	*	1	0442	142	125.	*	1	0712	217	20.	*	1	0942	292	3.
1	0214	68	1.	*	1	0444	143	123.	*	1	0714	218	19.	*	1	0944	293	3.
1	0216	69	1.	*	1	0446	144	121.	*	1	0716	219	19.	*	1	0946	294	3.
1	0218	70	1.	*	1	0448	145	119.	*	1	0718	220	18.	*	1	0948	295	3.
1	0220	71	1.	*	1	0450	146	118.	*	1	0720	221	18.	*	1	0950	296	3.
1	0222	72	1.	*	1	0452	147	116.	*	1	0722	222	17.	*	1	0952	297	3.
1	0224	73	2.	*	1	0454	148	114.	*	1	0724	223	17.	*	1	0954	298	3.
1	0226	74	2.	*	1	0456	149	112.	*	1	0726	224	16.	*	1	0956	299	3.
1	0228	75	2.	*	1	0458	150	110.	*	1	0728	225	16.	*	1	0958	300	2.
				*					*					*				

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
+ (CFS)	(HR)					
		(CFS)				
+ 344.	3.20		84.	51.	51.	51.
		(INCHES)	1.104	1.119	1.119	1.119
		(AC-FT)	41.	42.	42.	42.

CUMULATIVE AREA = 0.70 SQ MI

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          *            *
420 KK    *    050640  *      COMBINE
          *            *
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422 KO OUTPUT CONTROL VARIABLES

IPRNT	2	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

423 HC HYDROGRAPH COMBINATION

ICOMP	2	NUMBER OF HYDROGRAPHS TO COMBINE

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HYDROGRAPH AT STATION 050640
SUM OF 2 HYDROGRAPHS

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DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0230	76	2.	1		0500	151	112.	1		0730	226	16.
1		0002	2	0.	1		0232	77	2.	1		0502	152	110.	1		0732	227	16.
1		0004	3	0.	1		0234	78	3.	1		0504	153	108.	1		0734	228	15.
1		0006	4	0.	1		0236	79	3.	1		0506	154	106.	1		0736	229	15.
1		0008	5	0.	1		0238	80	4.	1		0508	155	104.	1		0738	230	15.
1		0010	6	0.	1		0240	81	5.	1		0510	156	103.	1		0740	231	14.
1		0012	7	0.	1		0242	82	6.	1		0512	157	101.	1		0742	232	14.
1		0014	8	1.	1		0244	83	7.	1		0514	158	99.	1		0744	233	14.
1		0016	9	1.	1		0246	84	9.	1		0516	159	97.	1		0746	234	13.
1		0018	10	1.	1		0248	85	11.	1		0518	160	95.	1		0748	235	13.
1		0020	11	1.	1		0250	86	15.	1		0520	161	94.	1		0750	236	13.
1		0022	12	1.	1		0252	87	19.	1		0522	162	92.	1		0752	237	12.
1		0024	13	1.	1		0254	88	25.	1		0524	163	91.	1		0754	238	12.

1	0026	14	1.	*	1	0256	89	32.	*	1	0526	164	89.	*	1	0756	239	12.
1	0028	15	1.	*	1	0258	90	44.	*	1	0528	165	87.	*	1	0758	240	11.
1	0030	16	1.	*	1	0300	91	62.	*	1	0530	166	86.	*	1	0800	241	11.
1	0032	17	1.	*	1	0302	92	92.	*	1	0532	167	84.	*	1	0802	242	11.
1	0034	18	1.	*	1	0304	93	146.	*	1	0534	168	83.	*	1	0804	243	10.
1	0036	19	1.	*	1	0306	94	228.	*	1	0536	169	82.	*	1	0806	244	10.
1	0038	20	1.	*	1	0308	95	319.	*	1	0538	170	80.	*	1	0808	245	10.
1	0040	21	1.	*	1	0310	96	385.	*	1	0540	171	79.	*	1	0810	246	10.
1	0042	22	1.	*	1	0312	97	407.	*	1	0542	172	77.	*	1	0812	247	9.
1	0044	23	1.	*	1	0314	98	395.	*	1	0544	173	76.	*	1	0814	248	9.
1	0046	24	0.	*	1	0316	99	365.	*	1	0546	174	75.	*	1	0816	249	9.
1	0048	25	0.	*	1	0318	100	333.	*	1	0548	175	73.	*	1	0818	250	9.
1	0050	26	0.	*	1	0320	101	305.	*	1	0550	176	72.	*	1	0820	251	9.
1	0052	27	0.	*	1	0322	102	283.	*	1	0552	177	70.	*	1	0822	252	8.
1	0054	28	0.	*	1	0324	103	266.	*	1	0554	178	69.	*	1	0824	253	8.
1	0056	29	0.	*	1	0326	104	253.	*	1	0556	179	68.	*	1	0826	254	8.
1	0058	30	0.	*	1	0328	105	243.	*	1	0558	180	66.	*	1	0828	255	8.
1	0100	31	0.	*	1	0330	106	235.	*	1	0600	181	65.	*	1	0830	256	8.
1	0102	32	0.	*	1	0332	107	230.	*	1	0602	182	63.	*	1	0832	257	7.
1	0104	33	0.	*	1	0334	108	225.	*	1	0604	183	62.	*	1	0834	258	7.
1	0106	34	0.	*	1	0336	109	221.	*	1	0606	184	61.	*	1	0836	259	7.
1	0108	35	0.	*	1	0338	110	217.	*	1	0608	185	59.	*	1	0838	260	7.
1	0110	36	0.	*	1	0340	111	212.	*	1	0610	186	58.	*	1	0840	261	7.
1	0112	37	0.	*	1	0342	112	207.	*	1	0612	187	57.	*	1	0842	262	6.
1	0114	38	0.	*	1	0344	113	202.	*	1	0614	188	55.	*	1	0844	263	6.
1	0116	39	0.	*	1	0346	114	196.	*	1	0616	189	54.	*	1	0846	264	6.
1	0118	40	0.	*	1	0348	115	191.	*	1	0618	190	53.	*	1	0848	265	6.
1	0120	41	0.	*	1	0350	116	186.	*	1	0620	191	52.	*	1	0850	266	6.
1	0122	42	0.	*	1	0352	117	181.	*	1	0622	192	51.	*	1	0852	267	6.
1	0124	43	0.	*	1	0354	118	177.	*	1	0624	193	49.	*	1	0854	268	6.
1	0126	44	0.	*	1	0356	119	173.	*	1	0626	194	48.	*	1	0856	269	5.
1	0128	45	0.	*	1	0358	120	169.	*	1	0628	195	47.	*	1	0858	270	5.
1	0130	46	0.	*	1	0400	121	166.	*	1	0630	196	45.	*	1	0900	271	5.
1	0132	47	0.	*	1	0402	122	163.	*	1	0632	197	43.	*	1	0902	272	5.
1	0134	48	0.	*	1	0404	123	160.	*	1	0634	198	41.	*	1	0904	273	5.
1	0136	49	0.	*	1	0406	124	158.	*	1	0636	199	40.	*	1	0906	274	5.
1	0138	50	0.	*	1	0408	125	155.	*	1	0638	200	38.	*	1	0908	275	5.
1	0140	51	0.	*	1	0410	126	153.	*	1	0640	201	37.	*	1	0910	276	5.
1	0142	52	0.	*	1	0412	127	151.	*	1	0642	202	35.	*	1	0912	277	4.
1	0144	53	0.	*	1	0414	128	149.	*	1	0644	203	34.	*	1	0914	278	4.
1	0146	54	0.	*	1	0416	129	147.	*	1	0646	204	32.	*	1	0916	279	4.
1	0148	55	0.	*	1	0418	130	145.	*	1	0648	205	31.	*	1	0918	280	4.
1	0150	56	0.	*	1	0420	131	143.	*	1	0650	206	30.	*	1	0920	281	4.
1	0152	57	0.	*	1	0422	132	142.	*	1	0652	207	28.	*	1	0922	282	4.
1	0154	58	0.	*	1	0424	133	140.	*	1	0654	208	27.	*	1	0924	283	4.
1	0156	59	0.	*	1	0426	134	139.	*	1	0656	209	26.	*	1	0926	284	4.
1	0158	60	0.	*	1	0428	135	137.	*	1	0658	210	25.	*	1	0928	285	4.

1	0200	61	0.	*	1	0430	136	136.	*	1	0700	211	24.	*	1	0930	286	4.
1	0202	62	0.	*	1	0432	137	134.	*	1	0702	212	24.	*	1	0932	287	4.
1	0204	63	0.	*	1	0434	138	133.	*	1	0704	213	23.	*	1	0934	288	3.
1	0206	64	0.	*	1	0436	139	132.	*	1	0706	214	22.	*	1	0936	289	3.
1	0208	65	0.	*	1	0438	140	130.	*	1	0708	215	22.	*	1	0938	290	3.
1	0210	66	0.	*	1	0440	141	129.	*	1	0710	216	21.	*	1	0940	291	3.
1	0212	67	0.	*	1	0442	142	128.	*	1	0712	217	21.	*	1	0942	292	3.
1	0214	68	1.	*	1	0444	143	126.	*	1	0714	218	20.	*	1	0944	293	3.
1	0216	69	1.	*	1	0446	144	125.	*	1	0716	219	20.	*	1	0946	294	3.
1	0218	70	1.	*	1	0448	145	123.	*	1	0718	220	19.	*	1	0948	295	3.
1	0220	71	1.	*	1	0450	146	121.	*	1	0720	221	19.	*	1	0950	296	3.
1	0222	72	1.	*	1	0452	147	119.	*	1	0722	222	18.	*	1	0952	297	3.
1	0224	73	1.	*	1	0454	148	117.	*	1	0724	223	18.	*	1	0954	298	3.
1	0226	74	2.	*	1	0456	149	115.	*	1	0726	224	17.	*	1	0956	299	3.
1	0228	75	2.	*	1	0458	150	114.	*	1	0728	225	17.	*	1	0958	300	3.
				*					*					*				

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
+ (CFS)	(HR)					
		(CFS)				
+ 407.	3.20		89.	54.	54.	54.
		(INCHES)	1.126	1.141	1.141	1.141
		(AC-FT)	44.	45.	45.	45.

CUMULATIVE AREA = 0.74 SQ MI

*** FDKRUT - NEWTON RAPHSON FAILEDFIXED POINT ITERATION USED - ITERATION= 1

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+					6-HOUR	24-HOUR	72-HOUR			
	HYDROGRAPH AT									
+		070808	12.	3.43	2.	1.	1.	0.02		
	DIVERSION TO									
+		808OUT	0.	3.43	0.	0.	0.	0.02		

	HYDROGRAPH AT						
+	808PP	12.	3.43	2.	1.	1.	0.02
	ROUTED TO						
+	070610	12.	3.43	2.	1.	1.	0.02
	HYDROGRAPH AT						
+	070610	5.	3.43	1.	0.	0.	0.01
	DIVERSION TO						
+	610OUT	0.	3.40	0.	0.	0.	0.01
	HYDROGRAPH AT						
+	610PP	5.	3.40	1.	0.	0.	0.01
	2 COMBINED AT						
+	070610	17.	3.43	3.	2.	2.	0.02
	ROUTED TO						
+	070508	17.	3.43	3.	2.	2.	0.02
	HYDROGRAPH AT						
+	070508	4.	3.50	1.	0.	0.	0.01
	DIVERSION TO						
+	508OUT	0.	3.50	0.	0.	0.	0.01
	HYDROGRAPH AT						
+	508PP	4.	3.50	1.	0.	0.	0.01
	2 COMBINED AT						
+	070508	21.	3.47	3.	2.	2.	0.03
	ROUTED TO						
+	070010	21.	3.47	3.	2.	2.	0.03
	HYDROGRAPH AT						
+	070010	7.	3.43	1.	1.	1.	0.01
	DIVERSION TO						
+	010OUT	0.	3.43	0.	0.	0.	0.01
	HYDROGRAPH AT						
+	010PP	6.	3.43	1.	1.	1.	0.01
	2 COMBINED AT						

+		070010	27.	3.47	4.	3.	3.	0.04
+	ROUTED TO	070210	27.	3.47	4.	3.	3.	0.04
+	HYDROGRAPH AT	070209	12.	3.47	2.	1.	1.	0.02
+	ROUTED TO	070210	12.	3.47	2.	1.	1.	0.02
+	HYDROGRAPH AT	070210	5.	3.47	1.	0.	0.	0.01
+	2 COMBINED AT	070210	17.	3.47	3.	2.	2.	0.03
+	DIVERSION TO	210OUT	0.	3.43	0.	0.	0.	0.03
+	HYDROGRAPH AT	210PP	17.	3.43	3.	2.	2.	0.03
+	2 COMBINED AT	070210	44.	3.47	7.	4.	4.	0.07
+	ROUTED TO	050005	44.	3.47	7.	4.	4.	0.07
+	HYDROGRAPH AT	050005	21.	3.53	3.	2.	2.	0.04
+	DIVERSION TO	005OUT	0.	3.53	0.	0.	0.	0.04
+	HYDROGRAPH AT	005PP	21.	3.53	3.	2.	2.	0.04
+	HYDROGRAPH AT	070010	0.	3.37	0.	0.	0.	0.00
+	ROUTED TO	070020	0.	3.47	0.	0.	0.	0.00
+	ROUTED TO	070030	0.	3.67	0.	0.	0.	0.00

	HYDROGRAPH AT							
+		070030	5.	3.07	1.	0.	0.	0.00
	2 COMBINED AT							
+		070030	5.	3.07	1.	0.	0.	0.00
	ROUTED TO							
+		070040	5.	3.10	1.	0.	0.	0.00
	HYDROGRAPH AT							
+		070210	0.	3.47	0.	0.	0.	0.00
	ROUTED TO							
+		070220	0.	3.47	0.	0.	0.	0.00
	ROUTED TO							
+		070040	0.	3.77	0.	0.	0.	0.00
	HYDROGRAPH AT							
+		070040	5.	3.20	1.	0.	0.	0.01
	3 COMBINED AT							
+		070040	9.	3.13	1.	1.	1.	0.01
	ROUTED TO							
+		070050	9.	3.17	1.	1.	1.	0.01
	HYDROGRAPH AT							
+		070050	23.	3.07	2.	1.	1.	0.02
	2 COMBINED AT							
+		070050	30.	3.10	4.	2.	2.	0.03
	ROUTED TO							
+		070060	30.	3.13	4.	2.	2.	0.03
	HYDROGRAPH AT							
+		070310	30.	3.07	3.	2.	2.	0.02
	ROUTED TO							
+		070060	30.	3.10	3.	2.	2.	0.02
	HYDROGRAPH AT							
+		070060	26.	3.10	3.	2.	2.	0.02
	3 COMBINED AT							
+		070060	83.	3.10	9.	6.	6.	0.07

	ROUTED TO								
+		070070	82.	3.13	9.	6.	6.	0.07	
	HYDROGRAPH AT								
+		070070	43.	3.07	4.	3.	3.	0.03	
	HYDROGRAPH AT								
+		070080	52.	3.13	4.	2.	2.	0.02	
	3 COMBINED AT								
+		070080	168.	3.13	17.	10.	10.	0.12	
	ROUTED TO								
+		07Det	46.	3.67	17.	10.	10.	0.12	
+									69.95 3.67
	DIVERSION TO								
+		07Qspl	0.	3.67	0.	0.	0.	0.12	
	HYDROGRAPH AT								
+		07Qpip	46.	3.67	17.	10.	10.	0.12	
	ROUTED TO								
+		070420	46.	3.67	17.	10.	10.	0.12	
	HYDROGRAPH AT								
+		070410	17.	3.13	2.	1.	1.	0.01	
	ROUTED TO								
+		070420	17.	3.13	2.	1.	1.	0.01	
	HYDROGRAPH AT								
+		070420	5.	3.20	0.	0.	0.	0.00	
	3 COMBINED AT								
+		070420	59.	3.20	19.	12.	12.	0.14	
	ROUTED TO								
+		210005	59.	3.20	19.	12.	12.	0.14	
	HYDROGRAPH AT								
+		210005	13.	3.23	1.	1.	1.	0.01	
	2 COMBINED AT								
+		210005	72.	3.23	20.	12.	12.	0.15	

	ROUTED TO								
+		050030	72.	3.23	20.	12.	12.	0.15	
	HYDROGRAPH AT								
+		050005	0.	3.40	0.	0.	0.	0.00	
	ROUTED TO								
+		050010	0.	4.63	0.	0.	0.	0.00	
	HYDROGRAPH AT								
+		050010	96.	3.13	8.	5.	5.	0.07	
	2 COMBINED AT								
+		050010	96.	3.13	8.	5.	5.	0.07	
	ROUTED TO								
+		050020	93.	3.17	8.	5.	5.	0.07	
	HYDROGRAPH AT								
+		050210	100.	3.13	8.	5.	5.	0.05	
	ROUTED TO								
+		210ST	0.	5.53	0.	0.	0.	0.05	
+									0.55 9.97
	ROUTED TO								
+		050020	0.	4.73	0.	0.	0.	0.05	
	HYDROGRAPH AT								
+		050020	13.	3.17	1.	1.	1.	0.01	
	3 COMBINED AT								
+		050020	105.	3.17	10.	6.	6.	0.13	
	ROUTED TO								
+		050030	103.	3.20	10.	6.	6.	0.13	
	HYDROGRAPH AT								
+		050030	54.	3.10	3.	2.	2.	0.02	
	ROUTED TO								
+		030ST	20.	3.27	2.	1.	1.	0.02	
+									68.13 3.27
	3 COMBINED AT								
+		050030	190.	3.20	32.	20.	20.	0.30	

	ROUTED TO								
+		050305	188.	3.20	32.	20.	20.	0.30	
	ROUTED TO								
+		050050	186.	3.27	32.	20.	20.	0.30	
	HYDROGRAPH AT								
+		050040	105.	3.20	12.	7.	7.	0.10	
	ROUTED TO								
+		40STOR	37.	3.67	12.	7.	7.	0.10	
+									61.58 3.67
	ROUTED TO								
+		050050	37.	3.67	12.	7.	7.	0.10	
	HYDROGRAPH AT								
+		050310	11.	3.13	1.	1.	1.	0.01	
	ROUTED TO								
+		SRPDet	5.	3.37	1.	1.	1.	0.01	
+									54.43 3.37
	HYDROGRAPH AT								
+		S 64th	7.	3.30	1.	0.	0.	0.01	
	HYDROGRAPH AT								
+		050065	38.	3.07	2.	1.	1.	0.01	
	HYDROGRAPH AT								
+		050062	16.	3.10	1.	1.	1.	0.01	
	ROUTED TO								
+		050050	15.	3.13	1.	1.	1.	0.01	
	6 COMBINED AT								
+		050050	254.	3.23	49.	30.	30.	0.43	
	HYDROGRAPH AT								
+		050060	53.	3.17	5.	3.	3.	0.03	
	2 COMBINED AT								
+		050050	303.	3.23	54.	33.	33.	0.46	
	ROUTED TO								
+		05Det	117.	4.00	54.	33.	33.	0.46	
+									53.41 4.00

	DIVERSION TO						
+		05Qspl	0.	4.00	0.	0.	0.	0.46
	HYDROGRAPH AT						
+		05Qpip	117.	4.00	54.	33.	33.	0.46
	HYDROGRAPH AT						
+		050610	99.	3.17	10.	6.	6.	0.08
	2 COMBINED AT						
+		050610	143.	3.17	63.	38.	38.	0.54
	ROUTED TO						
+		050620	142.	3.20	63.	38.	38.	0.54
	HYDROGRAPH AT						
+		050620	110.	3.17	12.	7.	7.	0.10
	2 COMBINED AT						
+		050620	249.	3.20	75.	45.	45.	0.64
	ROUTED TO						
+		050630	249.	3.20	75.	45.	45.	0.64
	HYDROGRAPH AT						
+		050630	120.	3.13	9.	6.	6.	0.06
	2 COMBINED AT						
+		050630	344.	3.20	84.	51.	51.	0.70
	ROUTED TO						
+		050640	342.	3.20	84.	51.	51.	0.70
	HYDROGRAPH AT						
+		050640	65.	3.20	6.	3.	3.	0.03
	2 COMBINED AT						
+		050640	407.	3.20	89.	54.	54.	0.74
	ROUTED TO						
+		051510	402.	3.20	89.	54.	54.	0.74
	ROUTED TO						
+		051520	399.	3.23	89.	54.	54.	0.74
	HYDROGRAPH AT						

+		051610	39.	3.17	3.	2.	2.	0.02
	ROUTED TO							
+		051520	39.	3.17	3.	2.	2.	0.02
	HYDROGRAPH AT							
+		051710	8.	3.17	1.	0.	0.	0.00
	ROUTED TO							
+		051520	8.	3.17	1.	0.	0.	0.00
	HYDROGRAPH AT							
+		051520	43.	3.17	4.	2.	2.	0.02
	4 COMBINED AT							
+		051520	478.	3.20	97.	59.	59.	0.78
	ROUTED TO							
+		051530	476.	3.23	97.	59.	59.	0.78
	HYDROGRAPH AT							
+		051530	92.	3.17	7.	4.	4.	0.04
	2 COMBINED AT							
+		051530	548.	3.23	104.	63.	63.	0.83
	ROUTED TO							
+		051540	547.	3.23	104.	63.	63.	0.83
	HYDROGRAPH AT							
+		051810	12.	3.13	1.	1.	1.	0.00
	ROUTED TO							
+		051540	12.	3.13	1.	1.	1.	0.00
	HYDROGRAPH AT							
+		051540	9.	3.13	1.	0.	0.	0.00
	3 COMBINED AT							
+		051540	560.	3.23	106.	64.	64.	0.83
	ROUTED TO							
+		051550	558.	3.23	106.	64.	64.	0.83
	DIVERSION TO							
+		05PRK	246.	3.23	92.	56.	56.	0.83

	HYDROGRAPH AT								
+		05EX	312.	3.23	14.	8.	8.	0.83	
	ROUTED TO								
+		051560	306.	3.23	14.	8.	8.	0.83	
	ROUTED TO								
+		051570	303.	3.23	14.	8.	8.	0.83	
	HYDROGRAPH AT								
+		051550	246.	3.10	92.	56.	56.	0.00	
	HYDROGRAPH AT								
+		051560	10.	3.17	1.	1.	1.	0.01	
	2 COMBINED AT								
+		PRK	256.	3.17	93.	57.	57.	0.01	
	ROUTED TO								
+		05PKST	242.	3.73	93.	57.	57.	0.01	
+									1229.55 3.73
	ROUTED TO								
+		051565	242.	3.73	93.	57.	57.	0.01	

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

SUMMARIES REMOVED FOR PRINTOUT- SEE ELECTRONIC FILE

1

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 210ST
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	0.00	1.00	1.00
STORAGE	0.	8.	8.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	0.55	0.00	4.	0.	0.00	9.97	0.00

1

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 030ST
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	65.00	68.00	68.00
STORAGE	0.	1.	1.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	68.13	0.13	1.	20.	6.87	3.27	0.00

*** NORMAL END OF HEC-1 ***

Fourth Iteration

4th Iteration

Reduce pipe sizes downstream from Paiute Park
HGL rises in pipe- determine effect on park.

From revised HEC-1 model (PBOsb.DAT)
Outlet functions as unrestricted culvert in HEC-1 model

1 Determine flows in pipe at times other than peak to determine length of time pipe backs up park outlet-
2 Revise flows in Storm Cad model to match those shown at the times below and reran Storm Cad
3 Use HY8 to check effect of tailwater shown by Storm Cad

	Paiute-		**Pinto-**		**68th St-**		**70th St-**		**Scottsdale-**	
	Time*	Flow	Time	Flow	Time	Flow	Time	Flow	Time	Flow
Peak -20	250	3	250	7	250	12	252	21	252	19
Peak -10	300	8	300	30	300	49	302	100	302	92
Peak -8	302	11	302	46	302	73	304	158	304	146
Peak -4	306	23	306	103	306	167	308	304	308	319
Peak	310	44	310	143	310	249	312	344	312	407
Peak+4	314	61	314	138	314	236	316	297	316	365
Peak +8	318	74	318	131	318	207	320	253	320	305
Peak +10	320	79	320	131	320	197	322	238	322	283
Peak +20	330	100	330	135	330	179	332	207	332	230
Peak +30	340	111	340	138	340	172	342	191	342	207
Peak +40	350	116	350	134	350	159	352	170	352	181
Peak +50	400	121	400	103	400	148	402	145	402	163

*Match times to peak at Pinto inlet

Results-

Paiute Park discharge operates as free discharge system up to Peak -4 minutes. Basin stage equals HGL at 1st manhole at this time. Backflow expected into Paiute Park from Pinto between Peak -4 minutes to about Peak +8 minutes. Times are approximate because Paiute Park stage/storage/discharge curves are based on a free outflow condition, not on a backflow condition. Actual backflow duration expected to be less than 12 minutes because WSE in park will rise faster than predicted due to backflow.
System returns to free discharge conditions after Peak +8 minutes.

Osborn

Pipe	Upstream Node	Downstream Node	Section Size	Discharge (cfs)	Velocity (ft/s)	System Flow Time (min)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Invert Elevation (ft)
P-7	Marriott	Bend	36 inch	46.00	6.51	0.00	1,272.00	1,269.15	1,265.74	1,272.00	1,268.91	1,265.33
P-6	Bend	Thomas & 61st Pl	36 inch	46.00	7.16	0.13	1,272.00	1,267.89	1,265.33	1,272.00	1,266.71	1,263.92
P-5	Thomas & 61st Pl	61st Pl & Catalina	42 inch	59.00	8.24	0.85	1,272.00	1,266.36	1,263.92	1,268.00	1,264.22	1,261.30
P-4	61st Pl & Catalina	Catalina @ Canal	54 inch	72.00	7.38	2.01	1,268.00	1,263.95	1,261.30	1,267.00	1,262.15	1,252.02
P-3	Catalina @ Canal	90 Degree Bend	66 inch	188.00	7.91	6.70	1,267.00	1,260.43	1,252.02	1,265.00	1,259.80	1,251.89
P-2	90 Degree Bend	64th Street	66 inch	188.00	7.91	7.12	1,265.00	1,258.55	1,251.89	1,256.00	1,254.79	1,249.30
P-1A	64th St. Sump	64th Street	42 inch	54.00	5.61	0.00	1,256.00	1,255.19	1,250.26	1,256.00	1,254.79	1,249.30
P-1	64th Street	Paiute Park	10 x 4 ft	254.00	6.35	9.65	1,256.00	1,253.42	1,249.30	1,258.00	1,252.90	1,249.00

Try 48"

0.2' high

Surcharged From backup

Osborn

Pipe	Upstream Node	Downstream Node	Section Size	Discharge (cfs)	Velocity (ft/s)	System Flow Time (min)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Invert Elevation (ft)
P-7	Marriott	Bend	36 inch	46.00	6.51	0.00	1,272.00	1,269.15	1,265.74	1,272.00	1,268.91	1,265.33
P-6	Bend	Thomas & 61st Pl	36 inch	46.00	7.16	0.13	1,272.00	1,267.89	1,265.33	1,272.00	1,266.71	1,263.92
P-5	Thomas & 61st Pl	61st Pl & Catalina	42 inch	59.00	8.24	0.85	1,272.00	1,266.36	1,263.92	1,268.00	1,264.22	1,261.30
P-4	61st Pl & Catalina	Catalina @ Canal	54 inch	72.00	7.38	2.01	1,268.00	1,263.95	1,261.30	1,267.00	1,262.15	1,252.02
P-3	Catalina @ Canal	90 Degree Bend	66 inch	188.00	7.91	6.70	1,267.00	1,260.43	1,252.02	1,265.00	1,259.80	1,251.89
P-2	90 Degree Bend	64th Street	66 inch	188.00	7.91	7.12	1,265.00	1,258.55	1,251.89	1,256.00	1,254.79	1,249.30
P-1A	64th St. Sump	64th Street	48 inch	54.00	4.30	0.00	1,256.00	1,254.99	1,250.26	1,256.00	1,254.79	1,249.30
P-1	64th Street	Paiute Park	10 x 4 ft	254.00	6.35	9.65	1,256.00	1,253.42	1,249.30	1,258.00	1,252.90	1,249.00

04

PB PARSONS BRINCKERHOFF COMPUTATION SHEET

100 YEARS®

Page 1 of

Made by AJH

Date 3/31/99

Checked by

Date

Subject Paiute Park
Backwater effect

Effect of 12 min backup -

	Out Flow @ 2min Intervals	Ave during 2min time step	Vol in 2min	
Start 306	23 cfs	28 cfs	3360	— Stage 50.9
	34	39	4680	
	44	48	5760	
	52	57	6840	
	61	65	7800	
	68	71	8520	
End 318	74			— Stage 52.2
			36,960	Total

Surface area of basin @ elev 52 = 3.17 ac

rise in stage due to restricted outflow =

$= 36,960 / 43560 \times 3.17$

$= 0.3'$

stage @ 318 = 52.2 ✓ same elev as 52

Stage increases to 52.5

Check Inflow pipe hydraulics -

Time peak = 323 ∴ after backup -
Stage @ 323 = 52.6 add 0.3' = 52.9

Recalculate 64th Storm cad @ 52.9 Tailw

4th [illegible]ration
Peak - 10 min

Osborn

Pipe	Upstream Node	Downstream Node	Section Size	Discharge (cfs)	Velocity (ft/s)	System Flow Time (min)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Invert Elevation (ft)
P-19, 60"	Paiute Park Inlet	MH 97+00	60 inch	8.00	4.15	0.00	1,255.00	1,249.42	1,248.65	1,255.00	1,248.48	1,247.66
P-18, 60"	MH 97+00	MH 92+00	60 inch	8.00	4.15	0.14	1,255.00	1,248.43	1,247.66	1,260.00	1,246.55	1,245.76
P-17, 60"	MH 92+00	10" SS Xing	60 inch	8.00	4.15	0.26	1,260.00	1,246.53	1,245.76	1,262.00	1,245.17	1,244.08
P-16, 60"	10" SS Xing	Pinto Ln	60 inch	8.00	2.52	0.88	1,262.00	1,245.17	1,244.08	1,260.00	1,245.17	1,242.76
P-15, 72"	Pinto Ln	10" SS Xing/MH	72 inch	30.00	4.50	4.39	1,260.00	1,244.47	1,242.76	1,256.00	1,244.47	1,240.78
P-14, 72"	10" SS Xing/MH	68th St.	72 inch	30.00	1.64	7.64	1,256.00	1,244.47	1,240.78	1,255.00	1,244.47	1,237.70
P-13, 84"	68th St.	MH 71+00	78 inch	30.00	0.93	13.81	1,255.00	1,243.77	1,237.70	1,257.00	1,243.75	1,231.33
P-12, 84"	MH 71+00	70th St	78 inch	30.00	0.90	22.89	1,257.00	1,243.75	1,231.33	1,253.00	1,243.74	1,229.91
P-11, 96"	70th St	71st St	84 inch	30.00	0.78	32.11	1,253.00	1,243.24	1,229.91	1,248.00	1,243.22	1,227.92
P-43	71st St	71st Pl	84 inch	30.00	0.78	49.21	1,248.00	1,243.22	1,228.00	1,247.00	1,243.21	1,227.00
P-44	71st Pl	Scottsdale Rd. Junc.	84 inch	30.00	0.78	57.59	1,247.00	1,242.91	1,228.00	1,247.00	1,242.90	1,225.62
P-8, 114"	Scottsdale Rd. Junc.	Brown Rd.	90 inch	30.00	0.68	64.35	1,247.00	1,242.60	1,225.62	1,245.00	1,242.60	1,223.91
P-7, 114"	Brown Rd.	MH 45+00	90 inch	407.00	9.21	74.02	1,245.00	1,242.45	1,223.91	1,244.00	1,241.88	1,223.35
P-6, 114	MH 45+00	Civic Center Junc.	90 inch	407.00	9.21	74.38	1,244.00	1,241.75	1,223.35	1,242.00	1,239.79	1,221.38
P-5, 114"	Civic Center Junc.	75th St	96 inch	478.00	9.51	75.65	1,242.00	1,239.51	1,221.38	1,238.00	1,237.31	1,220.49
P-4, 114"	75th St	Miller Rd.	108 inch	500.00	7.86	77.05	1,238.00	1,237.26	1,220.49	1,237.00	1,236.24	1,219.86
P-3, 8 x 5 Bo	Miller Rd.	Exst Junc	8 x 5 ft	500.00	12.50	78.40	1,237.00	1,235.99	1,219.86	1,236.00	1,234.95	1,219.23
P-2, 84"	Exst Junc	Osborn Park Junc.	84 inch	500.00	12.99	78.60	1,236.00	1,233.64	1,219.23	1,232.00	1,227.61	1,217.22
P-1, 84"	Osborn Park Junc.	IBW	84 inch	500.00	12.99	79.86	1,232.00	1,224.99	1,217.22	1,225.00	1,223.60	1,216.60

No change in discharge from free outlet cond.

4th Iteration
Peak Flows -10 Min

CURRENT DATE: 03-26-1999
CURRENT TIME: 15:15:35

FILE DATE: 03-26-1999
FILE NAME: PAIUTE

****
********** FHWA CULVERT ANALYSIS **********
********** HY-8, VERSION 6.0 **********
****

CULV NO.	SITE DATA: INLET ELEV. (ft)	SITE DATA: OUTLET ELEV. (ft)	SITE DATA: CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1248.65	1247.66	256.00	1 RCP	5.00	5.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

****

SUMMARY OF CULVERT FLOWS (cfs) FILE: PAIUTE DATE: 03-26-1999

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1248.65	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1250.80	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1251.18	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1251.78	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1252.39	80.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1252.94	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1253.48	120.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1254.04	140.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1254.81	160.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1255.33	180.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1256.09	200.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

****

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: PAIUTE DATE: 03-26-1999

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1248.65	0.000	0.00	0.00	0.00
1250.80	0.000	20.00	0.00	0.00
1251.18	0.000	40.00	0.00	0.00
1251.78	0.000	60.00	0.00	0.00
1252.39	0.000	80.00	0.00	0.00
1252.94	0.000	100.00	0.00	0.00
1253.48	0.000	120.00	0.00	0.00
1254.04	0.000	140.00	0.00	0.00
1254.81	0.000	160.00	0.00	0.00
1255.33	0.000	180.00	0.00	0.00
1256.09	0.000	200.00	0.00	0.00

****

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

****

4th Iteration
Peak Flows -10 Min

CURRENT DATE: 03-26-1999 FILE DATE: 03-26-1999
CURRENT TIME: 15:15:35 FILE NAME: PAIUTE

****

PERFORMANCE CURVE FOR CULVERT 1 - 1(5.00 (ft) BY 5.00 (ft)) RCP

****

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1248.65	0.00	-0.15	0-NF	0.00	0.00	0.00	0.84	0.00	0.00
20.00	1250.80	1.54	2.15	1-S2n	1.12	1.21	1.12	0.84	6.05	0.00
40.00	1251.18	2.42	2.53	1-S2n	1.61	1.75	1.61	0.84	7.31	0.00
60.00	1251.78	3.13	2.93	1-S2n	2.01	2.17	2.01	0.84	8.13	0.00
80.00	1252.39	3.74	3.37	1-S2n	2.36	2.53	2.36	0.84	8.77	0.00
100.00	1252.94	4.29	3.85	1-S2n	2.69	2.84	2.64	0.84	9.53	0.00
120.00	1253.48	4.83	4.40	1-S2n	3.02	3.12	2.92	0.84	10.07	0.00
140.00	1254.04	5.39	5.01	5-S2n	3.37	3.38	3.28	0.84	10.26	0.00
160.00	1254.81	6.00	6.16	2-M2c	3.75	3.62	3.62	0.84	10.54	0.00
180.00	1255.33	6.68	6.65	2-M2c	4.24	3.83	3.83	0.84	11.18	0.00
200.00	1256.09	7.44	7.23	2-M2c	5.00	4.03	4.03	0.84	11.79	0.00

****

El. inlet face invert 1248.65 ft El. outlet invert 1247.66 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

****

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	1248.65 ft
OUTLET STATION	256.00 ft
OUTLET ELEVATION	1247.66 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0039
CULVERT LENGTH ALONG SLOPE	256.00 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	CIRCULAR
BARREL DIAMETER	5.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE WITH HEADWALL
INLET DEPRESSION	NONE

****

4th Iteration
Peak Flows -10 Min

CURRENT DATE: 03-26-1999
CURRENT TIME: 15:15:35

FILE DATE: 03-26-1999
FILE NAME: PAIUTE

****
********** TAILWATER **********
****
****

CONSTANT WATER SURFACE ELEVATION
1248.50

****
********** ROADWAY OVERTOPPING DATA **********
****

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	30.00 ft
CREST LENGTH	200.00 ft
OVERTOPPING CREST ELEVATION	1257.00 ft

****

4th Iteration.
Peak -4 Min

Osborn

Pipe	Upstream Node	Downstream Node	Section Size	Discharge (cfs)	Velocity (ft/s)	System Flow Time (min)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Invert Elevation (ft)
P-19, 60"	Paiute Park Inlet	MH 97+00	60 inch	23.00	2.75	0.00	1,255.00	1,250.86	1,248.65	1,255.00	1,250.92	1,247.66
P-18, 60"	MH 97+00	MH 92+00	60 inch	23.00	1.70	0.25	1,255.00	1,250.91	1,247.66	1,260.00	1,250.94	1,245.76
P-17, 60"	MH 92+00	10" SS Xing	60 inch	23.00	1.17	0.58	1,260.00	1,250.93	1,245.76	1,262.00	1,250.92	1,244.08
P-16, 60"	10" SS Xing	Pinto Ln	60 inch	23.00	1.17	2.36	1,262.00	1,250.92	1,244.08	1,260.00	1,250.90	1,242.76
P-15, 72"	Pinto Ln	10" SS Xing/MH	72 inch	103.00	3.64	7.41	1,260.00	1,250.20	1,242.76	1,256.00	1,249.84	1,240.78
P-14, 72"	10" SS Xing/MH	68th St.	72 inch	103.00	3.64	10.16	1,256.00	1,249.83	1,240.78	1,255.00	1,249.54	1,237.70
P-13, 84"	68th St.	MH 71+00	78 inch	167.00	5.03	12.45	1,255.00	1,248.84	1,237.70	1,257.00	1,248.33	1,231.33
P-12, 84"	MH 71+00	70th St	78 inch	167.00	5.03	14.10	1,257.00	1,248.31	1,231.33	1,253.00	1,247.80	1,229.91
P-11, 96"	70th St	71st St	84 inch	304.00	7.90	15.76	1,253.00	1,247.30	1,229.91	1,248.00	1,245.49	1,227.92
P-43	71st St	71st Pl	84 inch	304.00	7.90	17.45	1,248.00	1,245.48	1,228.00	1,247.00	1,244.59	1,227.00
P-44	71st Pl	Scottsdale Rd. Junc.	84 inch	304.00	7.90	18.27	1,247.00	1.24e3	1,228.00	1,247.00	1,243.58	1,225.62
P-8, 114"	Scottsdale Rd. Junc.	Brown Rd.	90 inch	319.00	7.22	18.94	1,247.00	1,243.28	1,225.62	1,245.00	1,242.60	1,223.91
P-7, 114"	Brown Rd.	MH 45+00	90 inch	407.00	9.21	19.85	1,245.00	1,242.45	1,223.91	1,244.00	1,241.88	1,223.35
P-6, 114	MH 45+00	Civic Center Junc.	90 inch	407.00	9.21	20.21	1,244.00	1,241.75	1,223.35	1,242.00	1,239.79	1,221.38
P-5, 114"	Civic Center Junc.	75th St	96 inch	478.00	9.51	21.48	1,242.00	1,239.51	1,221.38	1,238.00	1,237.31	1,220.49
P-4, 114"	75th St	Miller Rd.	108 inch	500.00	7.86	22.88	1,238.00	1,237.26	1,220.49	1,237.00	1,236.24	1,219.86
P-3, 8 x 5 Bo	Miller Rd.	Exst Junc	8 x 5 ft	500.00	12.50	24.23	1,237.00	1,235.99	1,219.86	1,236.00	1,234.95	1,219.23
P-2, 84"	Exst Junc	Osborn Park Junc.	84 inch	500.00	12.99	24.43	1,236.00	1,233.64	1,219.23	1,232.00	1,227.61	1,217.22
P-1, 84"	Osborn Park Junc.	IBW	84 inch	500.00	12.99	25.69	1,232.00	1,224.99	1,217.22	121,962.17	1,223.60	1,216.60

Depth = 3.3'
Same as Free discharge
Paiute Park Stage = 1250.9
∞ Begin backflow From Pinto

4th Iteration
Peak Flows -4 Min

CURRENT DATE: 03-26-1999
CURRENT TIME: 15:37:37

FILE DATE: 03-26-1999
FILE NAME: PAIUTE

****
********** FHWA CULVERT ANALYSIS **********
********** HY-8, VERSION 6.0 **********
****

CULV NO.	SITE DATA: INLET ELEV. (ft)	SITE DATA: OUTLET ELEV. (ft)	SITE DATA: CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1248.65	1247.66	256.00	1 RCP	5.00	5.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

****

SUMMARY OF CULVERT FLOWS (cfs) FILE: PAIUTE DATE: 03-26-1999

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1250.90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1251.10	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1251.18	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1251.78	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1252.39	80.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1252.94	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1253.48	120.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1254.04	140.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1254.81	160.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1255.33	180.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1256.09	200.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

****

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: PAIUTE DATE: 03-26-1999

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1250.90	0.000	0.00	0.00	0.00
1251.10	0.000	20.00	0.00	0.00
1251.18	0.000	40.00	0.00	0.00
1251.78	0.000	60.00	0.00	0.00
1252.39	0.000	80.00	0.00	0.00
1252.94	0.000	100.00	0.00	0.00
1253.48	0.000	120.00	0.00	0.00
1254.04	0.000	140.00	0.00	0.00
1254.81	0.000	160.00	0.00	0.00
1255.33	0.000	180.00	0.00	0.00
1256.09	0.000	200.00	0.00	0.00

****

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

****

4th Iteration
Peak Flows -4 Min

CURRENT DATE: 03-26-1999 FILE DATE: 03-26-1999
CURRENT TIME: 15:37:37 FILE NAME: PAIUTE

****

PERFORMANCE CURVE FOR CULVERT 1 - 1(5.00 (ft) BY 5.00 (ft)) RCP

****

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1250.90	0.00	2.25	0-NF	0.00	0.00	0.00	3.24	0.00	0.00
20.00	1251.10	1.54	2.45	3-M1t	1.12	1.21	3.24	3.24	1.49	0.00
40.00	1251.18	2.42	2.53	1-S2n	1.61	1.75	1.61	3.24	7.31	0.00
60.00	1251.78	3.13	2.93	1-S2n	2.01	2.17	2.01	3.24	8.13	0.00
80.00	1252.39	3.74	3.37	1-S2n	2.36	2.53	2.36	3.24	8.77	0.00
100.00	1252.94	4.29	3.85	1-S2n	2.69	2.84	2.64	3.24	9.53	0.00
120.00	1253.48	4.83	4.40	1-S2n	3.02	3.12	2.92	3.24	10.07	0.00
140.00	1254.04	5.39	5.01	5-S2n	3.37	3.38	3.28	3.24	10.26	0.00
160.00	1254.81	6.00	6.16	2-M2c	3.75	3.62	3.62	3.24	10.54	0.00
180.00	1255.33	6.68	6.65	2-M2c	4.24	3.83	3.83	3.24	11.18	0.00
200.00	1256.09	7.44	7.23	2-M2c	5.00	4.03	4.03	3.24	11.79	0.00

****

El. inlet face invert 1248.65 ft El. outlet invert 1247.66 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

****

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	1248.65 ft
OUTLET STATION	256.00 ft
OUTLET ELEVATION	1247.66 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0039
CULVERT LENGTH ALONG SLOPE	256.00 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	CIRCULAR
BARREL DIAMETER	5.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE WITH HEADWALL
INLET DEPRESSION	NONE

****

CURRENT DATE: 03-26-1999 FILE DATE: 03-26-1999
CURRENT TIME: 15:37:37 FILE NAME: PAIUTE

****
********** TAILWATER **********
****
****

CONSTANT WATER SURFACE ELEVATION
1250.90

****
********** ROADWAY OVERTOPPING DATA **********
****

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	30.00 ft
CREST LENGTH	200.00 ft
OVERTOPPING CREST ELEVATION	1257.00 ft

****

4th Iteration Peak Flows

Osborn

Pipe	Upstream Node	Downstream Node	Section Size	Discharge (cfs)	Velocity (ft/s)	System Flow Time (min)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Invert Elevation (ft)
P-19, 60"	Paiute Park Inlet	MH 97+00	60 inch	44.00	2.24	0.00	1,255.00	1,254.34	1,248.65	1,255.00	1,254.33	1,247.66
P-18, 60"	MH 97+00	MH 92+00	60 inch	44.00	2.24	0.25	1,255.00	1,254.31	1,247.66	1,260.00	1,254.30	1,245.76
P-17, 60"	MH 92+00	10" SS Xing	60 inch	44.00	2.24	0.46	1,260.00	1,254.30	1,245.76	1,262.00	1,254.26	1,244.08
P-16, 60"	10" SS Xing	Pinto Ln	60 inch	44.00	2.24	1.39	1,262.00	1,254.26	1,244.08	1,260.00	1,254.16	1,242.76
P-15, 72"	Pinto Ln	10" SS Xing/MH	72 inch	143.00	5.06	4.03	1,260.00	1,253.46	1,242.76	1,256.00	1,252.78	1,240.78
P-14, 72"	10" SS Xing/MH	68th St.	72 inch	143.00	5.06	6.01	1,256.00	1,252.76	1,240.78	1,255.00	1,252.19	1,237.70
P-13, 84"	68th St.	MH 71+00	78 inch	249.00	7.50	7.66	1,255.00	1,251.49	1,237.70	1,257.00	1,250.36	1,231.33
P-12, 84"	MH 71+00	70th St	78 inch	249.00	7.50	8.77	1,257.00	1,250.32	1,231.33	1,253.00	1,249.19	1,229.91
P-11, 96"	70th St	71st St	84 inch	344.00	8.94	9.88	1,253.00	1,248.69	1,229.91	1,248.00	1,246.37	1,227.92
P-43	71st St	71st Pl	84 inch	344.00	8.94	11.37	1,248.00	1,246.36	1,228.00	1,247.00	1,245.22	1,227.00
P-44	71st Pl	Scottsdale Rd. Junc.	84 inch	344.00	8.94	12.10	1,247.00	1,244.92	1,228.00	1,247.00	1,244.00	1,225.62
P-8, 114"	Scottsdale Rd. Junc.	Brown Rd.	90 inch	407.00	9.21	12.69	1,247.00	1,243.70	1,225.62	1,245.00	1,242.60	1,223.91
P-7, 114"	Brown Rd.	MH 45+00	90 inch	407.00	9.21	13.40	1,245.00	1,242.45	1,223.91	1,244.00	1,241.88	1,223.35
P-6, 114	MH 45+00	Civic Center Junc.	90 inch	407.00	9.21	13.76	1,244.00	1,241.75	1,223.35	1,242.00	1,239.79	1,221.38
P-5, 114"	Civic Center Junc.	75th St	96 inch	478.00	9.51	15.03	1,242.00	1,239.51	1,221.38	1,238.00	1,237.31	1,220.49
P-4, 114"	75th St	Miller Rd.	108 inch	500.00	7.86	16.43	1,238.00	1,237.26	1,220.49	1,237.00	1,236.24	1,219.86
P-3, 8 x 5 Bo	Miller Rd.	Exst Junc	8 x 5 ft	500.00	12.50	17.78	1,237.00	1,235.99	1,219.86	1,236.00	1,234.95	1,219.23
P-2, 84"	Exst Junc	Osborn Park Junc.	84 inch	500.00	12.99	17.99	1,236.00	1,233.64	1,219.23	1,232.00	1,227.61	1,217.22
P-1, 84"	Osborn Park Junc.	IBW	84 inch	500.00	12.99	19.25	1,232.00	1,224.99	1,217.22	1,225.00	1,223.60	1,216.60

Discharge affected
Basin stage @ 1252.4
80 Inflow to Pointe
from Pinto

4th Iteration
Peak Flows

CURRENT DATE: 03-26-1999
CURRENT TIME: 15:18:53

FILE DATE: 03-26-1999
FILE NAME: PAIUTE

****
********** FHWA CULVERT ANALYSIS **********
********** HY-8, VERSION 6.0 **********
****

CULV NO.	SITE DATA: INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1248.65	1247.66	256.00	1 RCP	5.00	5.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

****

SUMMARY OF CULVERT FLOWS (cfs) FILE: PAIUTE DATE: 03-26-1999

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1254.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1254.33	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1254.44	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1254.62	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1254.88	80.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1255.22	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1255.62	120.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1256.10	140.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1256.66	160.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1257.29	180.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1257.99	200.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

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SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: PAIUTE DATE: 03-26-1999

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1254.30	0.000	0.00	0.00	0.00
1254.33	0.000	20.00	0.00	0.00
1254.44	0.000	40.00	0.00	0.00
1254.62	0.000	60.00	0.00	0.00
1254.88	0.000	80.00	0.00	0.00
1255.22	0.000	100.00	0.00	0.00
1255.62	0.000	120.00	0.00	0.00
1256.10	0.000	140.00	0.00	0.00
1256.66	0.000	160.00	0.00	0.00
1257.29	0.000	180.00	0.00	0.00
1257.99	0.000	200.00	0.00	0.00

****

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

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4th Iteration
Peak Flows

CURRENT DATE: 03-26-1999 FILE DATE: 03-26-1999
CURRENT TIME: 15:18:53 FILE NAME: PAIUTE

PERFORMANCE CURVE FOR CULVERT 1 - 1(5.00 (ft) BY 5.00 (ft)) RCP

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1254.30	0.00	5.65	0-NF	0.00	0.00	0.00	6.64	0.00	0.00
20.00	1254.33	1.54	5.68	4-FFt	1.12	1.21	5.00	6.64	1.02	0.00
40.00	1254.44	2.42	5.79	4-FFt	1.61	1.75	5.00	6.64	2.04	0.00
60.00	1254.62	3.13	5.97	4-FFt	2.01	2.17	5.00	6.64	3.06	0.00
80.00	1254.88	3.74	6.23	4-FFt	2.36	2.53	5.00	6.64	4.07	0.00
100.00	1255.22	4.29	6.57	4-FFt	2.69	2.84	5.00	6.64	5.09	0.00
120.00	1255.62	4.83	6.97	4-FFt	3.02	3.12	5.00	6.64	6.11	0.00
140.00	1256.10	5.39	7.45	4-FFt	3.37	3.38	5.00	6.64	7.13	0.00
160.00	1256.66	6.00	8.01	4-FFt	3.75	3.62	5.00	6.64	8.15	0.00
180.00	1257.29	6.68	8.64	4-FFt	4.24	3.83	5.00	6.64	9.17	0.00
200.00	1257.99	7.44	9.34	4-FFt	5.00	4.03	5.00	6.64	10.19	0.00

El. inlet face invert 1248.65 ft El. outlet invert 1247.66 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	1248.65 ft
OUTLET STATION	256.00 ft
OUTLET ELEVATION	1247.66 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0039
CULVERT LENGTH ALONG SLOPE	256.00 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	CIRCULAR
BARREL DIAMETER	5.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE WITH HEADWALL
INLET DEPRESSION	NONE

4th Iteration
Peak Flows

CURRENT DATE: 03-26-1999
CURRENT TIME: 15:18:53

FILE DATE: 03-26-1999
FILE NAME: PAIUTE

****
********** TAILWATER **********
****
****

CONSTANT WATER SURFACE ELEVATION
1254.30

****
********** ROADWAY OVERTOPPING DATA **********
****

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	30.00 ft
CREST LENGTH	200.00 ft
OVERTOPPING CREST ELEVATION	1257.00 ft

****

4th Iteration
Peak + 4 Min

Osborn

Pipe	Upstream Node	Downstream Node	Section Size	Discharge (cfs)	Velocity (ft/s)	System Flow Time (min)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Invert Elevation (ft)
P-19, 60"	Paiute Park Inlet	MH 97+00	60 inch	61.00	3.50	0.00	1,255.00	1,252.80	1,248.65	1,255.00	1,252.82	1,247.66
P-18, 60"	MH 97+00	MH 92+00	60 inch	61.00	3.11	0.17	1,255.00	1,252.80	1,247.66	1,260.00	1,252.78	1,245.76
P-17, 60"	MH 92+00	10" SS Xing	60 inch	61.00	3.11	0.32	1,260.00	1,252.77	1,245.76	1,262.00	1,252.70	1,244.08
P-16, 60"	10" SS Xing	Pinto Ln	60 inch	61.00	3.11	0.99	1,262.00	1,252.70	1,244.08	1,260.00	1,252.51	1,242.76
P-15, 72"	Pinto Ln	10" SS Xing/MH	72 inch	138.00	4.88	2.90	1,260.00	1,251.81	1,242.76	1,256.00	1,251.17	1,240.78
P-14, 72"	10" SS Xing/MH	68th St.	72 inch	138.00	4.88	4.95	1,256.00	1,251.15	1,240.78	1,255.00	1,250.62	1,237.70
P-13, 84"	68th St.	MH 71+00	78 inch	236.00	7.11	6.65	1,255.00	1,249.92	1,237.70	1,257.00	1,248.91	1,231.33
P-12, 84"	MH 71+00	70th St	78 inch	236.00	7.11	7.83	1,257.00	1,248.87	1,231.33	1,253.00	1,247.86	1,229.91
P-11, 96"	70th St	71st St	84 inch	297.00	7.72	9.00	1,253.00	1,247.36	1,229.91	1,248.00	1,245.63	1,227.92
P-43	71st St	71st Pl	84 inch	297.00	7.72	10.72	1,248.00	1,245.62	1,228.00	1,247.00	1,244.77	1,227.00
P-44	71st Pl	Scottsdale Rd. Junc.	84 inch	297.00	7.72	11.57	1,247.00	1,244.47	1,228.00	1,247.00	1,243.79	1,225.62
P-8, 114"	Scottsdale Rd. Junc.	Brown Rd.	90 inch	365.00	8.26	12.25	1,247.00	1,243.49	1,225.62	1,245.00	1,242.60	1,223.91
P-7, 114"	Brown Rd.	MH 45+00	90 inch	407.00	9.21	13.05	1,245.00	1,242.45	1,223.91	1,244.00	1,241.88	1,223.35
P-6, 114	MH 45+00	Civic Center Junc.	90 inch	407.00	9.21	13.41	1,244.00	1,241.75	1,223.35	1,242.00	1,239.79	1,221.38
P-5, 114"	Civic Center Junc.	75th St	96 inch	478.00	9.51	14.68	1,242.00	1,239.51	1,221.38	1,238.00	1,237.31	1,220.49
P-4, 114"	75th St	Miller Rd.	108 inch	500.00	7.86	16.08	1,238.00	1,237.26	1,220.49	1,237.00	1,236.24	1,219.86
P-3, 8 x 5 Bo	Miller Rd.	Exst Junc	8 x 5 ft	500.00	12.50	17.43	1,237.00	1,235.99	1,219.86	1,236.00	1,234.95	1,219.23
P-2, 84"	Exst Junc	Osborn Park Junc.	84 inch	500.00	12.99	17.63	1,236.00	1,233.64	1,219.23	1,232.00	1,227.61	1,217.22
P-1, 84"	Osborn Park Junc.	IBW	84 inch	500.00	12.99	18.89	1,232.00	1,224.99	1,217.22	1,225.00	1,223.60	1,216.60

Discharge Restricted
Depth = 5.1'
Paiute Park Stage = 1251.8
∞ Back Flow expected

4th Iteration
Peak Flows +4 Min

CURRENT DATE: 03-26-1999
CURRENT TIME: 15:42:25

FILE DATE: 03-26-1999
FILE NAME: PAIUTE

****
********** FHWA CULVERT ANALYSIS **********
********** HY-8, VERSION 6.0 **********
****

CULV NO.	SITE DATA: INLET ELEV. (ft)	SITE DATA: OUTLET ELEV. (ft)	SITE DATA: CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1248.65	1247.66	256.00	1 RCP	5.00	5.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

****

SUMMARY OF CULVERT FLOWS (cfs) FILE: PAIUTE DATE: 03-26-1999

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1252.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1252.83	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1252.94	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1253.12	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1253.38	80.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1253.72	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1254.12	120.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1254.60	140.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1255.06	160.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1255.61	180.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1256.09	200.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

****

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: PAIUTE DATE: 03-26-1999

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1252.80	0.000	0.00	0.00	0.00
1252.83	0.000	20.00	0.00	0.00
1252.94	0.000	40.00	0.00	0.00
1253.12	0.000	60.00	0.00	0.00
1253.38	0.000	80.00	0.00	0.00
1253.72	0.000	100.00	0.00	0.00
1254.12	0.000	120.00	0.00	0.00
1254.60	0.000	140.00	0.00	0.00
1255.06	0.000	160.00	0.00	0.00
1255.61	0.000	180.00	0.00	0.00
1256.09	0.000	200.00	0.00	0.00

****

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

****

4th Iteration
Peak Flows +4 Min

CURRENT DATE: 03-26-1999 FILE DATE: 03-26-1999
CURRENT TIME: 15:42:25 FILE NAME: PAIUTE

PERFORMANCE CURVE FOR CULVERT 1 - 1(5.00 (ft) BY 5.00 (ft)) RCP

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1252.80	0.00	4.15	0-NF	0.00	0.00	0.00	5.14	0.00	0.00
20.00	1252.83	1.54	4.18	1-S1f	1.12	1.21	5.00	5.14	1.02	0.00
40.00	1252.94	2.42	4.29	1-S1f	1.61	1.75	5.00	5.14	2.04	0.00
60.00	1253.12	3.13	4.47	1-S1f	2.01	2.17	5.00	5.14	3.06	0.00
80.00	1253.38	3.74	4.73	1-S1f	2.36	2.53	5.00	5.14	4.07	0.00
100.00	1253.72	4.29	5.07	4-FFt	2.69	2.84	5.00	5.14	5.09	0.00
120.00	1254.12	4.83	5.47	4-FFt	3.02	3.12	5.00	5.14	6.11	0.00
140.00	1254.60	5.39	5.95	4-FFt	3.37	3.38	5.00	5.14	7.13	0.00
160.00	1255.06	6.00	6.41	3-M1f	3.75	3.62	5.00	5.14	8.15	0.00
180.00	1255.61	6.68	6.96	3-M1f	4.24	3.83	5.00	5.14	9.17	0.00
200.00	1256.09	7.44	7.42	3-M1f	5.00	4.03	5.00	5.14	10.19	0.00

El. inlet face invert 1248.65 ft El. outlet invert 1247.66 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	1248.65 ft
OUTLET STATION	256.00 ft
OUTLET ELEVATION	1247.66 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0039
CULVERT LENGTH ALONG SLOPE	256.00 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	CIRCULAR
BARREL DIAMETER	5.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE WITH HEADWALL
INLET DEPRESSION	NONE

CURRENT DATE: 03-26-1999 FILE DATE: 03-26-1999
CURRENT TIME: 15:42:25 FILE NAME: PAIUTE

****
********** TAILWATER **********
****
****

CONSTANT WATER SURFACE ELEVATION
1252.80

****
********** ROADWAY OVERTOPPING DATA **********
****

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	30.00 ft
CREST LENGTH	200.00 ft
OVERTOPPING CREST ELEVATION	1257.00 ft

****

4½ Duration from Peak +8 min

Osborn

Pipe	Upstream Node	Downstream Node	Section Size	Discharge (cfs)	Velocity (ft/s)	System Flow Time (min)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Invert Elevation (ft)
P-19, 60"	Paiute Park Inlet	MH 97+00	60 inch	74.00	7.81	0.00	1,255.00	1,251.08	1,248.65	1,255.00	1,251.02	1,247.66
P-18, 60"	MH 97+00	MH 92+00	60 inch	74.00	5.42	0.08	1,255.00	1,250.94	1,247.66	1,260.00	1,251.15	1,245.76
P-17, 60"	MH 92+00	10" SS Xing	60 inch	74.00	3.77	0.19	1,260.00	1,251.14	1,245.76	1,262.00	1,251.04	1,244.08
P-16, 60"	10" SS Xing	Pinto Ln	60 inch	74.00	3.77	0.74	1,262.00	1,251.04	1,244.08	1,260.00	1,250.75	1,242.76
P-15, 72"	Pinto Ln	10" SS Xing/MH	72 inch	131.00	4.63	2.31	1,260.00	1,250.05	1,242.76	1,256.00	1,249.47	1,240.78
P-14, 72"	10" SS Xing/MH	68th St.	72 inch	131.00	4.63	4.47	1,256.00	1,249.46	1,240.78	1,255.00	1,248.98	1,237.70
P-13, 84"	68th St.	MH 71+00	78 inch	207.00	6.24	6.27	1,255.00	1,248.28	1,237.70	1,257.00	1,247.50	1,231.33
P-12, 84"	MH 71+00	70th St	78 inch	207.00	6.24	7.60	1,257.00	1,247.47	1,231.33	1,253.00	1,246.69	1,229.91
P-11, 96"	70th St	71st St	84 inch	253.00	6.57	8.94	1,253.00	1,246.19	1,229.91	1,248.00	1,244.94	1,227.92
P-43	71st St	71st Pl	84 inch	253.00	6.57	10.97	1,248.00	1,244.93	1,228.00	1,247.00	1,244.31	1,227.00
P-44	71st Pl	Scottsdale Rd. Junc.	84 inch	253.00	6.57	11.96	1,247.00	1,244.01	1,228.00	1,247.00	1,243.52	1,225.62
P-8, 114"	Scottsdale Rd. Junc.	Brown Rd.	90 inch	305.00	6.90	12.76	1,247.00	1,243.22	1,225.62	1,245.00	1,242.60	1,223.91
P-7, 114"	Brown Rd.	MH 45+00	90 inch	407.00	9.21	13.71	1,245.00	1,242.45	1,223.91	1,244.00	1,241.88	1,223.35
P-6, 114	MH 45+00	Civic Center Junc.	90 inch	407.00	9.21	14.08	1,244.00	1,241.75	1,223.35	1,242.00	1,239.79	1,221.38
P-5, 114"	Civic Center Junc.	75th St	96 inch	478.00	9.51	15.34	1,242.00	1,239.51	1,221.38	1,238.00	1,237.31	1,220.49
P-4, 114"	75th St	Miller Rd.	108 inch	500.00	7.86	16.75	1,238.00	1,237.26	1,220.49	1,237.00	1,236.24	1,219.86
P-3, 8 x 5 Bo	Miller Rd.	Exst Junc	8 x 5 ft	500.00	12.50	18.09	1,237.00	1,235.99	1,219.86	1,236.00	1,234.95	1,219.23
P-2, 84"	Exst Junc	Osborn Park Junc.	84 inch	500.00	12.99	18.30	1,236.00	1,233.64	1,219.23	1,232.00	1,227.61	1,217.22
P-1, 84"	Osborn Park Junc.	IBW	84 inch	500.00	12.99	19.56	1,232.00	1,224.99	1,217.22	1,225.00	1,223.60	1,216.60

Depth = 3.3'
Back to Free Discharge Cond.
Paiute Park Stage = 1252.2
∴ No backflow

4th Iteration
Peak Flows +8 Min

CURRENT DATE: 03-26-1999
CURRENT TIME: 15:51:08

FILE DATE: 03-26-1999
FILE NAME: PAIUTE

****
********** FHWA CULVERT ANALYSIS **********
********** HY-8, VERSION 6.0 **********
****

CU L V NO.	SITE DATA: INLET ELEV. (ft)	SITE DATA: OUTLET ELEV. (ft)	SITE DATA: CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1248.65	1247.66	256.00	1 RCP	5.00	5.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

****

SUMMARY OF CULVERT FLOWS (cfs) FILE: PAIUTE DATE: 03-26-1999

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1251.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1251.19	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1251.18	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1251.78	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1252.39	80.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1252.94	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1253.48	120.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1254.04	140.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1254.81	160.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1255.33	180.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1256.09	200.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

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SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: PAIUTE DATE: 03-26-1999

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1251.00	0.000	0.00	0.00	0.00
1251.19	0.000	20.00	0.00	0.00
1251.18	0.000	40.00	0.00	0.00
1251.78	0.000	60.00	0.00	0.00
1252.39	0.000	80.00	0.00	0.00
1252.94	0.000	100.00	0.00	0.00
1253.48	0.000	120.00	0.00	0.00
1254.04	0.000	140.00	0.00	0.00
1254.81	0.000	160.00	0.00	0.00
1255.33	0.000	180.00	0.00	0.00
1256.09	0.000	200.00	0.00	0.00

****

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

****

4th Iteration
Peak Flows +8 Min

CURRENT DATE: 03-26-1999 FILE DATE: 03-26-1999
CURRENT TIME: 15:51:08 FILE NAME: PAIUTE

PERFORMANCE CURVE FOR CULVERT 1 - 1(5.00 (ft) BY 5.00 (ft)) RCP

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1251.00	0.00	2.35	0-NF	0.00	0.00	0.00	3.34	0.00	0.00
20.00	1251.19	1.54	2.54	3-M1t	1.12	1.21	3.34	3.34	1.44	0.00
40.00	1251.18	2.42	2.53	1-S2n	1.61	1.75	1.61	3.34	7.31	0.00
60.00	1251.78	3.13	2.93	1-S2n	2.01	2.17	2.01	3.34	8.13	0.00
80.00	1252.39	3.74	3.37	1-S2n	2.36	2.53	2.36	3.34	8.77	0.00
100.00	1252.94	4.29	3.85	1-S2n	2.69	2.84	2.64	3.34	9.53	0.00
120.00	1253.48	4.83	4.40	1-S2n	3.02	3.12	2.92	3.34	10.07	0.00
140.00	1254.04	5.39	5.01	5-S2n	3.37	3.38	3.28	3.34	10.26	0.00
160.00	1254.81	6.00	6.16	2-M2c	3.75	3.62	3.62	3.34	10.54	0.00
180.00	1255.33	6.68	6.65	2-M2c	4.24	3.83	3.83	3.34	11.18	0.00
200.00	1256.09	7.44	7.23	2-M2c	5.00	4.03	4.03	3.34	11.79	0.00

El. inlet face invert 1248.65 ft El. outlet invert 1247.66 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	0.00 ft
INLET ELEVATION	1248.65 ft
OUTLET STATION	256.00 ft
OUTLET ELEVATION	1247.66 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0039
CULVERT LENGTH ALONG SLOPE	256.00 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	CIRCULAR
BARREL DIAMETER	5.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE WITH HEADWALL
INLET DEPRESSION	NONE

CURRENT DATE: 03-26-1999 FILE DATE: 03-26-1999
CURRENT TIME: 15:51:08 FILE NAME: PAIUTE

****
********** TAILWATER **********
****
****

CONSTANT WATER SURFACE ELEVATION
1251.00

****
********** ROADWAY OVERTOPPING DATA **********
****

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	30.00 ft
CREST LENGTH	200.00 ft
OVERTOPPING CREST ELEVATION	1257.00 ft

****

FAX

Parsons Brinckerhoff
1501 West Fountainhead Parkway, Suite 400
Tempe, Arizona 85282
602-966-8295
Fax: 602-966-9234

to: Jeff Holtzmeister

From: Alan Humphrey

Date: 3/26/98

Telephone no.

job no. 11119

Fax no.: 829-6016

no. of pages (including this page)

comments: Jeff - This is a bit rough, but it's close. Call me after you review it.

Alan

Scottsdale Maintenance Yard

PREMIER

SHEET NO. 1 OF 1

PROJECT NO.: 9907

SUBJECT: **Osborn Storm Drain, Paiute Park – Adding Maintenance Area to Basin**

BY: **H. Allen** DATE: **May 4, 1999** CHK: DATE:

Goal: Model storm routing through Paiute Park with the maintenance area being used as storage for the basin.

Results:

	Without Maintenance Area Storage	With Maintenance Area Storage
Peak Outflow Q, cfs	117	106
Peak W.S.E., ft	53.41	53.10

Procedures:

Copied PB file PBOSB.dat and called copy PP1.dat.

Assumed that the proposed pre-basin would move about 250 feet to the west into where the maintenance area is now (see attached figure) and that the bottom elevation of the new basin area is 1252 (similar to the basin area to the east of the current pre-basin).

The additional basin area is 250 x 200 = 50,000 sq. ft. or 1.15 acres. This area was added to the SA record in PP1.dat for node 05Det (Paiute Park) for elevations 1242 and higher.

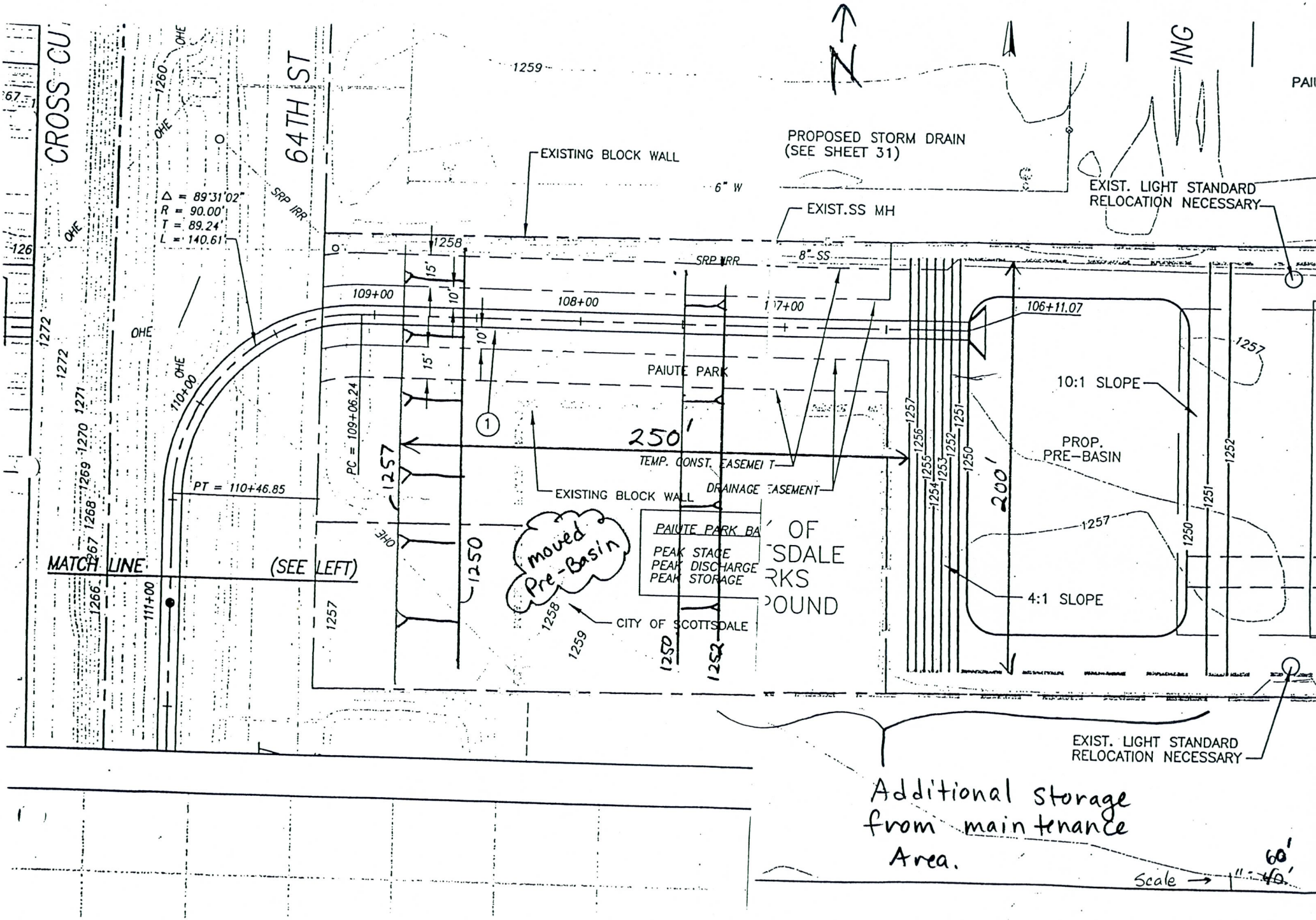
Ran PP1.dat with results shown above. Additional storage volume caused the peak outflow to decrease by 11 cfs and the peak water surface elevation to drop by 0.3 feet.

Attachments:

Modified basin plan

Selected pages from PBOSB.OUT

Selected pages from PP1.OUT


CROSS CU
64TH ST
PROPOSED STORM DRAIN
(SEE SHEET 31)
EXISTING BLOCK WALL
EXIST.SS MH
EXIST. LIGHT STANDARD
RELOCATION NECESSARY
SRP IRR
8"-SS
6" W
OHE
Δ = 89°31'02"
R = 90.00'
T = 89.24'
L = 140.61
109+00
108+00
107+00
106+11.07
110+00
PC = 109+06.24
PT = 110+46.85
111+00
PAIUTE PARK
250'
TEMP. CONST. EASEMENT
DRAINAGE EASEMENT
EXISTING BLOCK WALL
10:1 SLOPE
PROP.
PRE-BASIN
200'
4:1 SLOPE
MATCH LINE
(SEE LEFT)
moved
Pre-Basin
PAIUTE PARK BA
PEAK STAGE
PEAK DISCHARGE
PEAK STORAGE
OF
SDALE
RKS
POUND
CITY OF SCOTTSDALE
EXIST. LIGHT STANDARD
RELOCATION NECESSARY
Additional storage
from maintenance
Area.
Scale → 1" = 40'
60'

PBOSB.OUT

PBOSB.OUT

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *              JUL  1997                *
 *            VERSION 4.1                *
 *                                       *
 *  RUN DATE   19APR99  TIME  16:30:43   *
 *                                       *
 *****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
                  * ************************************************************************
                  * This is ALTERNATIVE A hydrology for Change Order #2
                  *
                  * - This model is based on the Recommended Plan - Part A for the Osborn Road
                  *     Outfall with the following changes:
                  *        Osborn Road Outfall has been modified to include a junction structure
                  *        at Miller Road.  The junction conveys excess runoff across Osborn Road
                  *        into Osborn Park located between old Osborn Road and new Osborn Road.
                  *        The outfall structure(s) for the park have been augmented to handle the
                  *        excess runoff.  The primary runoff continues east along Osborn Road and
                  *        outfalls to Indian Bend Wash.
                  *
```

PBOSB.OUT

```
 1          ID    **********************************************************************
 2          ID    STP-PAPAGO REGIONAL FLOOD CONTROL PROJECT
 3          ID    SCOTTSDALE - TEMPE - PHOENIX
 4          ID    **********************************************************************
 5          ID
 6          ID    Kimley-Horn and Associates, Inc.
 7          ID    KVL Consultants, Inc.
 8          ID
 9          ID    10-Year, 6-Hour Storm Event
10          ID    10/97
11          ID
12          ID    FILE MODIFIED BY PARSONS BRINCKERHOFF TO BE USED IN DESIGN OF OSBORN OUTFALL
13          ID    MODIFICATIONS:
14          ID    1) SUBBASIN 050062 REROUTED DIRECTLY TO PAIUTE PARK- IMPROVEMENTS TO 64TH ST
15          ID       CONVEY FLOW TO DETENTION BASIN. AREA REDUCED TO 3.9 ACRES (0.0061 SM)
16          ID    2) PAIUTE PARK STAGE/DISCHARGE CURVE ADJUSTED
17          ID    3) SUBBASINS CONTRIBUTING TO 66" ADOT PIPE AND CONCENTRATION POINT 051510
18          ID       (BROWN ROAD) ROUTED OUT OF PROPOSED PIPE (SUBBASINS 050710, 050720,
19          ID       051510 AND 050810)
20          ID    4) REVISE AREA OF SUBBASIN 050130 FROM 0.041 SM TO 0.0063 SM.AND ROUTE TO
21          ID       EXISTING DETENTION BASIN. REMAINING AREA IS SRP PROPERTY WHICH DRAINS
22          ID       WEST.
23          ID       AREA REDUCTION DUE TO:
24          ID       REMOVE APARTMENTS AT THOMAS AND 64TH ST DUE TO ON-SITE RETENTION.
25          ID       REMOVE PORTION OF SRP SUBSTATION WHICH DRAINS EAST.
26          ID       COLLECT PAVEMENT FLOWS FROM 64TH ST (THOMAS TO PAIUTE PARK) IN LARGE PIPE
27          ID       COLLECT FLOWS FROM PAVED AREA BETWEEN SUBSTATION AND APARTMENTS IN LARGE
28          ID       PIPE
29          ID    Parsons Brinckerhoff
30          ID    Alan Humphrey
31          ID    3/15/99
            *
            *DIAGRAM
32          IT       2                    300
33          IO       5

34          KK  070808   BASIN
35          BA   0.017
36          PH       0       0    0.50    0.97    1.61    1.76    1.86    2.05
37          LS       0      88       0       0      98       0
38          UK     300  0.0100    0.20      99
39          UK     100  0.0100    0.10       1
40          RK    1600   0.214    0.03            TRAP       2     3.5
            *
            * The 10 year flows are diverted into a proposed storm drain along Oak Street.
            * In storm events greater than the 10 yr, the remaining flow will follow its
            * natural course across and sheet flow across Oak Street to the north.
            *
```



```
LINE        ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
```

```
346          KK  050050   FROM 050062
347          KO       2
348          RK    1000   0.002   0.013            CIRC     2.5       1
             *
             * Flows combined from 050040, 050305, revised 050310 and 050065
             * into main pipe above Paiute Park. PB- Add 050062 and S 64th
             *

349          KK  050050 COMBINE
350          KM   Peak flow in main pipe above Paiute Park
351          KO       2
352          HC       6
             * Revise Hydrograph combine count from 5 to 6
             * Move Subbasin 050060 (Paiute Park) to combine here.

353          KK  050060   BASIN
354          BA   0.029
355          LS       0      79       0       0      98       0
356          UK     105    0.01     0.3      20
357          UK     160    0.01     0.1      80
358          RK    1300  0.0038    0.03            TRAP     100     1.0

359          KK  050050 COMBINE
360          KM   Paiute Park inflow
361          HC       2
             * ***************************************************************
             * PB Modification:
             * Revise Kimley-Horn stage/storage/discharge curve
             * Revisions based on iterative calculations which included effect of
             * Paiute Park discharges on downstream pipe system.
             * ***************************************************************

362          KK   05Det
363          KO       2
             * Original KH Curve
             * RS      1    STOR
             * SV      0    0.64    2.37    5.14    8.40    11.7    15.1    18.5    22.1
             *    22.1S
             * SE     49      50      51      52      53      54      55      56      57
             *        58
             * SQ    4.5      22      37      47      56      65      73      81      88
             *      156
             * Revised PB Curve
```



```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

364          RS       1    STOR
365          SA    1.20    1.84    3.17    3.21    3.31    3.35    3.42    3.49
366          SE      50      51      52      53      54      55      56      57
367          SQ       0      20      40      60      80     100     120     140
368          SE      50    50.8   51.18   51.78   52.39   52.94   53.48   54.04
```

Initial 05Det

```
                *
                * Paiute Park outfall - 05Qpip is the outflow in the storm drain
                * 05Qspl is the flow overtopping the basin
                *
                *
                * Overflows to CP 050060
                *

369             KK  05Qpip
370             KO       2
371             DT  05Qspl
372             DI       0     160     382     780    1292    1897
373             DQ       0    0.01     212     600    1102    1697
                *
                * Begin storm drain system in Osborn Road
                *
                * ***********************************************************************
                * PB Modification
                * Relocate hydrograph and subsequent route for Basin 050062
                * Remove hydrographs from this location
                * ***********************************************************************
                * KK050062   BASIN
                * BA 0.006
                * BA 0.014
                * LS     0      79       0       0      98       0
                * UK   100    0.01     0.3      15
                * UK    50    0.01     0.1      85
                * RK   900   0.005   0.012            TRAP      60       1
                * KK050610   FROM 050062
                * RK  1500   0.003   0.013            TRAP      60       1

374             KK  050610   BASIN
375             BA   0.081
376             LS       0      79       0       0      98       0
377             UK     130  0.0100    0.32      56
378             UK      70  0.0100    0.10      44
379             RK    1450  0.0038    0.02            TRAP      45     1.0
380             RK    1240  0.0033    0.02            TRAP      60     1.0
                * ***********************************************************************
                * PB Modification
                * Revise combine operation from 3 to 2 hydrographs due to hydrograph
                * relocation.
                * ***********************************************************************

381             KK  050610    COMBINE
382             KM   OSBORN & PINTO
383             KO       2
384             HC       2
```



```
LINE            ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
```

+	(CFS)	(HR)		6-HR	24-HR	72-HR	9.97-HR
			(CFS)				
+	407.	3.20		89.	54.	54.	54.
			(INCHES)	1.126	1.141	1.141	1.141
			(AC-FT)	44.	45.	45.	45.

CUMULATIVE AREA = .74 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

+	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	070808	12.	3.43	2.	1.	1.	.02		
+	DIVERSION TO	808OUT	0.	3.43	0.	0.	0.	.02		
+	HYDROGRAPH AT	808PP	12.	3.43	2.	1.	1.	.02		
+	ROUTED TO	070610	12.	3.43	2.	1.	1.	.02		
+	HYDROGRAPH AT	070610	5.	3.43	1.	0.	0.	.01		
+	DIVERSION TO	610OUT	0.	3.40	0.	0.	0.	.01		
+	HYDROGRAPH AT	610PP	5.	3.40	1.	0.	0.	.01		
+	2 COMBINED AT	070610	17.	3.43	3.	2.	2.	.02		
+	ROUTED TO	070508	17.	3.43	3.	2.	2.	.02		
+	HYDROGRAPH AT	070508	4.	3.50	1.	0.	0.	.01		
+	DIVERSION TO	508OUT	0.	3.50	0.	0.	0.	.01		
	HYDROGRAPH AT									

	ROUTED TO								
+		050050	186.	3.27	32.	20.	20.	.30		
	HYDROGRAPH AT								
+		050040	105.	3.20	12.	7.	7.	.10		
	ROUTED TO								
+		40STOR	37.	3.67	12.	7.	7.	.10		
+									61.58	3.67
	ROUTED TO								
+		050050	37.	3.67	12.	7.	7.	.10		
	HYDROGRAPH AT								
+		050310	11.	3.13	1.	1.	1.	.01		
	ROUTED TO								
+		SRPDet	5.	3.37	1.	1.	1.	.01		
+									54.43	3.37
	HYDROGRAPH AT								
+		S 64th	7.	3.30	1.	0.	0.	.01		
	HYDROGRAPH AT								
+		050065	38.	3.07	2.	1.	1.	.01		
	HYDROGRAPH AT								
+		050062	16.	3.10	1.	1.	1.	.01		
	ROUTED TO								
+		050050	15.	3.13	1.	1.	1.	.01		
	6 COMBINED AT								
+		050050	254.	3.23	49.	30.	30.	.43		
	HYDROGRAPH AT								
+		050060	53.	3.17	5.	3.	3.	.03		
	2 COMBINED AT								
+		050050	303.	3.23	54.	33.	33.	.46		
	ROUTED TO								
+		05Det	117.	4.00	54.	33.	33.	.46		
+									53.41	4.00
	DIVERSION TO								
+		05Qspl	0.	4.00	0.	0.	0.	.46		
	HYDROGRAPH AT								
+		05Qpip	117.	4.00	54.	33.	33.	.46		

PP1.OUT

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *                JUL  1997              *
 *             VERSION 4.1               *
 *                                       *
 *  RUN DATE   04MAY99  TIME  22:40:44   *
 *                                       *
 *****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
                * ****************************************************************************
                * This is ALTERNATIVE A hydrology for Change Order #2
                *
                * - This model is based on the Recommended Plan - Part A for the Osborn Road
                *     Outfall with the following changes:
                *        Osborn Road Outfall has been modified to include a junction structure
                *        at Miller Road.  The junction conveys excess runoff across Osborn Road
                *        into Osborn Park located between old Osborn Road and new Osborn Road.
                *        The outfall structure(s) for the park have been augmented to handle the
                *        excess runoff.  The primary runoff continues east along Osborn Road and
                *        outfalls to Indian Bend Wash.
                *
    1           ID    ****************************************************************************
    2           ID    STP-PAPAGO REGIONAL FLOOD CONTROL PROJECT
```

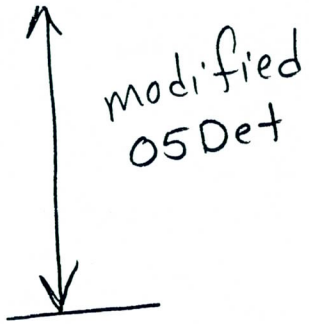
```
 3          ID    SCOTTSDALE - TEMPE - PHOENIX
 4          ID    ********************************************************************************
 5          ID
 6          ID    Kimley-Horn and Associates, Inc.
 7          ID    KVL Consultants, Inc.
 8          ID
 9          ID    10-Year, 6-Hour Storm Event
10          ID    10/97
11          ID
12          ID    FILE MODIFIED BY PARSONS BRINCKERHOFF TO BE USED IN DESIGN OF OSBORN OUTFALL
13          ID    MODIFICATIONS:
14          ID    1) SUBBASIN 050062 REROUTED DIRECTLY TO PAIUTE PARK- IMPROVEMENTS TO 64TH ST
15          ID       CONVEY FLOW TO DETENTION BASIN. AREA REDUCED TO 3.9 ACRES (0.0061 SM)
16          ID    2) PAIUTE PARK STAGE/DISCHARGE CURVE ADJUSTED
17          ID    3) SUBBASINS CONTRIBUTING TO 66" ADOT PIPE AND CONCENTRATION POINT 051510
18          ID       (BROWN ROAD) ROUTED OUT OF PROPOSED PIPE (SUBBASINS 050710, 050720,
19          ID       051510 AND 050810)
20          ID    4) REVISE AREA OF SUBBASIN 050130 FROM 0.041 SM TO 0.0063 SM.AND ROUTE TO
21          ID       EXISTING DETENTION BASIN. REMAINING AREA IS SRP PROPERTY WHICH DRAINS
22          ID       WEST.
23          ID       AREA REDUCTION DUE TO:
24          ID       REMOVE APARTMENTS AT THOMAS AND 64TH ST DUE TO ON-SITE RETENTION.
25          ID       REMOVE PORTION OF SRP SUBSTATION WHICH DRAINS EAST.
26          ID       COLLECT PAVEMENT FLOWS FROM 64TH ST (THOMAS TO PAIUTE PARK) IN LARGE PIPE
27          ID       COLLECT FLOWS FROM PAVED AREA BETWEEN SUBSTATION AND APARTMENTS IN LARGE
28          ID       PIPE
29          ID    Parsons Brinckerhoff
30          ID    Alan Humphrey
31          ID    3/15/99
32          ID
33          ID       PREMIER ENG. CORP. MODIFICATIONS,     19APR99
34          ID       Increase volume of Paiute Park to account for possible addition of
35          ID       volume from maintenance area.
36          ID       Henry Allen
37          ID
            *
            *DIAGRAM
38          IT       2                    300
39          IO       5
1                                      HEC-1 INPUT                                    PAGE  2

LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


40          KK  070808   BASIN
41          BA   0.017
42          PH       0       0    0.50    0.97    1.61    1.76    1.86    2.05
43          LS       0      88       0       0      98       0
44          UK     300  0.0100    0.20      99
45          UK     100  0.0100    0.10       1
46          RK    1600   0.214    0.03            TRAP       2     3.5
            *
```

```
 348          LS       0      79       0       0      98       0
 349          UK     100    0.01     0.3      15
 350          UK      50    0.01     0.1      85
 351          RK     900   0.005   0.012            TRAP      60       1

 352          KK  050050    FROM 050062
 353          KO       2
 354          RK    1000   0.002   0.013            CIRC     2.5       1
              *
              * Flows combined from 050040, 050305, revised 050310 and 050065
              * into main pipe above Paiute Park. PB- Add 050062 and S 64th
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 355          KK  050050 COMBINE
 356          KM   Peak flow in main pipe above Paiute Park
 357          KO       2
 358          HC       6
              * Revise Hydrograph combine count from 5 to 6
              * Move Subbasin 050060 (Paiute Park) to combine here.

 359          KK  050060   BASIN
 360          BA   0.029
 361          LS       0      79       0       0      98       0
 362          UK     105    0.01     0.3      20
 363          UK     160    0.01     0.1      80
 364          RK    1300  0.0038    0.03            TRAP     100     1.0

 365          KK  050050 COMBINE
 366          KM   Paiute Park inflow
 367          HC       2
              * ************************************************************************
              * PB Modification:
              * Revise Kimley-Horn stage/storage/discharge curve
              * Revisions based on iterative calculations which included effect of
              * Paiute Park discharges on downstream pipe system.
              *
              * Premier Modification
              *
              * Modify SA record to add volume created by making the maintenance
              * area part of the basin.
              *
              * ************************************************************************

 368          KK   05Det
 369          KO       2
              * Original KH Curve
              * RS      1    STOR
              * SV      0    0.64    2.37    5.14    8.40    11.7    15.1    18.5    22.1
```

modified 05Det




```
                *    22.1S
                * SE    49      50      51      52      53      54      55      56      57
                *       58
                * SQ   4.5      22      37      47      56      65      73      81      88
                *      156
                * Revised PB/Premier Curve
370             RS       1    STOR
371             SA    1.20    1.84    4.32    4.36    4.46    4.50    4.57    4.64
372             SE      50      51      52      53      54      55      56      57
373             SQ       0      20      40      60      80     100     120     140
374             SE      50    50.8   51.18   51.78   52.39   52.94   53.48   54.04
                *
                * Paiute Park outfall - 05Qpip is the outflow in the storm drain
                * 05Qspl is the flow overtopping the basin
                *
                *
                * Overflows to CP 050060
                *
1                                       HEC-1 INPUT                                     PAGE 12

          LINE  ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

375             KK  05Qpip
376             KO       2
377             DT  05Qspl
378             DI       0     160     382     780    1292    1897
379             DQ       0    0.01     212     600    1102    1697
                *
                * Begin storm drain system in Osborn Road
                *
                * ***************************************************************
                * PB Modification
                * Relocate hydrograph and subsequent route for Basin 050062
                * Remove hydrographs from this location
                * ***************************************************************
                * KK050062   BASIN
                * BA 0.006
                * BA 0.014
                * LS      0      79       0       0      98       0
                * UK    100    0.01     0.3      15
                * UK     50    0.01     0.1      85
                * RK    900   0.005   0.012            TRAP      60       1
                * KK050610   FROM 050062
                * RK   1500   0.003   0.013            TRAP      60       1

380             KK  050610   BASIN
381             BA   0.081
382             LS       0      79       0       0      98       0
383             UK     130  0.0100    0.32      56
384             UK      70  0.0100    0.10      44
385             RK    1450  0.0038    0.02            TRAP      45     1.0
```

1	0156	59	0.	*	1	0426	134	130.	*	1	0656	209	35.	*	1	0926	284	4.
1	0158	60	0.	*	1	0428	135	129.	*	1	0658	210	33.	*	1	0928	285	4.
1	0200	61	0.	*	1	0430	136	128.	*	1	0700	211	32.	*	1	0930	286	4.
1	0202	62	0.	*	1	0432	137	127.	*	1	0702	212	30.	*	1	0932	287	4.
1	0204	63	0.	*	1	0434	138	126.	*	1	0704	213	29.	*	1	0934	288	4.
1	0206	64	0.	*	1	0436	139	125.	*	1	0706	214	27.	*	1	0936	289	3.
1	0208	65	0.	*	1	0438	140	124.	*	1	0708	215	26.	*	1	0938	290	3.
1	0210	66	0.	*	1	0440	141	123.	*	1	0710	216	25.	*	1	0940	291	3.
1	0212	67	0.	*	1	0442	142	122.	*	1	0712	217	24.	*	1	0942	292	3.
1	0214	68	1.	*	1	0444	143	121.	*	1	0714	218	23.	*	1	0944	293	3.
1	0216	69	1.	*	1	0446	144	120.	*	1	0716	219	22.	*	1	0946	294	3.
1	0218	70	1.	*	1	0448	145	118.	*	1	0718	220	22.	*	1	0948	295	3.
1	0220	71	1.	*	1	0450	146	117.	*	1	0720	221	21.	*	1	0950	296	3.
1	0222	72	1.	*	1	0452	147	116.	*	1	0722	222	20.	*	1	0952	297	3.
1	0224	73	1.	*	1	0454	148	114.	*	1	0724	223	20.	*	1	0954	298	3.
1	0226	74	2.	*	1	0456	149	113.	*	1	0726	224	19.	*	1	0956	299	3.
1	0228	75	2.	*	1	0458	150	111.	*	1	0728	225	19.	*	1	0958	300	3.
				*					*					*				

****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
(CFS)	(HR)					
		(CFS)				
407.	3.20		89.	54.	54.	54.
		(INCHES)	1.125	1.141	1.141	1.141
		(AC-FT)	44.	45.	45.	45.

CUMULATIVE AREA = .74 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
HYDROGRAPH AT	070808	12.	3.43	2.	1.	1.	.02		
DIVERSION TO	808OUT	0.	3.43	0.	0.	0.	.02		
HYDROGRAPH AT	808PP	12.	3.43	2.	1.	1.	.02		
ROUTED TO	070610	12.	3.43	2.	1.	1.	.02		
HYDROGRAPH AT									

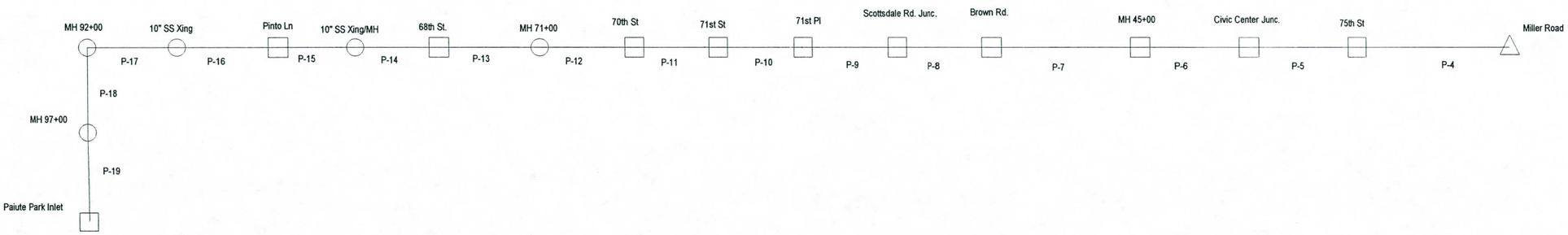
+		050050	15.	3.13	1.	1.	1.	.01
	6 COMBINED AT							
+		050050	254.	3.23	49.	30.	30.	.43
	HYDROGRAPH AT							
+		050060	53.	3.17	5.	3.	3.	.03
	2 COMBINED AT							
+		050050	303.	3.23	54.	33.	33.	.46
	ROUTED TO							
+		05Det	106.	4.17	53.	33.	33.	.46
+							53.10	4.17
	DIVERSION TO							
+		05Qspl	0.	4.17	0.	0.	0.	.46
	HYDROGRAPH AT							
+		05Qpip	106.	4.17	53.	33.	33.	.46
	HYDROGRAPH AT							
+		050610	99.	3.17	10.	6.	6.	.08
	2 COMBINED AT							
+		050610	142.	3.17	63.	38.	38.	.54
	ROUTED TO							
+		050620	140.	3.20	63.	38.	38.	.54
	HYDROGRAPH AT							
+		050620	110.	3.17	12.	7.	7.	.10
	2 COMBINED AT							
+		050620	248.	3.17	74.	45.	45.	.64
	ROUTED TO							
+		050630	248.	3.20	74.	45.	45.	.64
	HYDROGRAPH AT							
+		050630	120.	3.13	9.	6.	6.	.06
	2 COMBINED AT							
+		050630	343.	3.20	84.	51.	51.	.70
	ROUTED TO							
+		050640	342.	3.20	84.	51.	51.	.70
	HYDROGRAPH AT							
+		050640	65.	3.20	6.	3.	3.	.03
	2 COMBINED AT							

StormCad Models

Alternative A-

brownin.stm
brownin2.stm
srpbrown.stm

Alternative A, Upstream Reach



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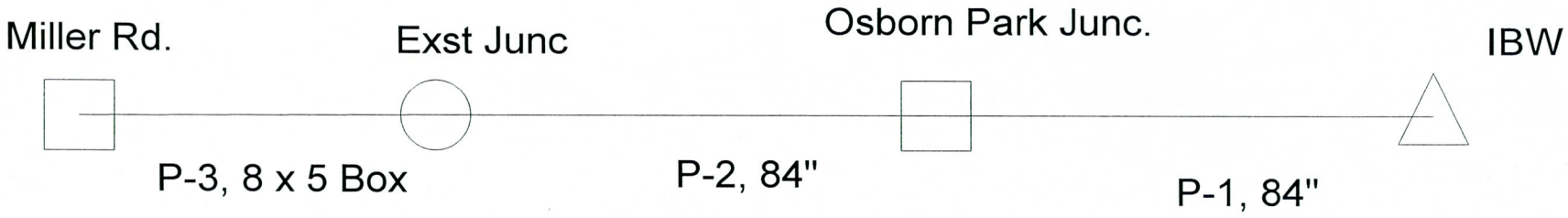
Alternative A, Upstream Reach

Pipe	Upstream Node	Downstream Node	Roughness	Constructed Slope (ft/ft)	Length (ft)	Section Size	Discharge (cfs)	Velocity (ft/s)	System Flow Time (min)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Invert Elevation (ft)
P-19	Paiute Park Inlet	MH 97+00	0.013	0.003960	250.00	60 inch	44.00	2.24	0.00	1,258.00	1,255.35	1,248.65	1,259.00	1,255.28	1,247.66
P-18	MH 97+00	MH 92+00	0.013	0.003800	500.00	60 inch	44.00	2.24	1.86	1,259.00	1,255.28	1,247.66	1,260.00	1,255.13	1,245.76
P-17	MH 92+00	10" SS Xing	0.013	0.013440	125.00	60 inch	44.00	2.24	5.58	1,260.00	1,255.03	1,245.76	1,261.00	1,255.00	1,244.08
P-16	10" SS Xing	Pinto Ln	0.013	0.003718	355.00	60 inch	44.00	2.24	6.51	1,261.00	1,254.97	1,244.08	1,260.00	1,254.87	1,242.76
P-15	Pinto Ln	10" SS Xing/MH	0.013	0.003300	600.00	72 inch	143.00	5.06	9.15	1,260.00	1,253.06	1,242.76	1,256.00	1,252.38	1,240.78
P-14	10" SS Xing/MH	68th St.	0.013	0.006160	500.00	72 inch	143.00	5.06	11.13	1,256.00	1,252.08	1,240.78	1,255.00	1,251.51	1,237.70
P-13	68th St.	MH 71+00	0.013	0.012740	500.00	78 inch	249.00	7.50	12.77	1,255.00	1,249.85	1,237.70	1,253.00	1,248.72	1,231.33
P-12	MH 71+00	70th St	0.013	0.002840	500.00	84 inch	249.00	6.47	13.88	1,253.00	1,247.70	1,231.33	1,251.00	1,246.94	1,229.91
P-11	70th St	71st St	0.013	0.002488	800.00	90 inch	341.00	7.72	15.17	1,251.00	1,245.64	1,229.91	1,248.00	1,244.06	1,227.92
P-10	71st St	71st Pl	0.013	0.002551	392.00	96 inch	341.00	6.78	16.90	1,248.00	1,243.56	1,228.00	1,247.00	1,243.01	1,227.00
P-9	71st Pl	Scottsdale Rd. Junc.	0.013	0.007532	316.00	96 inch	403.00	8.02	17.86	1,247.00	1,242.47	1,228.00	1,247.00	1,241.86	1,225.62
P-8	Scottsdale Rd. Junc.	Brown Rd.	0.013	0.004340	394.00	96 inch	403.00	8.02	18.52	1,247.00	1,241.81	1,225.62	1,245.00	1,241.04	1,223.91
P-7	Brown Rd.	MH 45+00	0.013	0.002800	200.00	96 inch	437.00	8.69	19.34	1,245.00	1,240.38	1,223.91	1,244.00	1,239.92	1,223.35
P-6	MH 45+00	Civic Center Junc.	0.013	0.002814	700.00	96 inch	437.00	8.69	19.72	1,244.00	1,239.86	1,223.35	1,242.00	1,238.25	1,221.38
P-5	Civic Center Junc.	75th St	0.013	0.001113	800.00	96 inch	509.00	10.13	21.06	1,242.00	1,237.37	1,221.38	1,238.00	1,234.88	1,220.49
P-4	75th St	Miller Road	0.013	0.000992	635.00	96 inch	569.00	11.32	22.38	1,238.00	1,234.08	1,220.49	1,236.00	1,231.61	1,219.86

Calc. tailwater
See outFall models

Alternative A, Osborn Outfall (Existing Pipe)



Alternative A, Osborn Outfall

Pipe	Upstream Node	Downstream Node	Roughness	Length (ft)	Constructed Slope (ft/ft)	Section Size	Discharge (cfs)	Velocity (ft/s)	System Flow Time (min)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Invert Elevation (ft)
P-3, 8 x 5 Box	Miller Rd.	Exst Junc	0.013	155.00	0.004065	8 x 5 ft	462.00	11.55	0.00	1,236.00	1,231.27	1,219.86	1,236.00	1,230.38	1,219.23
P-2, 84"	Exst Junc	Osborn Park Junc.	0.013	983.00	0.002045	84 inch	462.00	12.00	0.22	1,236.00	1,230.15	1,219.23	1,232.00	1,225.01	1,217.22
P-1, 84"	Osborn Park Junc.	IBW	0.013	227.00	0.002731	84 inch	462.00	12.00	1.59	1,232.00	1,224.79	1,217.22	1,225.00	1,223.60	1,216.60

Divide 576 cfs between Outfall pipes

≈ HGL in 48" SRP pipe

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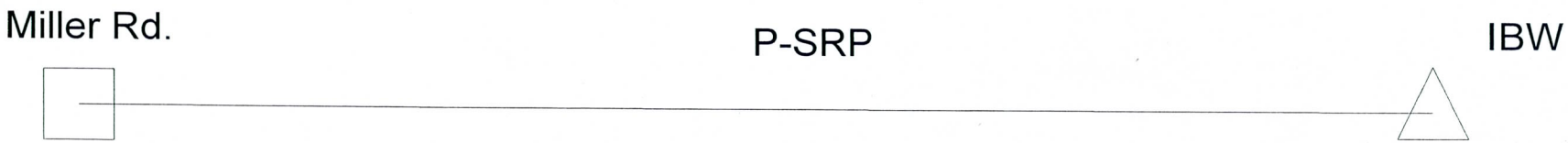
Alternative A, Existing SRP 48" Outfall



Alternative A, SRP Outfall

Pipe	Upstream Node	Downstream Node	Roughness	Section Size	Constructed Slope (ft/ft)	Discharge (cfs)	Velocity (ft/s)	System Flow Time (min)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Invert Elevation (ft)
P-SRP	Miller Rd.	IBW	0.013	48 inch	0.004444	114.00	9.07	0.00	1,236.00	1,231.50	1,225.00	1,225.00	1,223.00	1,219.00

Divide 576 cfs between SRP pipe + existing 84" in Osborn

≈ HGL in 84" Osborn Pipe

1231.50 + 0.11 = 1231.61 → Tailwater @ Miller

Junc. Loss

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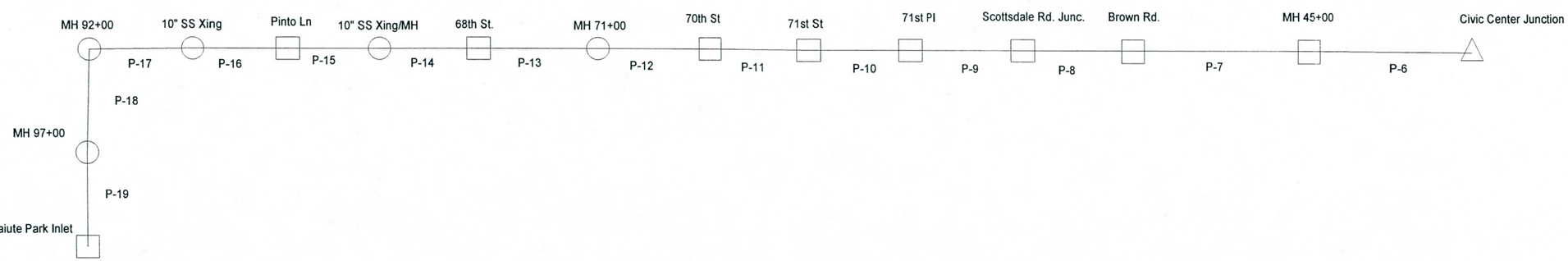
Alternative B-

pbaltb1.stm
pbaltb2.stm
exstosb.stm

Alternative B, Upstream Reach



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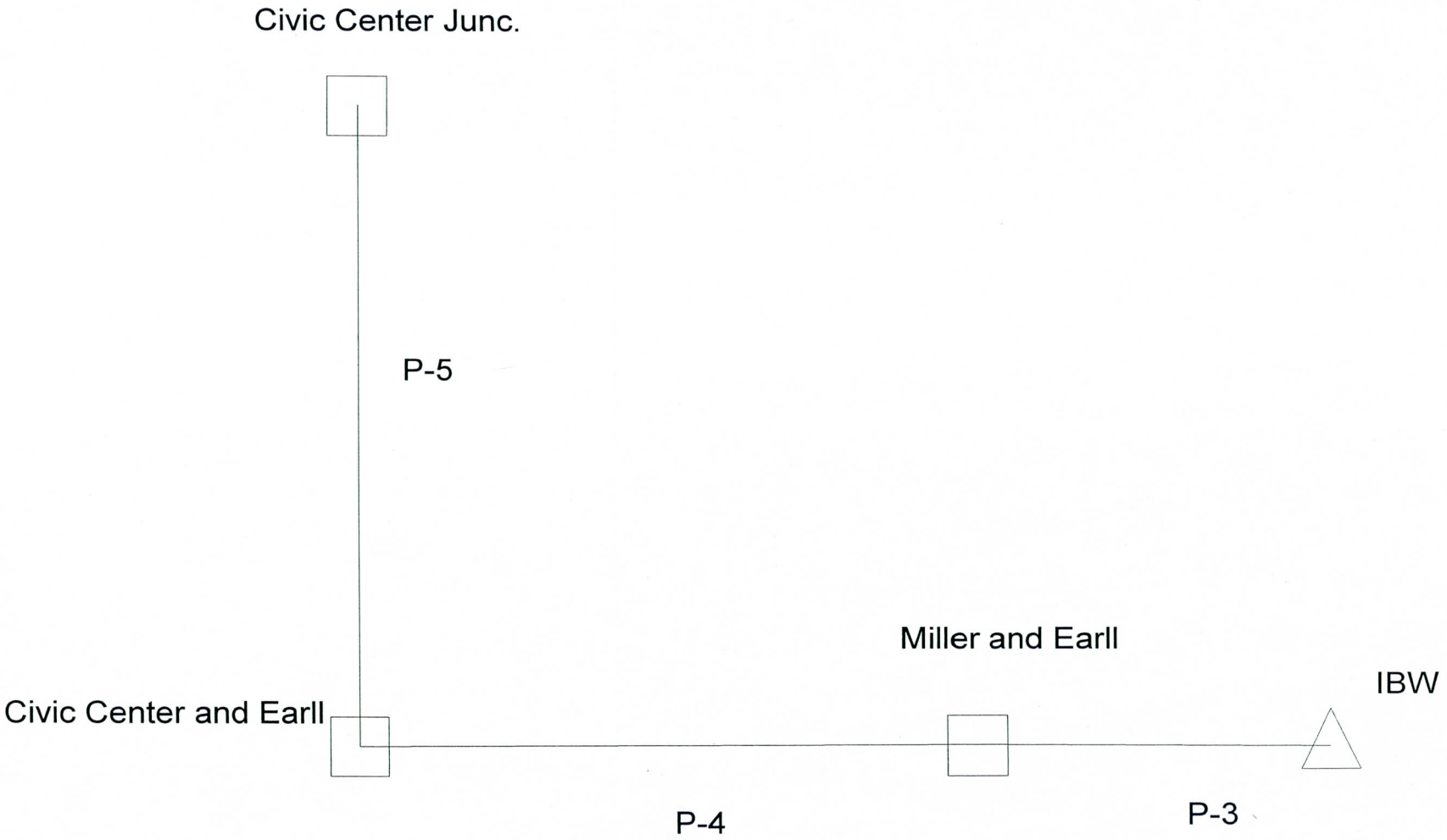
Alternative B, Upstream Reach

Pipe	Upstream Node	Downstream Node	Roughness	Constructed Slope (ft/ft)	Length (ft)	Section Size	Discharge (cfs)	Velocity (ft/s)	System Flow Time (min)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Invert Elevation (ft)
P-19	Paiute Park Inlet	MH 97+00	0.013	0.003960	250.00	60 inch	44.00	2.24	0.00	1,258.00	1,257.46	1,248.65	1,259.00	1,257.39	1,247.66
P-18	MH 97+00	MH 92+00	0.013	0.003800	500.00	60 inch	44.00	2.24	1.86	1,259.00	1,257.38	1,247.66	1,260.00	1,257.24	1,245.76
P-17	MH 92+00	10" SS Xing	0.013	0.013440	125.00	60 inch	44.00	2.24	5.58	1,260.00	1,257.14	1,245.76	1,261.00	1,257.10	1,244.08
P-16	10" SS Xing	Pinto Ln	0.013	0.003718	355.00	60 inch	44.00	2.24	6.51	1,261.00	1,257.08	1,244.08	1,260.00	1,256.98	1,242.76
P-15	Pinto Ln	10" SS Xing/MH	0.013	0.003300	600.00	72 inch	143.00	5.06	9.15	1,260.00	1,255.17	1,242.76	1,256.00	1,254.48	1,240.78
P-14	10" SS Xing/MH	68th St.	0.013	0.006160	500.00	72 inch	143.00	5.06	11.13	1,256.00	1,254.37	1,240.78	1,255.00	1,253.80	1,237.70
P-13	68th St.	MH 71+00	0.013	0.012740	500.00	78 inch	249.00	7.50	12.77	1,255.00	1,252.14	1,237.70	1,253.00	1,251.01	1,231.33
P-12	MH 71+00	70th St	0.013	0.002840	500.00	78 inch	249.00	7.50	13.88	1,253.00	1,250.31	1,231.33	1,251.00	1,249.18	1,229.91
P-11	70th St	71st St	0.013	0.002488	800.00	84 inch	341.00	8.86	14.99	1,251.00	1,247.68	1,229.91	1,248.00	1,245.40	1,227.92
P-10	71st St	71st Pl	0.013	0.002551	392.00	84 inch	341.00	8.86	16.50	1,248.00	1,245.34	1,228.00	1,247.00	1,244.22	1,227.00
P-9	71st Pl	Scottsdale Rd. Junc.	0.013	0.007532	316.00	84 inch	402.00	10.45	17.24	1,247.00	1,243.27	1,228.00	1,247.00	1,242.02	1,225.62
P-8	Scottsdale Rd. Junc.	Brown Rd.	0.013	0.004340	394.00	84 inch	402.00	10.45	17.74	1,247.00	1,241.94	1,225.62	1,245.00	1,240.37	1,223.91
P-7	Brown Rd.	MH 45+00	0.013	0.002800	200.00	90 inch	438.00	9.91	18.37	1,245.00	1,239.31	1,223.91	1,244.00	1,238.66	1,223.35
P-6	MH 45+00	Civic Center Junction	0.013	0.001929	700.00	90 inch	438.00	9.91	18.71	1,244.00	1,238.59	1,223.35	1,242.00	1,236.31	1,222.00

System tailwater
Matches downstream HGL

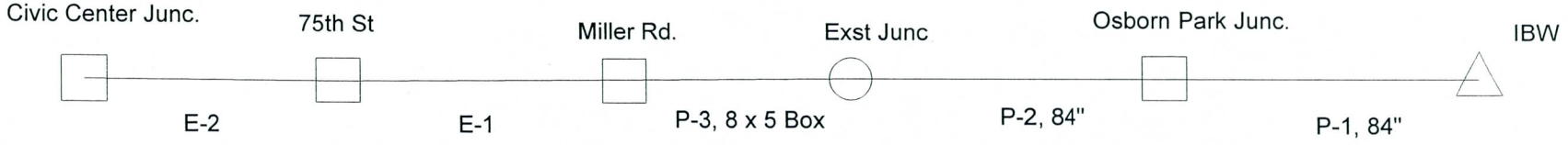
Alternative B, Civic Center Outfall



Alternative B, Civic Center Outfall

Pipe	Upstream Node	Downstream Node	Roughness	Constructed Slope (ft/ft)	Length (ft)	Section Size	Discharge (cfs)	Velocity (ft/s)	System Flow Time (min)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Invert Elevation (ft)
P-5	Civic Center Junc.	Civic Center and Earll	0.013	0.001000	1,300.00	84 inch	280.00	7.28	0.00	1,242.00	1,236.31	1,222.00	1,236.00	1,233.81	1,220.70
P-4	Civic Center and Earll	Miller and Earll	0.013	0.001000	1,300.00	90 inch	312.00	7.06	2.98	1,236.00	1,231.98	1,220.70	1,231.00	1,229.84	1,219.40
P-3	Miller and Earll	IBW	0.013	0.001462	1,300.00	96 inch	417.00	8.30	6.05	1,231.00	1,228.22	1,219.40	1,224.00	1,225.50	1,217.50

Alternative B, Existing Osborn Storm Drain



Alternative B, Exst. Osborn Storm Drain

Pipe	Upstream Node	Downstream Node	Roughness	Constructed Slope (ft/ft)	Length (ft)	Section Size	Discharge (cfs)	Velocity (ft/s)	System Flow Time (min)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Invert Elevation (ft)
E-2	Civic Center Junc.	75th St	0.013	0.004550	800.00	72 inch	234.00	11.10	0.00	1,242.00	1,236.11	1,231.92	1,238.00	1,234.45	1,228.28
E-1	75th St	Miller Rd.	0.013	0.014614	635.00	72 inch	302.00	12.58	1.38	1,238.00	1,233.03	1,228.28	1,237.00	1,227.70	1,219.00
P-3, 8 x 5 Bo	Miller Rd.	Exst Junc	0.013	0.004065	155.00	8 x 5 ft	313.00	7.83	2.29	1,237.00	1,227.25	1,219.86	1,236.00	1,226.84	1,219.23
P-2, 84"	Exst Junc	Osborn Park Junc.	0.013	0.002045	983.00	84 inch	313.00	8.13	2.62	1,236.00	1,226.53	1,219.23	1,232.00	1,224.18	1,217.22
P-1, 84"	Osborn Park Junc.	IBW	0.013	0.002731	227.00	84 inch	318.00	8.28	4.63	1,232.00	1,224.13	1,217.22	1,225.00	1,223.60	1,216.60

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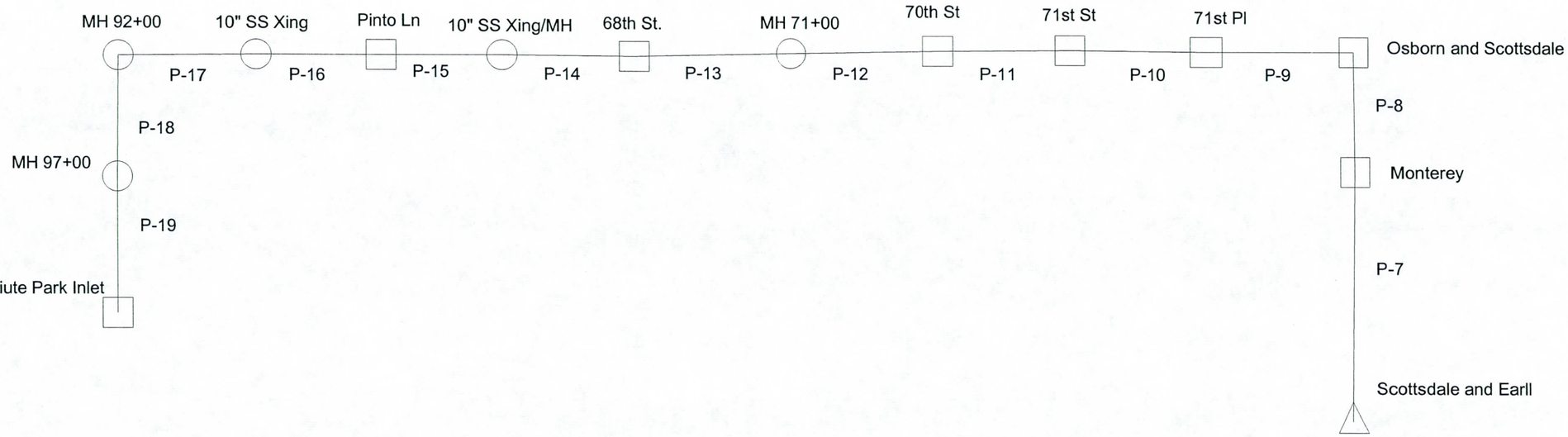
Alternative C-

pbaltc1.stm
pbaltc2.stm
waterlin.stm

Alternative C, Upstream Reach



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Alternative C, Upstream Reach

Pipe	Upstream Node	Downstream Node	Roughness	Constructed Slope (ft/ft)	Length (ft)	Section Size	Discharge (cfs)	Velocity (ft/s)	System Flow Time (min)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Invert Elevation (ft)
P-19	Paiute Park Inlet	MH 97+00	0.013	0.030000	33.00	60 inch	44.00	2.24	0.00	1,258.00	1,258.47	1,248.65	1,259.00	1,258.46	1,247.66
P-18	MH 97+00	MH 92+00	0.013	0.065517	29.00	60 inch	44.00	2.24	0.25	1,259.00	1,258.45	1,247.66	1,260.00	1,258.44	1,245.76
P-17	MH 92+00	10" SS Xing	0.013	0.013440	125.00	60 inch	44.00	2.24	0.46	1,260.00	1,258.34	1,245.76	1,261.00	1,258.31	1,244.08
P-16	10" SS Xing	Pinto Ln	0.013	0.003718	355.00	60 inch	44.00	2.24	1.39	1,261.00	1,258.28	1,244.08	1,260.00	1,258.18	1,242.76
P-15	Pinto Ln	10" SS Xing/MH	0.013	0.003300	600.00	72 inch	143.00	5.06	4.03	1,260.00	1,256.37	1,242.76	1,256.00	1,255.69	1,240.78
P-14	10" SS Xing/MH	68th St.	0.013	0.006160	500.00	72 inch	143.00	5.06	6.01	1,256.00	1,255.57	1,240.78	1,255.00	1,255.00	1,237.70
P-13	68th St.	MH 71+00	0.013	0.012740	500.00	78 inch	249.00	7.50	7.66	1,255.00	1,253.96	1,237.70	1,253.00	1,252.83	1,231.33
P-12	MH 71+00	70th St	0.013	0.002840	500.00	78 inch	249.00	7.50	8.77	1,253.00	1,252.13	1,231.33	1,251.00	1,251.00	1,229.91
P-11	70th St	71st St	0.013	0.001813	800.00	84 inch	341.00	8.86	9.88	1,251.00	1,249.71	1,229.45	1,248.00	1,247.43	1,228.00
P-10	71st St	71st Pl	0.013	0.002500	400.00	102 inch	341.00	6.01	11.38	1,248.00	1,247.40	1,228.00	1,247.00	1,247.00	1,227.00
P-9	71st Pl	Osborn and Scottsdale	0.013	0.004667	300.00	114 inch	402.00	5.67	12.49	1,247.00	1,247.23	1,227.00	1,247.00	1,247.00	1,225.60
P-8	Osborn and Scottsdale	Monterey	0.010	0.004028	643.00	84 inch	449.00	13.68	13.37	1,247.00	1,241.68	1,236.11	1,245.70	1,239.83	1,233.52
P-7	Monterey	Scottsdale and Earll	0.010	0.002488	643.00	90 inch	495.00	12.86	14.20	1,245.70	1,239.10	1,233.00	1,242.00	1,237.16	1,231.40

HGL Exceeds Ground

Tailwater = 1233.67 - HGL calculated

InsituForm

Note large diameter

Divide 510 cfs between 84" pipe and 45" Waterline

≈ Upstream HGL in 45" Waterline

Existing 45" Water Line in Scottsdale Rd.

Osborn and Scottsdale

Scottsdale and Earll

Alternative C, Existing 45" Waterline

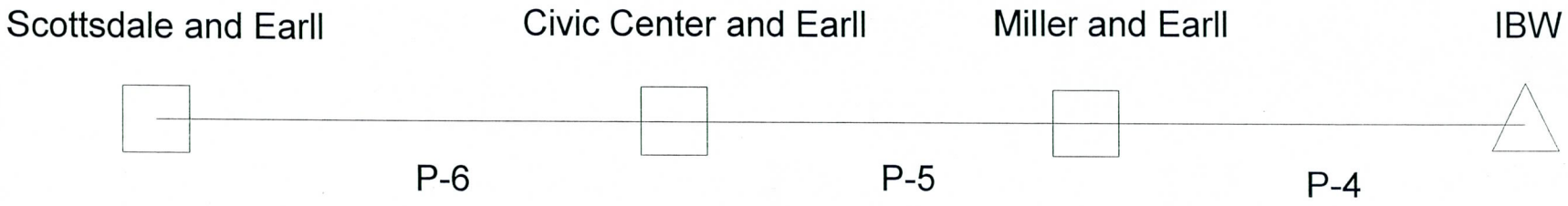
Pipe	Upstream Node	Downstream Node	Roughness	Constructed Slope (ft/ft)	Length (ft)	Section Size	Discharge (cfs)	Velocity (ft/s)	System Flow Time (min)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Invert Elevation (ft)
P-1	Osborn and Scottsdale	Scottsdale and Earll	0.012	0.003704	1,350.00	48 inch	65.00	8.12	0.00	1,247.00	1,241.43	1,239.00	1,242.00	1,236.43	1,234.00

Tailwater = 1233.67, HGL calculated

= 45"
@ n=0.010

≈ Upstream HGL @ Osborn + Scottsdale
(in Existing 84")

Alternative C, Downstream Reach



Alternative C, Downstream Reach

Pipe	Upstream Node	Downstream Node	Roughness	Constructed Slope (ft/ft)	Length (ft)	Section Size	Discharge (cfs)	Velocity (ft/s)	System Flow Time (min)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Invert Elevation (ft)
P-6	Scottsdale and Earll	Civic Center and Earll	0.013	0.001000	1,300.00	96 inch	341.00	6.78	0.00	1,242.00	1,232.19	1,223.30	1,236.50	1,230.37	1,222.00
P-5	Civic Center and Earll	Miller and Earll	0.013	0.002000	1,300.00	96 inch	374.00	7.51	3.19	1,236.50	1,229.74	1,222.00	1,231.00	1,227.64	1,219.40
P-4	Miller and Earll	IBW	0.013	0.002000	1,300.00	10 x 6 ft	489.00	8.15	6.09	1,231.00	1,225.86	1,219.60	1,230.00	1,223.00	1,217.00

1232.19 + 1.48' = 1233.67 = Upstream tailwater

↑

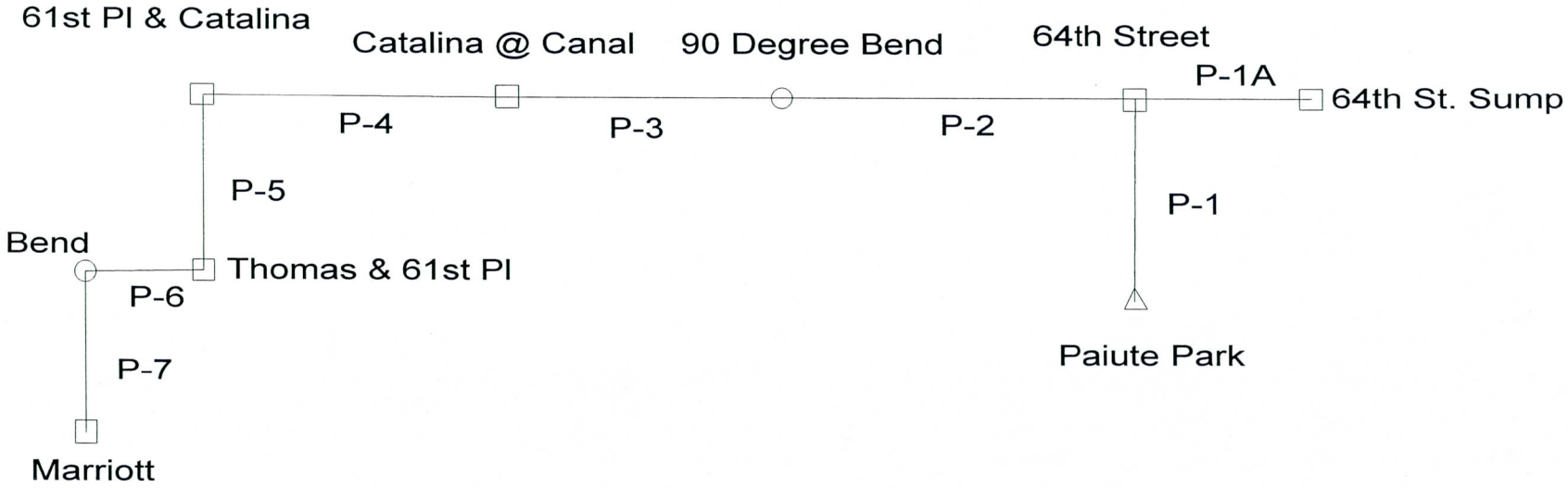
splitter loss

Alternative D-

pbaltd.stm

64th Street-

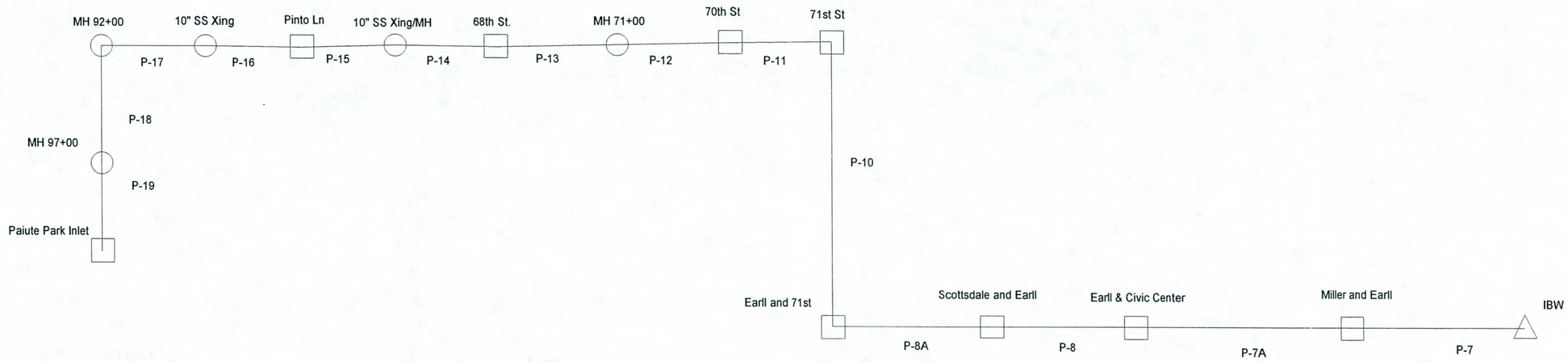
64thst.stm


61st Pl & Catalina
Catalina @ Canal
90 Degree Bend
64th Street
P-1A
64th St. Sump
P-4
P-3
P-2
P-5
P-1
Bend
Thomas & 61st Pl
P-6
P-7
Paiute Park
Marriott

64th Street

Pipe	Upstream Node	Downstream Node	Section Size	Discharge (cfs)	Velocity (ft/s)	System Flow Time (min)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Invert Elevation (ft)
P-7	Marriott	Bend	36 inch	46.00	6.51	0.00	1,272.00	1,270.01	1,265.74	1,272.00	1,269.81	1,265.33
P-6	Bend	Thomas & 61st Pl	42 inch	46.00	4.78	0.13	1,272.00	1,269.35	1,265.33	1,272.00	1,268.82	1,263.92
P-5	Thomas & 61st Pl	61st Pl & Catalina	42 inch	59.00	6.13	1.17	1,272.00	1,268.09	1,263.92	1,268.00	1,266.54	1,261.30
P-4	61st Pl & Catalina	Catalina @ Canal	54 inch	72.00	4.53	2.61	1,268.00	1,265.90	1,261.30	1,267.00	1,263.99	1,252.02
P-3	Catalina @ Canal	90 Degree Bend	66 inch	188.00	7.91	8.78	1,267.00	1,260.65	1,252.02	1,265.00	1,260.11	1,251.89
P-1A	64th St. Sump	64th Street	48 inch	54.00	4.30	0.00	1,256.00	1,255.83	1,250.26	1,256.00	1,255.66	1,249.30
P-2	90 Degree Bend	64th Street	66 inch	188.00	7.91	9.20	1,265.00	1,258.87	1,251.89	1,256.00	1,255.66	1,249.30
P-1	64th Street	Paiute Park	10 x 4 ft	254.00	6.35	11.72	1,256.00	1,253.42	1,249.30	1,258.00	1,252.90	1,249.00

Alternative D



Project Title: Osborn Road Base Model
I:\...\draft reoprt\storm cad\pbaltd.stm
04/26/99 09:39:23 AM

Parsons Brinckerhoff
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

Project Engineer: Parsons Brinckerhoff
StormCAD v1.5 [158]

Alternative D

Pipe	Upstream Node	Downstream Node	Roughness	Constructed Slope (ft/ft)	Length (ft)	Section Size	Discharge (cfs)	Velocity (ft/s)	System Flow Time (min)	Upstream Ground Elevation (ft)	Upstream HGL (ft)	Upstream Invert Elevation (ft)	Downstream Ground Elevation (ft)	Downstream HGL (ft)	Downstream Invert Elevation (ft)
P-19	Paiute Park Inlet	MH 97+00	0.013	0.003960	250.00	60 inch	44.00	2.24	0.00	1,258.00	1,256.96	1,248.65	1,259.00	1,256.89	1,247.66
P-18	MH 97+00	MH 92+00	0.013	0.003800	500.00	60 inch	44.00	2.24	1.86	1,259.00	1,256.89	1,247.66	1,260.00	1,256.75	1,245.76
P-17	MH 92+00	10" SS Xing	0.013	0.013440	125.00	60 inch	44.00	2.24	5.58	1,260.00	1,256.65	1,245.76	1,261.00	1,256.61	1,244.08
P-16	10" SS Xing	Pinto Ln	0.013	0.003718	355.00	60 inch	44.00	2.24	6.51	1,261.00	1,256.59	1,244.08	1,260.00	1,256.49	1,242.76
P-15	Pinto Ln	10" SS Xing/MH	0.013	0.003300	600.00	66 inch	143.00	6.02	9.15	1,260.00	1,255.21	1,242.76	1,256.00	1,254.12	1,240.78
P-14	10" SS Xing/MH	68th St.	0.013	0.006160	500.00	72 inch	143.00	5.06	10.81	1,256.00	1,254.00	1,240.78	1,255.00	1,253.43	1,237.70
P-13	68th St.	MH 71+00	0.013	0.012740	500.00	78 inch	249.00	7.50	12.46	1,255.00	1,251.77	1,237.70	1,253.00	1,250.64	1,231.33
P-12	MH 71+00	70th St	0.013	0.002840	500.00	78 inch	249.00	7.50	13.57	1,253.00	1,249.54	1,231.33	1,251.00	1,248.41	1,229.91
P-11	70th St	71st St	0.013	0.002488	800.00	90 inch	341.00	7.72	14.68	1,251.00	1,246.80	1,229.91	1,248.00	1,245.22	1,227.92
P-10	71st St	Earll and 71st	0.013	0.002000	1,300.00	90 inch	341.00	7.72	16.41	1,248.00	1,244.04	1,228.00	1,243.30	1,241.47	1,225.40
P-8A	Earll and 71st	Scottsdale and Earll	0.013	0.003231	650.00	90 inch	341.00	7.72	19.21	1,243.30	1,240.29	1,225.40	1,242.00	1,239.01	1,223.30
P-8	Scottsdale and Earll	Earll & Civic Center	0.013	0.001577	1,300.00	90 inch	402.00	9.10	20.62	1,242.00	1,236.64	1,223.30	1,236.50	1,233.07	1,221.25
P-7A	Earll & Civic Center	Miller and Earll	0.013	0.001500	1,300.00	96 inch	435.00	8.65	23.00	1,236.50	1,232.15	1,221.25	1,231.00	1,229.20	1,219.30
P-7	Miller and Earll	IBW	0.013	0.001385	1,300.00	10 x 6 ft	559.00	9.32	25.50	1,231.00	1,227.24	1,219.30	1,230.00	1,223.50	1,217.50

Velocity Checks

Alt. A, Upstreram Velocity Check

Upstream Node	Downstream Node	Section Size	Discharge (cfs)	Average Velocity (ft/s)	Upstream HGL (ft)
Paiute Park Inlet	MH 97+00	60 inch	59.00	7.18	1,250.81
MH 97+00	MH 92+00	60 inch	59.00	5.85	1,249.82
MH 92+00	10" SS Xing	60 inch	59.00	6.08	1,247.92
10" SS Xing	Pinto Ln	60 inch	59.00	4.30	1,246.90
Pinto Ln	10" SS Xing/MH	72 inch	72.00	6.79	1,245.03
10" SS Xing/MH	68th St.	72 inch	72.00	5.22	1,243.05
68th St.	MH 71+00	78 inch	125.00	6.79	1,240.65
MH 71+00	70th St	84 inch	125.00	5.42	1,234.86
70th St	71st St	90 inch	171.00	7.06	1,233.43
71st St	71st Pl	96 inch	171.00	5.72	1,232.21
71st Pl	Scottsdale Rd. Junc.	96 inch	202.00	8.20	1,231.56
Scottsdale Rd. Junc.	Brown Rd.	96 inch	202.00	5.98	1,230.02
Brown Rd.	MH 45+00	96 inch	219.00	5.64	1,229.45
MH 45+00	Civic Center Junc.	96 inch	219.00	4.90	1,229.36
Civic Center Junc.	75th St	96 inch	255.00	5.45	1,228.24
75th St	Miller Road	96 inch	285.00	6.60	1,226.91

Alt. A, Velocity Check, Osborn Outfall

Upstream Node	Downstream Node	Section Size	Discharge (cfs)	Average Velocity (ft/s)	Upstream HGL (ft)
Miller Rd.	Exst Junc	8 x 5 ft	273.00	6.83	1,225.98
Exst Junc	Osborn Park Junc.	84 inch	273.00	7.28	1,225.59
Osborn Park Junc.	IBW	84 inch	283.00	7.39	1,224.00

Alt. A, Velocity Check, SRP Outfall

Upstream Node	Downstream Node	Section Size	Discharge (cfs)	Average Velocity (ft/s)	Upstream HGL (ft)
Miller Rd.	IBW	48 inch	15.00	3.15	1,226.13

Alt. B, Velocity Check, Upstream

Upstream Node	Downstream Node	Section Size	Discharge (cfs)	Average Velocity (ft/s)	Upstream HGL (ft)
Paiute Park Inlet	MH 97+00	60 inch	57.00	7.10	1,250.77
MH 97+00	MH 92+00	60 inch	57.00	5.78	1,249.78
MH 92+00	10" SS Xing	60 inch	57.00	5.97	1,247.88
10" SS Xing	Pinto Ln	60 inch	57.00	4.16	1,246.90
Pinto Ln	10" SS Xing/MH	72 inch	72.00	6.87	1,245.03
10" SS Xing/MH	68th St.	72 inch	72.00	5.22	1,243.05
68th St.	MH 71+00	78 inch	125.00	6.15	1,240.65
MH 71+00	70th St	78 inch	125.00	3.77	1,239.40
70th St	71st St	84 inch	171.00	4.44	1,237.61
71st St	71st Pl	84 inch	171.00	4.44	1,237.03
71st Pl	Scottsdale Rd. Junc.	84 inch	201.00	5.22	1,235.80
Scottsdale Rd. Junc.	Brown Rd.	84 inch	201.00	5.22	1,235.46
Brown Rd.	MH 45+00	90 inch	219.00	4.96	1,234.01
MH 45+00	Civic Center Junction	90 inch	219.00	4.96	1,233.83

Alt. B, Velocity Check, Osborn Outfall

Upstream Node	Downstream Node	Section Size	Discharge (cfs)	Average Velocity (ft/s)	Upstream HGL (ft)
Civic Center Junc.	75th St	72 inch	90.00	5.78	1,234.47
75th St	Miller Rd.	72 inch	158.00	7.55	1,231.70
Miller Rd.	Exst Junc	8 x 5 ft	164.00	4.29	1,224.43
Exst Junc	Osborn Park Junc.	84 inch	164.00	4.98	1,224.24
Osborn Park Junc.	IBW	84 inch	174.00	4.59	1,223.73

Alt. B, Velocity Check, Civic Outfall

Upstream Node	Downstream Node	Section Size	Discharge (cfs)	Average Velocity (ft/s)	Upstream HGL (ft)
Civic Center Junc.	Civic Center and Earll	84 inch	167.00	4.34	1,231.99
Civic Center and Earll	Miller and Earll	90 inch	199.00	4.50	1,229.27
Miller and Earll	IBW	96 inch	304.00	6.16	1,226.78

Alt. D, Velocity Check

Upstream Node	Downstream Node	Section Size	Discharge (cfs)	Average Velocity (ft/s)	Upstream HGL (ft)
Paiute Park Inlet	MH 97+00	60 inch	57.00	7.10	1,250.77
MH 97+00	MH 92+00	60 inch	57.00	5.78	1,249.78
MH 92+00	10" SS Xing	60 inch	57.00	6.49	1,247.88
10" SS Xing	Pinto Ln	60 inch	57.00	5.09	1,246.39
Pinto Ln	10" SS Xing/MH	66 inch	72.00	7.15	1,245.09
10" SS Xing/MH	68th St.	72 inch	72.00	5.22	1,243.05
68th St.	MH 71+00	78 inch	125.00	6.70	1,240.65
MH 71+00	70th St	78 inch	125.00	5.03	1,235.38
70th St	71st St	90 inch	171.00	6.57	1,233.60
71st St	Earll and 71st	90 inch	171.00	5.53	1,232.23
Earll and 71st	Scottsdale and Earll	90 inch	171.00	4.30	1,231.11
Scottsdale and Earll	Earll & Civic Center	90 inch	201.00	5.53	1,228.54
Earll & Civic Center	Miller and Earll	96 inch	218.00	5.32	1,226.80
Miller and Earll	IBW	10 x 6 ft	280.00	5.22	1,224.15

Head Loss Calculations

Inlet Loss Spreadsheet

Inlet Loss Coefficients
FCDMC Drainage Manual, Vol II, Sec 4.3.3

Equation 4.9b:

$$hj = \frac{\frac{Q_2^2}{A_2 g} - \frac{Q_1^2}{A_1 g} \cdot \frac{Q_3^2 \cos()_3}{A_3 g} - \frac{Q_4^2 \cos()_4}{A_4 g}}{\frac{(A_1 + A_2)}{2}} + D2 - D1$$

Alternative A

	Q_1	D_1	A_1	Q_2	D_2	A_2	Q_3	D_3	A_3	$\cos()_3$	Q_4	D_4	A_4	$\cos()_4$	h_j
Paiute Park Inlet	90 degree bend- 1.28 times velocity head														**StormCad**
MH 97+00	Straight through manhole- 0.05 times velocity head														**StormCad**
MH 92+00	90 degree bend- 1.28 times velocity head														**StormCad**
Sewer Transition	Pipe to box to pipe transition- 0.30 times velocity head														**1.81**
Pinto	44	60	19.6	143	72	28.3	99	48	12.6	0			0.0		**StormCad**
Sewer Transition	Pipe to box to pipe transition- 0.30 times velocity head														**1.66**
68th St.	143	72	28.3	249	78	33.2	106	54	15.9	0			0.0		**1.02**
MH 71+00	Fiber Optic Crossing- 2, 45 degree bends- Add 2*0.4 times velocity head (V=6.5) plus 6" for change in pipe size														**1.30**
70th St.	249	84	38.5	344	90	44.2	95	54	15.9	0			0.0		**0.50**
71st St	Pipe Size Change- add D_2-D_1=0.5														**0.54**
71st Pl.	344	96	50.3	403	96	50.3	59	54	15.9	0			0.0		**StormCad**
Scottsdale	Straight through manhole- 0.05 times velocity head														0.31
Brown	403	96	50.3	433	96	50.3	30	48	12.6	0			0.0		0.35
	Sewer Transition- Add 0.3 times velocity head (V=8.7)														**0.66**
Total															**StormCad**
MH 45+00	Straight through manhole- 0.05 times velocity head														**0.88**
Civic Center	433	96	50.3	509	96	50.3	76	54	15.9	0			0.0		**0.80**
75th St.	509	96	50.3	569	96	50.3	60	54	15.9	0			0.0		**0.11**
Miller	569	96	50.3	577	96	50.3	8	55	16.5	0			0.0		**StormCad**
Miller Divert to 48"	Split to 48" pipe. No applicable head loss formula. Use 0.3 times velocity head. Applies to downstream models (Brownin2.stm and SRPbrown.stm).														
	Add loss from inlet at Miller to upstream HGL computed by downstream models (Brownin2.stm and SRPbrown.stm).														**StormCad**
Junction Below Miller	Junction structure - 8'x5' box to 84" pipe- sudden enlargement- Ke=0.1														

Alternative B

	Q_1	D_1	A_1	Q_2	D_2	A_2	Q_3	D_3	A_3	$\cos()_3$	Q_4	D_4	A_4	$\cos()_4$	h_j
Paiute Park Inlet	90 degree bend- 1.28 times velocity head														**StormCad**
MH 97+00	Straight through manhole- 0.05 times velocity head														**StormCad**
MH 92+00	90 degree bend- 1.28 times velocity head														**StormCad**
Sewer Transitions (2)	Pipe to box to pipe transition- 0.30 times velocity head														**1.81**
Pinto	44	60	19.6	143	72	28.3	99	48	12.6	0			0.0		**1.66**
68th St.	143	72	28.3	249	78	33.2	106	54	15.9	0			0.0		**StormCad**
MH 71+00	Fiber Optic Crossing- 2, 45 degree bends- Add 2*0.4 times velocity head														**1.50**
70th St.	249	78	33.2	341	84	38.5	92	54	15.9	0			0.0		**StormCad**
71st St	Straight through manhole- 0.05 times velocity head														**0.95**
71st Pl.	341	84	38.5	402	84	38.5	61	54	15.9	0			0.0		**StormCad**
Scottsdale	Straight through manhole- 0.05 times velocity head														0.61
Brown	402	84	38.5	438	90	44.2	36	48	12.6	0			0.0		0.46
	Sewer Transition- Add 0.3 times velocity head (V=9.9)														**1.06**
Total															**StormCad**
MH 45+00	Straight through manhole- 0.05 times velocity head														
SPLIT FLOW BETWEEN PROPOSED ROUTE IN CIVIC CENTER AND EXISTING STORM DRAIN IN OSBORN															
Civic Center															1.03
Osborn & Civic Center	90 degree bend- Add 1.28 times velocity head (V=7.2)														0.24
	Sewer Transition- Add 0.3 times velocity head (V=7.2)														0.24
	Splitter structure. No applicable head loss formula. Use 0.3 times velocity head (V=7.2)														**1.27**
Total															
Earll @ Civic Center	280	84	38.5	312	90	44.2	64	48	12.6	0			0.0		0.62
	90 degree bend- Add 1.28 times velocity head (V=7.0)														0.97
	Sewer Transition- Add 0.3 times velocity head (V=7.0)														0.23
Total															**1.83**
Earll @ Miller	312	90	44.2	417	96	50.3	55	48	12.6	0			0.0		1.33
	Sewer Transition- Add 0.3 times velocity head (V=8.2)														0.30
Total															**1.62**
Existing Oborn Storm Drain															
Civic Center	158	72	28.3	234	72	28.3	76	54	15.9	0			0.0		1.16
	Splitter structure. No applicable head loss formula. Use 0.3 times velocity head (V=9.7)														0.44
Total															**1.60**
75th St.	234	72	28.3	302	72	28.3	68	54	15.9	0			0.0		**1.42**
Miller	302	72	28.3	313	86	40.3	11	54	15.9	0			0.0		**0.45**
Junction Below Miller	Junction structure - 8'x5' box to 84" pipe- sudden enlargement- Ke=0.1														**StormCad**

Alternative C

	Q_1	D_1	A_1	Q_2	D_2	A_2	Q_3	D_3	A_3	$\cos()_3$	Q_4	D_4	A_4	$\cos()_4$	h_j
Paiute Park Inlet	90 degree bend- 1.28 times velocity head														**StormCad**
MH 97+00	Straight through manhole- 0.05 times velocity head														**StormCad**
MH 92+00	90 degree bend- 1.28 times velocity head														**StormCad**
Sewer Transitions (2)	Pipe to box to pipe transition- 0.30 times velocity head														**1.81**
Pinto	44	60	19.6	143	72	28.3	64	48	12.6	0			0.0		**1.66**
68th St.	143	72	28.3	249	78	33.2	106	54	15.9	0			0.0		**StormCad**
MH 71+00	Fiber Optic Crossing- 2, 45 degree bends- Add 2*0.4 times velocity head														**1.59**
70th St.	249	78	33.2	344	78	33.2	95	54	15.9	0			0.0		**StormCad**
71st St	Straight through manhole- 0.05 times velocity head														**0.95**
71st Pl.	341	84	38.5	402	84	38.5	61	54	15.9	0			0.0		**6.55**
Scottsdale & Osborn	65	66	23.8	449	84	38.5	384	54	15.9	0			0.0		**0.73**
Monterey	449	84	38.5	495	90	44.2	46	54	15.9	0			0.0		0.49
Scottsdale and Earll	560	90	44.2	587	90	44.2	27	54	15.9	0			0.0		0.99
	Splitter- 341 cfs to turn 90 degrees into 96" pipe and enlargement into structure. Use 1.28 + 0.10 times velocity head in downstream (Earll) pipe (V=6.8)														**1.48**
Total	Add total to upstream HGL of pipe between Scottsdale and Civic Center (pbaltc2.stm)														0.29
Earll @ Civic Center	341	96	50.3	374	96	50.3	33	33	5.9	0			0.0		0.26
	Sewer Transition- Add 0.3 times velocity head (V=7.5)														**0.55**
Total															1.42
Earll @ Miller	374	96	50.3	489	105	60.1	115	54	15.9	0			0.0		0.31
	Sewer Transition- Add 0.3 times velocity head (V=8.1)														**1.73**
Total															

Alternative D

	Q_1	D_1	A_1	Q_2	D_2	A_2	Q_3	D_3	A_3	$\cos()_3$	Q_4	D_4	A_4	$\cos()_4$	h_j
Paiute Park Inlet	90 degree bend- 1.28 times velocity head														**StormCad**
MH 97+00	Straight through manhole- 0.05 times velocity head														**StormCad**
MH 92+00	90 degree bend- 1.28 times velocity head														**StormCad**
Sewer Transitions (2)	Pipe to box to pipe transition- 0.30 times velocity head														**1.59**
Pinto	44	60	19.6	143	66	23.8	99	48	12.6	0			0.0		**1.66**
68th St.	143	72	28.3	249	78	33.2	106	54	15.9	0			0.0		**StormCad**
MH 71+00	Fiber Optic Crossing- 2, 45 degree bends- Add 2*0.4 times velocity head														**1.61**
70th St.	249	78	33.2	341	90	44.2	92	54	15.9	0			0.0		**StormCad**
71st St.	90 degree bend- 1.28 times velocity head														**StormCad**
71st St. And Earll	90 degree bend- 1.28 times velocity head														0.72
Scottsdale and Earll	341	90	44.2	402	90	44.2	61	54	15.9	0			0.0		1.65
	Junction structures - possibly 2, 45 degree angles and a transition under the Earll interceptor sewer- Add 1.28 times velocity head (V=9.1)														**2.37**
Total															0.57
Earll @ Civic Center	402	90	44.2	435	96	50.3	33	33	5.9	0			0.0		0.35
	Sewer Transition- Add 0.3 times velocity head (V=8.7)														**0.92**
Total															1.56
Earll @ Miller	435	96	50.3	559	105	60.1	124	54	15.9	0			0.0		0.40
	Sewer Transition- Add 0.3 times velocity head (V=9.3)														**1.96**
Total															

Transition Loss Calculations

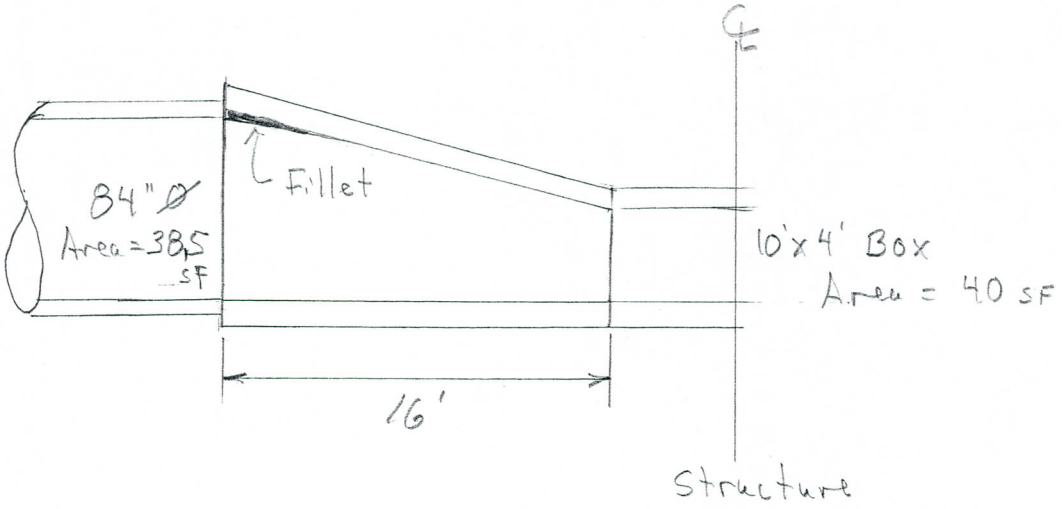
PB PARSONS BRINCKERHOFF COMPUTATION SHEET

100 YEARS ®

Subject: Sewer Transitions
Headloss

Page 1 of
Made by AJH
Date 4/21/99
Checked by
Date

Estimate headloss in transition structure.



Gradual Enlargement

$\theta = \tan^{-1}\frac{(7'-4')}{16'} = 11°$

$D_2/D_1 \cong 1$ use 1.4 (conservative

$K_e = 0.06$

Exit - use contraction

$V = \pm 8$ to 10 fps

Using $D_2/D_1 = 1.4$

$K_e = 0.18$

Total = 0.18 + 0.06 = 0.24

Assume 10'x4' Box is largest practical.
Check 90" pipe and 96"

90"

$A = 44.2$ sF

$\theta = \tan^{-1}\left(\frac{7.5-4}{16}\right) = 12.3°$ (use 15° in Table 4.2)

$D_2/D_1 = \frac{44.2}{40} = 1.1$

use 1.4 → $K_e = 0.12$ (gradual enlargement)

$K_e = 0.18$

Total = 0.12 + 0.18 = 0.30

96"

$A = 50.3$ sF

$\theta = \tan^{-1}\left(\frac{8-4}{16}\right) = 14° \approx 15°$

$D_2/D_1 = \frac{50.3}{40} = 1.3$ → use 1.4

∴ same as 90"

Cost Calculations

Alternative A

COST ESTIMATE FOR COMPARISON OF ALTERNATIVES

6/29/99

OSBORN OUTFALL, ALTERNATIVE A (From Paiute Park to IBW)
OSBORN ALIGNMENT

Description	*Unit*	*Quantity*	*Unit Cost*	*Total*
Partnering	L. SUM	1	$15,000	$15,000
NDPES/SWPPP Permits	L. SUM	1	$10,000	$10,000
Public Information Allowance	L. SUM	1	$20,000	$20,000
Project Signs Allowance	L. SUM	1	$10,000	$10,000
Removal of Existing Improvements	L. SUM	1	$40,000	$40,000
Traffic Loop Detector Replacement	EACH	6	$1,500	$9,000
Removal of Concrete Curb and Gutter	L.FT.	1,165	$2	$2,330
Pipe, Reinforced Concrete, Class III, 24"	L.FT.	420	$90	$37,800
Pipe, Reinforced Concrete, Class III, 42"	L.FT.	160	$150	$24,000
Pipe, Reinforced Concrete, Class III, 60"	L.FT.	1,590	$220	$349,800
Pipe, Reinforced Concrete, Class III, 72"	L.FT.	1,100	$280	$308,000
Pipe, Reinforced Concrete, Class III, 78"	L.FT.	500	$320	$160,000
Pipe, Reinforced Concrete, Class III, 84"	L.FT.	500	$360	$180,000
Pipe, Reinforced Concrete, Class III, 90"	L.FT.	800	$380	$304,000
Pipe, Reinforced Concrete, Class III, 96"	L.FT.	3,437	$400	$1,374,800
Transition Structure (Special Detail, Precast)	EACH	2	$30,000	$60,000
Transition Structure (Special Detail, Cast in Place)	EACH	2	$16,000	$32,000
Catch Basin Type D (Std. Det. 533-1)	EACH	14	$3,000	$42,000
18" Slotted Drain	L.FT.	160	$50	$8,000
Pavement Replacement, Type A (Std. Det. 200)	SQ.YD.	8,398	$24	$201,552
Pavement Replacement, "T"-Top (Std. Det. 200)	SQ.YD.	2,100	$32	$67,184
Concrete Curb, Type A (Std. Det. 220)	L.FT.	1,165	$8	$8,738
Concrete Sidewalk (MAG Det. 230 & 231)	SQ.FT.	5,825	$4	$23,300
Manhole, 48" Pipe and Smaller (Std. Det. 520 & 522)	EACH	7	$6,000	$42,000
Manhole , 51" Pipe and Larger (Std. Det. 521 & 522)	EACH	24	$7,500	$180,000
Headwall, 60" Concrete Pipe (Std. Det. 501-3)	EACH	1	$7,150	$7,150
Headwall, 10' x 4' Box Culvert (Special Detail)	EACH	1	$7,210	$7,210
Junction Structure (Special Details)	EACH	8	$11,000	$88,000
Remove & Dispose 48" pipe	L.FT.	335	$40	$13,400
Remove & Dispose 72" pipe	L.FT.	790	$82	$64,600
6" Sewer Line Replacement with Ductile Iron	L.FT.	25	$50	$1,250
8" Sewer Line Replacement with Ductile Iron	L.FT.	200	$50	$10,000
10" Sewer Line Replacement with Ductile Iron	L.FT.	50	$65	$3,250
18" Sewer Line Replacement with Ductile Iron	L.FT.	25	$155	$3,875
6" Water Line Replacement	L.FT.	750	$45	$33,750
8" Water Line Replacement	L.FT.	125	$50	$6,250
12" Water Line Replacement	L.FT.	500	$60	$30,000
6" Water Line Valve	EACH	10	$400	$4,000
8" Water Line Valve	EACH	7	$550	$3,850
12"Water Line Valve	EACH	1	$850	$850
16" Water Line Protect in Place	L. SUM	1	$3,500	$3,500
20" Water Line Protect in Place	L. SUM	1	$2,000	$2,000
2" Gas Line Relocation/Reconstruction	L.FT.	1,050	$15	$15,750
4" to 6" Gas Line Relocation/Reconstruction	L.FT.	125	$20	$2,500
18" to 24" Irrigation Line Reconstruction	L.FT.	25	$45	$1,125
48" Storm Drain Reconstruction	L.FT.	75	$50	$3,750
66" Storm Drain Reconstruction	L.FT.	25	$190	$4,750
Erosion Control	L. SUM	1	$50,000	$50,000
Subtotal A1				**$3,870,314**

COST ESTIMATE FOR COMPARISON OF ALTERNATIVES

6/29/99

OSBORN OUTFALL, ALTERNATIVE A (From Paiute Park to IBW)
OSBORN ALIGNMENT

Description	*Unit*	*Quantity*	*Unit Cost*	*Total*
Quality Control (2%)				$77,406
Water Supply/Dust Palliative (2%)				$77,406
Maintenance/Protection of Traffic (5%)				$193,515.68
Mobilization (3%)				$116,109.41
Construction Survey (1%)				$38,703
Construction Engineering & Contingencies (20%)				$774,062.70
Subtotal A2				**$1,277,203**
Construction Cost (Subtotal A1 + Subtotal A2)				***$5,147,517***
Depreciated Costs				
Depreciated Value of Exst 54" Storm System (1994)	L.FT.	659	$98	$64,600
Depreciated Value of Exst Osborn Storm System (1993)	L. SUM	1	$461,230	$461,230
Subtotal A3				***$525,830***
Traffic Delay at Intersections	L. SUM	1	$290,500	***$290,500***
PROJECT TOTAL FOR COMPARISON (ROUNDED)				***$5,963,800***

Alternative B

COST ESTIMATE FOR COMPARISON OF ALTERNATIVES

6/29/99

OSBORN OUTFALL, ALTERNATIVE B (From Paiute Park to IBW)
CIVIC CENTER & EARLL ALIGNMENT

Description	*Unit*	*Quantity*	*Unit Cost*	*Total*
Partnering	L. SUM	1	$15,000	$15,000
NDPES/SWPPP Permits	L. SUM	1	$10,000	$10,000
Public Information Allowance	L. SUM	1	$20,000	$20,000
Project Signs Allowance	L. SUM	1	$10,000	$10,000
Removal of Existing Improvements	L. SUM	1	$40,000	$40,000
Traffic Loop Detector Replacement	EACH	6	$1,500	$9,000
Removal of Concrete Curb and Gutter	L.FT.	2,705	$2	$5,410
Pipe, Reinforced Concrete, Class III, 24"	L.FT.	760	$90	$68,400
Pipe, Reinforced Concrete, Class III, 42"	L.FT.	80	$150	$12,000
Pipe, Reinforced Concrete, Class III, 60"	L.FT.	1,630	$220	$358,600
Pipe, Reinforced Concrete, Class III, 66"	L.FT.	0	$260	$0
Pipe, Reinforced Concrete, Class III, 72"	L.FT.	1,100	$280	$308,000
Pipe, Reinforced Concrete, Class III, 78"	L.FT.	1,000	$320	$320,000
Pipe, Reinforced Concrete, Class III, 84"	L.FT.	3,202	$360	$1,152,720
Pipe, Reinforced Concrete, Class III, 90"	L.FT.	2,200	$380	$836,000
Pipe, Reinforced Concrete, Class III, 96"	L.FT.	1,300	$400	$520,000
Reinforced Concrete Box Culvert, 10' X 6'	L.FT.	0	$450	$0
Transition Structure (Special Detail, Precast)	EACH	3	$30,000	$90,000
Transition Structure (Special Detail, Cast in Place)	EACH	2	$16,000	$32,000
Catch Basin Type D (Std. Det. 533-1)	EACH	22	$3,000	$66,000
18" Slotted Drain	L.FT.	240	$50	$12,000
Pavement Replacement, Type A (Std. Det. 200)	SQ.YD.	10,941	$24	$262,588
Pavement Replacement, "T"-Top (Std. Det. 200)	SQ.YD.	2,735	$32	$87,529
Concrete Curb, Type A (Std. Det. 220)	L.FT.	2,705	$8	$20,288
Concrete Sidewalk (Std. Det. 230)	SQ.FT.	13,525	$4	$54,100
60" Outlet Backflow Preventer (Tideflex Valve)	EACH	1	$30,000	$30,000
Manhole, 48" Pipe and Smaller (Std. Det. 520 & 522)	EACH	11	$6,000	$66,000
Manhole , 51" Pipe and Larger (Std. Det. 521 & 522)	EACH	27	$7,500	$202,500
Headwall, 60" Concrete Pipe (Std. Det. 501-3)	EACH	1	$7,150	$7,150
Headwall, 90" Concrete Pipe (Special Detail)	EACH	1	$21,850	$21,850
Headwall, 10' x 4' Box Culvert (Special Detail)	EACH	1	$7,210	$7,210
Junction Structure (Special Detail)	EACH	7	$11,000	$77,000
Remove & Dispose 48" pipe	L.FT.	335	$40	$13,400
6" Sewer Line Replacement with Ductile Iron	L.FT.	25	$50	$1,250
8" Sewer Line Replacement with Ductile Iron	L.FT.	175	$50	$8,750
10" Sewer Line Replacement with Ductile Iron	L.FT.	50	$65	$3,250
18" Sewer Line Replacement with Ductile Iron	L.FT.	25	$155	$3,875
6" Water Line Replacement	L.FT.	250	$45	$11,250
8" Water Line Replacement	L.FT.	200	$50	$10,000
12" Water Line Replacement	L.FT.	50	$60	$3,000
6" Water Line Valve	EACH	10	$400	$4,000
8" Water Line Valve	EACH	7	$550	$3,850
12"Water Line Valve	EACH	1	$850	$850
16" Water Line Protect in Place	L. SUM	1	$2,000	$2,000
20" Water Line Protect in Place	L. SUM	1	$2,000	$2,000
2" Gas Line Relocation/Reconstruction	L.FT.	1,075	$15	$16,125
18" to 24" Irrigation Line Reconstruction	L.FT.	75	$50	$3,750
90" Storm Drain Reconstruction	L.FT.	30	$400	$12,000
Erosion Control	L. SUM	1	$50,000	$50,000
Subtotal A1				**$4,870,694**

COST ESTIMATE FOR COMPARISON OF ALTERNATIVES

6/29/99

OSBORN OUTFALL, ALTERNATIVE B (From Paiute Park to IBW)
CIVIC CENTER & EARLL ALIGNMENT

Quality Control (2%)				$97,414
Water Supply/Dust Palliative (2%)				$97,414
Maintenance/Protection of Traffic (5%)				$243,534.72
Mobilization (3%)				$146,120.83
Construction Survey (1%)				$48,707
Construction Engineering & Contingencies (20%)				$974,138.90
Subtotal A2				**$1,607,329**
Construction Cost (Subtotal A1 + Subtotal A2)				***$6,478,024***
Depreciated Costs				
Depreciated Value of Exst 54" Storm System (1994)	L.FT.	659	$98	$64,600
Depreciated Value of Exst Osborn Storm System (1993)	L. SUM	1	$72,285	$72,285
Subtotal A3				***$136,885***
Traffic Delay at Intersections	L. SUM	1	$243,700	***$243,700***
PROJECT TOTAL FOR COMPARISON (ROUNDED)				***$6,858,600***

Alternative D

COST ESTIMATE FOR COMPARISON OF ALTERNATIVES

6/29/99

OSBORN OUTFALL, ALTERNATIVE D (From Paiute Park Outlet to IBW)
71ST & EARLL ALIGNMENT

Description	*Unit*	*Quantity*	*Unit Cost*	*Total*
Partnering	L. SUM	1	$15,000	$15,000
NDPES/SWPPP Permits	L. SUM	1	$10,000	$10,000
Public Information Allowance	L. SUM	1	$20,000	$20,000
Project Signs Allowance	L. SUM	1	$10,000	$10,000
Removal of Existing Improvements	L. SUM	1	$40,000	$40,000
Traffic Loop Detector Replacement	EACH	6	$1,500	$9,000
Removal of Concrete Curb and Gutter	L.FT.	2,785	$2	$5,570
Pipe, Reinforced Concrete, Class III, 24"	L.FT.	780	$60	$46,800
Pipe, Reinforced Concrete, Class III, 42"	L.FT.	80	$150	$12,000
Pipe, Reinforced Concrete, Class III, 60"	L.FT.	1,630	$220	$358,600
Pipe, Reinforced Concrete, Class III, 66"	L.FT.	600	$260	$156,000
Pipe, Reinforced Concrete, Class III, 72"	L.FT.	500	$280	$140,000
Pipe, Reinforced Concrete, Class III, 78"	L.FT.	1,000	$320	$320,000
Pipe, Reinforced Concrete, Class III, 84"	L.FT.	0	$360	$0
Pipe, Reinforced Concrete, Class III, 90"	L.FT.	4,050	$380	$1,539,000
Pipe, Reinforced Concrete, Class III, 96"	L.FT.	1,300	$400	$520,000
Reinforced Concrete Box Culvert, 10' X 6'	L.FT.	1,300	$450	$585,000
Transition Structure (Special Detail, Precast)	EACH	2	$30,000	$60,000
Transition Structure (Special Detail, Cast in Place)	EACH	3	$16,000	$48,000
Catch Basin Type D (Std. Det. 533-1)	EACH	26	$3,000	$78,000
18" Slotted Drain	L.FT.	240	$50	$12,000
Pavement Replacement, Type A (Std. Det. 200)	SQ.YD.	9,626	$24	$231,029
Pavement Replacement, "T"-Top (Std. Det. 200)	SQ.YD.	2,407	$32	$77,010
Concrete Curb, Type A (Std. Det. 220)	L.FT.	2,785	$8	$20,888
Concrete Sidewalk (Std. Det. 230)	SQ.FT.	13,925	$4	$55,700
60" Outlet Backflow Preventer (Tideflex Valve)	EACH	1	$30,000	$30,000
Manhole, 48" Pipe and Smaller (Std. Det. 520 & 522)	EACH	13	$6,000	$78,000
Manhole , 51" Pipe and Larger (Std. Det. 521 & 522)	EACH	21	$7,500	$157,500
Headwall, 60" Concrete Pipe (Std. Det. 501-3)	EACH	1	$7,150	$7,150
Headwall, 90" Concrete Pipe (Special Detail)	EACH	1	$21,850	$21,850
Headwall, 10' x 4' Box Culvert (Special Detail)	EACH	1	$7,210	$7,210
Junction Structure (Special Detail)	EACH	7	$11,000	$77,000
6" Sewer Line Replacement with Ductile Iron	L.FT.	25	$50	$1,250
8" Sewer Line Replacement with Ductile Iron	L.FT.	175	$55	$9,625
10" Sewer Line Replacement with Ductile Iron	L.FT.	50	$65	$3,250
18" Sewer Line Replacement with Ductile Iron	L.FT.	25	$155	$3,875
6" Water Line Replacement	L.FT.	275	$45	$12,375
8" Water Line Replacement	L.FT.	200	$50	$10,000
12" Water Line Replacement	L.FT.	25	$60	$1,500
6" Water Line Valve	EACH	10	$400	$4,000
8" Water Line Valve	EACH	7	$550	$3,850
12"Water Line Valve	EACH	1	$850	$850
16" Water Line Protect in Place	L. SUM	1	$2,000	$2,000
20" Water Line Protect in Place	L. SUM	1	$2,000	$2,000
2" Gas Line Relocation/Reconstruction	L.FT.	1,075	$15	$16,125
18" to 24" Irrigation Line Reconstruction	L.FT.	75	$50	$3,750
90" Storm Drain Reconstruction	L.FT.	30	$400	$12,000
Erosion Control	L. SUM	1	$50,000	$50,000
Subtotal A1				**$4,884,757**

COST ESTIMATE FOR COMPARISON OF ALTERNATIVES

6/29/99

OSBORN OUTFALL, ALTERNATIVE D (From Paiute Park Outlet to IBW)
71ST & EARLL ALIGNMENT

Description	*Unit*	*Quantity*	*Unit Cost*	*Total*
Quality Control (2%)				$97,695
Water Supply/Dust Palliative (2%)				$97,695
Maintenance/Protection of Traffic (5%)				$244,237.83
Mobilization (3%)				$146,542.70
Construction Survey (1%)				$48,848
Construction Engineering & Contingencies (20%)				$976,951.32
Subtotal A2				**$1,611,970**
Construction Cost (Subtotal A1 + Subtotal A2)				***$6,496,726***
Traffic Delay at Intersections	L. SUM	1	$52,500	***$52,500***
PROJECT TOTAL FOR COMPARISON (ROUNDED)				***$6,549,200***

Traffic Delay Costs

Osborn Outfall						Howard Olien
Traffic Control Cost						5-May-99
Project Duration:		30 Days*		K Factor:	9%	
Travel Delay Cost:		10 $/Hour				
Intersection	Approach	Vehicles Per Day	Average Delay Per Vehicle (Seconds)	Total Delay Per Day (Hours)	Total Delay (Hours)	Total Cost
Scottsdale/Osborn	Northbound	20,810	27	157.2	4,717	$47,166
	Southbound	23,724	36	240.0	7,199	$71,990
	Eastbound	3,879	12	13.2	395	$3,948
	Westbound	8,500	55	129.1	3,873	$38,728
					Total	**$161,832**
Civic Center/Osborn	Northbound	6,331	1	2.3	68	$679
	Southbound	7,220	2	4.0	119	$1,191
	Eastbound	4,679	23	29.5	886	$8,864
	Westbound	10,259	81	231.2	6,935	$69,348
					Total	**$80,083**
Miller/Osborn	Northbound	8,480	10	22.9	686	$6,862
	Southbound	9,776	15	41.0	1,230	$12,303
	Eastbound	4,679	23	29.5	886	$8,864
	Westbound	10,921	23	68.5	2,056	$20,559
					Total	**$48,589**
				Total Alternative		**$290,504**

*Project Duration Reflects Intersection Construction Only

Osborn Outfall						Howard Olien
Traffic Control Cost						5-May-99
Project Duration:		30 Days*		K Factor:	9%	
Travel Delay Cost:		10 $/Hour				
Intersection	Approach	Vehicles Per Day	Average Delay Per Vehicle (Seconds)	Total Delay Per Day (Hours)	Total Delay (Hours)	Total Cost
Scottsdale/Osborn	Northbound	20,810	27.2	157.2	4,717	$47,166
	Southbound	23,724	36.4	240.0	7,199	$71,990
	Eastbound	3,879	12.2	13.2	395	$3,948
	Westbound	8,500	54.7	129.1	3,873	$38,728
					Total	**$161,832**
Civic Center/Osborn	Northbound	6,331	1.3	2.3	68	$679
	Southbound	7,220	2.0	4.0	119	$1,191
	Eastbound	4,679	22.7	29.5	886	$8,864
	Westbound	10,259	81.1	231.2	6,935	$69,348
					Total	**$80,083**
Civic Center/Earll	Northbound	6,331	0.9	1.7	50	$499
	Southbound	7,220	2.1	4.2	127	$1,267
	Eastbound	822	0.0	0.0	0	$1
	Westbound	1,810	0.0	0.0	0	$4
					Total	**$1,771**
Miller/Earll	Northbound	8,480	0.0	0.0	0	$0
	Southbound	9,659	0.0	0.0	0	$0
	Eastbound	822	0.0	0.0	0	$0
	Westbound	1,077	0.0	0.0	0	$0
					Total	**$0**
				Total Alternative		**$243,686**

*Project Duration Reflects Intersection Construction Only

Osborn Outfall							Howard Olien
Traffic Control Cost							5-May-99
	Project Duration:	30	Days*	K Factor:	9%		
	Travel Delay Cost:	10	$/Hour				
Intersection	Approach	Vehicles Per Day	Average Delay Per Vehicle (Seconds)	Total Delay Per Day (Hours)	Total Delay (Hours)	Total Cost	
Scottsdale/Earll	Northbound	22,188	13.9	85.4	2,563	$25,627	
	Southbound	25,294	10.8	76.1	2,282	$22,822	
	Eastbound	1,048	3.9	1.1	34	$344	
	Westbound	1,807	12.9	6.5	194	$1,935	
					Total	$50,728	
Civic Center/Earll	Northbound	6,331	0.9	1.7	50	$499	
	Southbound	7,220	2.1	4.2	127	$1,267	
	Eastbound	822	0.0	0.0	0	$1	
	Westbound	1,810	0.0	0.0	0	$4	
					Total	$1,771	
Miller/Earll	Northbound	8,480	0.0	0.0	0	$0	
	Southbound	9,659	0.0	0.0	0	$0	
	Eastbound	822	0.0	0.0	0	$0	
	Westbound	1,077	0.0	0.0	0	$0	
					Total	$0	
				Total Alternative		$52,499	

*Project Duration Reflects Intersection Construction Only

Highway Capacity Software Output

HCS: Signals Release 3.1a

Inter:
Analyst: Howard Olien
Date: 5/4/99
E/W St: Osborn

City/St: Scottsdale
Proj #: Osborn Road Outfall
Period: 1999 Peak Hour
N/S St: Scottsdale

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	1	2	1	1	3	0
LGConfig	L	TR		L	TR		L	T	R	L	TR	
Volume	52	262	35	115	573	77	281	1405	187	320	1602	213
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	
RTOR Vol			5			10			10			10

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Ped	X		
WB Left	P				SB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Ped	X		
NB Right					EB Right			
SB Right					WB Right			
Green	30.0					60.0		
Yellow	3.0					3.0		
All Red	2.0					2.0		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capcity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	115	382	0.50	0.300	43.8	D		
TR	1016	3386	0.32	0.300	27.9	C	30.3	C
Westbound								
L	278	928	0.46	0.300	33.8	C		
TR	1015	3384	0.70	0.300	35.0+	D	34.9	C
Northbound								
L	73	121	4.27	0.600				
T	2063	3438	0.76	0.600	17.3	B		
R	923	1538	0.21	0.600	9.7	A		
Southbound								
L	92	154	3.87	0.600				
TR	2914	4857	0.69	0.600	15.0	B		

Intersection Delay = (sec/veh) Intersection LOS =

HCS: Signals Release 3.1a

Howard Olien
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OPERATIONAL ANALYSIS

Intersection:
City/State: Scottsdale
Analyst: Howard Olien
Project No: Osborn Road Outfall
Time Period Analyzed: 1999 Peak Hour
Date: 5/4/99
East/West Street Name: Osborn
North/South Street Name: Scottsdale

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	52	262	35	115	573	77	281	1405	187	320	1602	213
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PK 15 Vol	14	73	10	32	159	21	78	390	52	89	445	59
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900		1900	1900		1900	1900	1900	1900	1900	
ParkExist												
NumPark												
% Heavy Veh	5	5	5	5	5	5	5	5	5	5	5	5
No. Lanes	1	2	0	1	2	0	1	2	1	1	3	0
LGConfig	L	TR		L	TR		L	T	R	L	TR	
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	
RTOR Vol			5			10			10			10
Adj Flow	58	324		128	711		312	1561	197	356	2006	
%InSharedLn												
Prop Turns			0.10			0.10						0.11
NumPeds			0			0			0			0
NumBus	0	0		0	0		0	0	0	0	0	

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Arriv. Type	3	3		3	3		3	3	3	3	3	
Unit Ext.	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Ext of g	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Ped Min g		0.0			0.0			0.0			0.0	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P							
EB Thru	P							
EB Right	P							
EB Peds	X							
WB Left	P							
WB Thru	P							
WB Right	P							
WB Peds	X							
NB Right								
SB Right								
NB Left					P			
NB Thru					P			
NB Right					P			
NB Ped					X			
SB Left					P			
SB Thru					P			
SB Right					P			
SB Ped					X			
EB Right								
WB Right								
Green	30.0				60.0			
Yellow	3.0				3.0			
All Red	2.0				2.0			

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT WORKSHEET

Appr./ Movement	Mvt Volume	PHF	Flow Rate	No. Lanes	Lane Group	RTOR	Adjusted Flow Rate In Lane Grp	Prop. Left Turns	Prop. Right Turns
Eastbound									
Left	52	0.90	58	1	L		58		
Thru	262	0.90	291	2	TR		324		0.10
Right	35	0.90	33	0		5			
Westbound									
Left	115	0.90	128	1	L		128		
Thru	573	0.90	637	2	TR		711		0.10
Right	77	0.90	74	0		10			
Northbound									
Left	281	0.90	312	1	L		312		
Thru	1405	0.90	1561	2	T		1561		
Right	187	0.90	197	1	R	10	197		
Southbound									
Left	320	0.90	356	1	L		356		
Thru	1602	0.90	1780	3	TR		2006		0.11
Right	213	0.90	226	0		10			

* Value entered by user.

SATURATION FLOW ADJUSTMENT WORKSHEET

Appr/ Lane Group	Ideal Sat Flow	f W	f HV	f G	f P	f BB	f A	f LU	f RT	f LT	Adj Sat Flow
Eastbound							Sec LT Adj/LT Sat:				
L	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	----	0.211	382
TR	1900	1.000	0.952	1.000	1.000	1.000	1.00	0.95	0.985	1.000	3386

Westbound							Sec LT Adj/LT Sat:				
L	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	----	0.513	928
TR	1900	1.000	0.952	1.000	1.000	1.000	1.00	0.95	0.984	1.000	3384

Northbound							Sec LT Adj/LT Sat:				
L	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	----	0.067	121
T	1900	1.000	0.952	1.000	1.000	1.000	1.00	0.95	1.000	1.000	3438
R	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.850	----	1538
Southbound							Sec LT Adj/LT Sat:				
L	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	----	0.085	154
TR	1900	1.000	0.952	1.000	1.000	1.000	1.00	0.91	0.983	1.000	4857

CAPACITY ANALYSIS WORKSHEET

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Pri.								
Sec.								
Left	L	58	382		0.15	0.300	115	0.50
Thru	TR	324	3386		0.10	0.300	1016	0.32
Right								
Westbound								
Pri.								
Sec.								
Left	L	128	928		0.14	0.300	278	0.46
Thru	TR	711	3384	#	0.21	0.300	1015	0.70
Right								
Northbound								
Pri.								
Sec.								
Left	L	312	121	#	2.58	0.600	73	4.27
Thru	T	1561	3438		0.45	0.600	2063	0.76
Right	R	197	1538		0.13	0.600	923	0.21
Southbound								
Pri.								
Sec.								
Left	L	356	154		2.31	0.600	92	3.87
Thru	TR	2006	4857		0.41	0.600	2914	0.69
Right								

Sum (v/s) critical = 2.79

Lost Time/Cycle, L = 10.00 sec Critical v/c(X) = 3.10

LEVEL OF SERVICE WORKSHEET

Appr/ Lane Grp	Ratios v/c	Ratios g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Incremental Del d2	Res Del d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound												
L	0.50	0.300	28.9	1.000	115	0.50	14.9	0.0	43.8	D		
TR	0.32	0.300	27.1	1.000	1016	0.50	0.8	0.0	27.9	C	30.3	C
Westbound												
L	0.46	0.300	28.4	1.000	278	0.50	5.4	0.0	33.8	C		
TR	0.70	0.300	31.0	1.000	1015	0.50	4.0	0.0	35.0+	D	34.9	C
Northbound												
L	4.27	0.600	20.0	1.000	73	0.50		0.0				
T	0.76	0.600	14.7	1.000	2063	0.50	2.6	0.0	17.3	B		
R	0.21	0.600	9.2	1.000	923	0.50	0.5	0.0	9.7	A		
Southbound												
L	3.87	0.600	20.0	1.000	92	0.50		0.0				
TR	0.69	0.600	13.6	1.000	2914	0.50	1.4	0.0	15.0	B		

Intersection Delay = (sec/veh) Intersection LOS =

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

APPROACH	EB	WB	NB	SB
Cycle Length, C 100.0 sec				
Actual Green Time for Lane Group, G	30.0	30.0	60.0	60.0
Effective Green Time for Lane Group, g	30.00	30.00	60.00	60.00
Opposing Effective Green Time, go	30.0	30.0	60.0	60.0
Number of Lanes in Lane Group, N	1	1	1	1
Number of Opposing Lanes, No	2	2	3	2
Adjusted Left-Turn Flow Rate, Vlt	58	128	312	356
Proportion of Left Turns in Opposing Flow, Plto	0.00	0.00	0.00	0.00
Adjusted Opposing Flow Rate, Vo	711	324	2006	1561
Lost Time for Lane Group, tl	5.00	5.00	5.00	5.00
Left Turns per Cycle: LTC=VltC/3600	1.61	3.56	8.67	9.89
Opposing Flow per Lane, Per Cycle: Volc=VoC/3600fluo	10.39	4.74	20.41	22.82
Opposing Platoon Ratio, Rpo (Table 9-2 or Eqn 9-7)	1.00	1.00	1.00	1.00
gf=[Gexp(- a * (LTC ** b))]-tl, gf<=g	0.0	0.0	0.0	0.0
Opposing Queue Ratio: qro=1-Rpo(go/C)	0.70	0.70	0.40	0.40
gq=(4.943Volc**0.762)[(qro**1.061)-tl], gq<=g	13.37	2.33	22.59	28.59
gu =g-gq if gq>=gf, =g-gf if gq<gf	16.63	27.67	37.41	31.41
n=(gq-gf)/2, n>=0	6.69	1.16	11.30	14.29
Ptho=1-Plto	1.00	1.00	1.00	1.00
Pl*=Plt[1+{(N-1)g/(gf+gu/El1+4.24)))	1.00	1.00	1.00	1.00
El1 (Figure 9-7)	2.62	1.80	10.62	6.14
El2=(1-Ptho**n)/Plto, El2>=1.0	1.00	1.00	1.00	1.00
fmin=2(1+Plt)/g or fmin=2(1+Pl)/g	0.13	0.13	0.07	0.07
gdiff=max(gq-gf,0)	0.00	0.00	0.00	0.00
fm=[gf/g]+[gu/g][1/{1+Pl(El1-1)}], (min=fmin;max=1.00)	0.21	0.51	0.07	0.09
flt=fm=[gf/g]+gdiff[1/{1+Plt(El2-1)}] +[gu/g][1/(1+Plt(El1-1)],(min=fmin;max=1.0) or flt=[fm+0.91(N-1)]/N**				
flt	0.211	0.513	0.067	0.085

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

APPROACH	EB	WB	NB	SB
Cycle Length, C 100.0 sec				
Actual Green Time for Lane Group, G				
Effective Green Time for Lane Group, g				
Opposing Effective Green Time, go				
Number of Lanes in Lane Group, N				
Number of Opposing Lanes, No				
Adjusted Left-Turn Flow Rate, Vlt				
Proportion of Left Turns in Lane Group, Plt				
Proportion of Left Turns in Opposing Flow, Plto				
Adjusted Opposing Flow Rate, Vo				
Lost Time for Lane Group, tl				
Left Turns per Cycle: LTC=VltC/3600				
Opposing Flow per Lane, Per Cycle: Volc=VoC/3600fluo				
Opposing Platoon Ratio, Rpo (Table 9-2 or Eqn 9-7)				
gf=[Gexp(- a * (LTC ** b))]-tl, gf<=g				
Opposing Queue Ratio: qro=1-Rpo(go/C)				
gq=(4.943Volc**0.762)[(qro**1.061)-tl], gq<=g				
gu =g-gq if gq>=gf, =g-gf if gq<gf				
n=(gq-gf)/2, n>=0				
Ptho=1-Plto				
Pl*=Plt[1+{(N-1)g/(gf+gu/El1+4.24)))				
El1 (Figure 9-7)				
El2=(1-Ptho**n)/Plto, El2>=1.0				
fmin=2(1+Plt)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g][1/{1+Pl(El1-1)}], (min=fmin;max=1.00)				
flt=fm=[gf/g]+gdiff[1/{1+Plt(El2-1)}]				
+[gu/g][1/(1+Plt(El1-1)],(min=fmin;max=1.0) or flt=[fm+0.91(N-1)]/N**				
flt Primary				

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.

For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Adj. LT Vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Primary phase effective green, g				
Secondary phase effective green, gq				
(From Supplemental Permitted LT Worksheet), gu				
Cycle length, C 100.0 Red =(C-g-gq-gu), r				
Arrivals: v/(3600(max(X,1.0))), qa				
Primary ph. departures: s/3600, sp				
Secondary ph. departures: s(gq+gu)/(gu*3600), ss				
XPerm				
XProt				
XCase				
Queue at begining of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
Westbound								
Northbound								
Southbound								

Intersection Delay sec/veh Intersection LOS

ERROR MESSAGES

No errors to report.

HCS: Signals Release 3.1a

Inter:
Analyst: Howard Olien
Date: 5/4/99
E/W St: Osborn

City/St: Scottsdale
Proj #: Osborn Road Outfall
Period: 1999 Construction Peak Hour
N/S St: Scottsdale

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	1	1	0	1	1	0
LGConfig		LTR			LTR		L	TR		L	TR	
Volume	52	262	35	115	573	77	281	1405	187	320	1602	213
Lane Width		12.0			12.0		12.0	12.0		12.0	12.0	
RTOR Vol			5			10			10			10

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	P				NB	Left	P			
	Thru	P					Thru	P			
	Right	P					Right	P			
	Peds	X					Ped	X			
WB	Left	P				SB	Left	P			
	Thru	P					Thru	P			
	Right	P					Right	P			
	Peds	X					Ped	X			
NB	Right					EB	Right				
SB	Right					WB	Right				
Green		30.0						60.0			
Yellow		3.0						3.0			
All Red		2.0						2.0			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capcity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LTR	309	1031	1.24	0.300	166.0	F	166.0	F
Westbound								
LTR	360	1199	2.33	0.300	642.4	F	642.4	F
Northbound								
L	73	121	4.27	0.600				
TR	1067	1779	1.65	0.600	315.7	F		
Southbound								
L	73	121	4.88	0.600				
TR	1067	1779	1.88	0.600	419.6	F		

Intersection Delay = (sec/veh) Intersection LOS =

HCS: Signals Release 3.1a

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OPERATIONAL ANALYSIS

Intersection:
City/State: Scottsdale
Analyst: Howard Olien
Project No: Osborn Road Outfall
Time Period Analyzed: 1999 Construction Peak Hour
Date: 5/4/99
East/West Street Name: Osborn
North/South Street Name: Scottsdale

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	52	262	35	115	573	77	281	1405	187	320	1602	213
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PK 15 Vol	14	73	10	32	159	21	78	390	52	89	445	59
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat		1900			1900		1900	1900		1900	1900	
ParkExist												
NumPark												
% Heavy Veh	5	5	5	5	5	5	5	5	5	5	5	5
No. Lanes	0	1	0	0	1	0	1	1	0	1	1	0
LGConfig		LTR			LTR		L	TR		L	TR	
Lane Width		12.0			12.0		12.0	12.0		12.0	12.0	
RTOR Vol			5			10			10			10
Adj Flow		382			839		312	1758		356	2006	
%InSharedLn												
Prop Turns	0.15		0.09	0.15		0.09			0.11			0.11
NumPeds			0			0			0			0
NumBus		0			0		0	0		0	0	

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0			0.0		0.0	0.0		0.0	0.0	
Arriv. Type		3			3		3	3		3	3	
Unit Ext.		3.0			3.0		3.0	3.0		3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time		2.0			2.0		2.0	2.0		2.0	2.0	
Ext of g		2.0			2.0		2.0	2.0		2.0	2.0	
Ped Min g		0.0			0.0			0.0			0.0	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Ped	X		
WB Left	P				SB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Ped	X		
NB Right					EB Right			
SB Right					WB Right			
Green	30.0					60.0		
Yellow	3.0					3.0		
All Red	2.0					2.0		

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT WORKSHEET

Appr./ Movement	Mvt Volume	PHF	Flow Rate	No. Lanes	Lane Group	RTOR	Adjusted Flow Rate In Lane Grp	Prop. Left Turns	Prop. Right Turns
Eastbound									
Left	52	0.90	58	0					
Thru	262	0.90	291	1	LTR		382	0.15	0.09
Right	35	0.90	33	0		5			
Westbound									
Left	115	0.90	128	0					
Thru	573	0.90	637	1	LTR		839	0.15	0.09
Right	77	0.90	74	0		10			
Northbound									
Left	281	0.90	312	1	L		312		
Thru	1405	0.90	1561	1	TR		1758		0.11
Right	187	0.90	197	0		10			
Southbound									
Left	320	0.90	356	1	L		356		
Thru	1602	0.90	1780	1	TR		2006		0.11
Right	213	0.90	226	0		10			

* Value entered by user.

SATURATION FLOW ADJUSTMENT WORKSHEET

Appr/ Lane Group	Ideal Sat Flow	f W	f HV	f G	f P	f BB	f A	f LU	f RT	f LT	Adj Sat Flow
Eastbound							Sec LT Adj/LT Sat:		----		
LTR	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.888	0.642	1031

Westbound							Sec LT Adj/LT Sat:		----		
LTR	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.888	0.746	1199

Northbound							Sec LT Adj/LT Sat:				
L	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	----	0.067	121
TR	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.983	1.000	1779

Southbound							Sec LT Adj/LT Sat:				
L	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	----	0.067	121
TR	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.983	1.000	1779

CAPACITY ANALYSIS WORKSHEET

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Pri.								
Sec.								
Left								
Thru	LTR	382	1031		0.37	0.300	309	1.24
Right								
Westbound								
Pri.								
Sec.								
Left								
Thru	LTR	839	1199	#	0.70	0.300	360	2.33
Right								
Northbound								
Pri.								
Sec.								
Left	L	312	121		2.58	0.600	73	4.27
Thru	TR	1758	1779		0.99	0.600	1067	1.65
Right								
Southbound								
Pri.								
Sec.								
Left	L	356	121	#	2.94	0.600	73	4.88
Thru	TR	2006	1779		1.13	0.600	1067	1.88
Right								

Sum (v/s) critical = 3.64

Lost Time/Cycle, L = 10.00 sec Critical v/c(X) = 4.05

LEVEL OF SERVICE WORKSHEET

Appr/ Lane Grp	Ratios v/c	Ratios g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Incremental Del d2	Res Del d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound												
LTR	1.24	0.300	35.0	1.000	309	0.50	131.0	0.0	166.0	F	166.0	F
Westbound												
LTR	2.33	0.300	35.0	1.000	360	0.50	607.4	0.0	642.4	F	642.4	F
Northbound												
L	4.27	0.600	20.0	1.000	73	0.50		0.0				
TR	1.65	0.600	20.0	1.000	1067	0.50	295.7	0.0	315.7	F		
Southbound												
L	4.88	0.600	20.0	1.000	73	0.50		0.0				
TR	1.88	0.600	20.0	1.000	1067	0.50	399.6	0.0	419.6	F		

Intersection Delay = (sec/veh) Intersection LOS =

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

APPROACH	EB	WB	NB	SB
Cycle Length, C 100.0 sec				
Actual Green Time for Lane Group, G			60.0	60.0
Effective Green Time for Lane Group, g			60.00	60.00
Opposing Effective Green Time, go			60.0	60.0
Number of Lanes in Lane Group, N			1	1
Number of Opposing Lanes, No			1	1
Adjusted Left-Turn Flow Rate, Vlt			312	356
Proportion of Left Turns in Opposing Flow, Plto			0.00	0.00
Adjusted Opposing Flow Rate, Vo			2006	1758
Lost Time for Lane Group, tl			5.00	5.00
Left Turns per Cycle: LTC=VltC/3600			8.67	9.89
Opposing Flow per Lane, Per Cycle: Volc=VoC/3600fluo			55.72	48.83
Opposing Platoon Ratio, Rpo (Table 9-2 or Eqn 9-7)			1.00	1.00
gf=[Gexp(- a * (LTC ** b))]-tl, gf<=g			0.0	0.0
Opposing Queue Ratio: qro=1-Rpo(go/C)			0.40	0.40
gq=(4.943Volc**0.762)[(qro**1.061)-tl], gq<=g			60.00	60.00
gu =g-gq if gq>=gf, =g-gf if gq<gf			0.00	0.00
n=(gq-gf)/2, n>=0			30.00	30.00
Ptho=1-Plto			1.00	1.00
Pl*=Plt[1+{(N-1)g/(gf+gu/El1+4.24)))			1.00	1.00
El1 (Figure 9-7)			8.74	6.86
El2=(1-Ptho**n)/Plto, El2>=1.0			1.00	1.00
fmin=2(1+Plt)/g or fmin=2(1+Pl)/g			0.07	0.07
gdiff=max(gq-gf,0)			0.00	0.00
fm=[gf/g]+[gu/g][1/{1+Pl(El1-1)}], (min=fmin;max=1.00)			0.07	0.07
flt=fm=[gf/g]+gdiff[1/{1+Plt(El2-1)}] +[gu/g][1/(1+Plt(El1-1)],(min=fmin;max=1.0) or flt=[fm+0.91(N-1)]/N** flt			0.067	0.067

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

APPROACH	EB	WB	NB	SB
Cycle Length, C 100.0 sec				
Actual Green Time for Lane Group, G	30.0	30.0		
Effective Green Time for Lane Group, g	30.00	30.00		
Opposing Effective Green Time, go	30.0	30.0		
Number of Lanes in Lane Group, N	1	1		
Number of Opposing Lanes, No	1	1		
Adjusted Left-Turn Flow Rate, Vlt	58	128		
Proportion of Left Turns in Lane Group, Plt	0.15	0.15		
Proportion of Left Turns in Opposing Flow, Plto	0.15	0.15		
Adjusted Opposing Flow Rate, Vo	839	382		
Lost Time for Lane Group, tl	5.00	5.00		
Left Turns per Cycle: LTC=VltC/3600	1.61	3.56		
Opposing Flow per Lane, Per Cycle: Volc=VoC/3600fluo	23.31	10.61		
Opposing Platoon Ratio, Rpo (Table 9-2 or Eqn 9-7)	1.00	1.00		
gf=[Gexp(- a * (LTC ** b))]-tl, gf<=g	4.4	0.0		
Opposing Queue Ratio: qro=1-Rpo(go/C)	0.70	0.70		
gq=(4.943Volc**0.762)[(qro**1.061)-tl], gq<=g	30.00	15.48		
gu =g-gq if gq>=gf, =g-gf if gq<gf	0.00	14.52		
n=(gq-gf)/2, n>=0	12.80	7.74		
Ptho=1-Plto	0.85	0.85		
Pl*=Plt[1+{(N-1)g/(gf+gu/El1+4.24)))	0.15	0.15		
El1 (Figure 9-7)	3.20	2.04		
El2=(1-Ptho**n)/Plto, El2>=1.0	5.77	4.74		
fmin=2(1+Plt)/g or fmin=2(1+Pl)/g	0.08	0.08		
gdiff=max(gq-gf,0)	25.60	15.48		
fm=[gf/g]+[gu/g][1/{1+Pl(El1-1)}], (min=fmin;max=1.00)	0.64	0.75		
flt=fm=[gf/g]+gdiff[1/{1+Plt(El2-1)}]				
+[gu/g][1/(1+Plt(El1-1)],(min=fmin;max=1.0) or flt=[fm+0.91(N-1)]/N**				
flt Primary	0.642	0.746		

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Adj. LT Vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Primary phase effective green, g				
Secondary phase effective green, gq				
(From Supplemental Permitted LT Worksheet), gu				
Cycle length, C 100.0 Red =(C-g-gq-gu), r				
Arrivals: v/(3600(max(X,1.0))), qa				
Primary ph. departures: s/3600, sp				
Secondary ph. departures: s(gq+gu)/(gu*3600), ss				
XPerm				
XProt				
XCase				
Queue at begining of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
Westbound								
Northbound								
Southbound								

Intersection Delay sec/veh Intersection LOS

ERROR MESSAGES

No errors to report.

HCS: Signals Release 3.1a

Inter:
Analyst: Howard Olien
Date: 5/5/99
E/W St: Osborn

City/St: Scottsdale
Proj #: Osborn Road Outfall
Period: 1999 Peak Hour
N/S St: Civic Center

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	1	3	0	1	2	0
LGConfig	L	TR		L	TR		L	TR		L	TR	
Volume	63	316	42	138	693	92	86	427	57	98	487	65
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol			6			10			10			10

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Ped	X		
WB Left	P				SB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Ped	X		
NB Right					EB Right			
SB Right					WB Right			
Green	30.0					60.0		
Yellow	3.0					3.0		
All Red	2.0					2.0		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capcity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	72	241	0.97	0.300	133.1	F		
TR	1016	3385	0.38	0.300	28.8	C	44.6	D
Westbound								
L	245	816	0.62	0.300	41.6	D		
TR	1015	3384	0.85	0.300	41.6	D	41.6	D
Northbound								
L	433	722	0.22	0.600	10.4	B		
TR	2920	4867	0.18	0.600	9.1	A	9.3	A
Southbound								
L	485	808	0.22	0.600	10.3	B		
TR	2032	3386	0.30	0.600	10.1	B	10.1	B

Intersection Delay = 27.0 (sec/veh) Intersection LOS = C

HCS: Signals Release 3.1a

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OPERATIONAL ANALYSIS

Intersection:	
City/State:	Scottsdale
Analyst:	Howard Olien
Project No:	Osborn Road Outfall
Time Period Analyzed:	1999 Peak Hour
Date:	5/5/99
East/West Street Name:	Osborn
North/South Street Name:	Civic Center

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	63	316	42	138	693	92	86	427	57	98	487	65
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PK 15 Vol	18	88	12	38	193	26	24	119	16	27	135	18
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900		1900	1900		1900	1900		1900	1900	
ParkExist												
NumPark												
% Heavy Veh	5	5	5	5	5	5	5	5	5	5	5	5
No. Lanes	1	2	0	1	2	0	1	3	0	1	2	0
LGConfig	L	TR		L	TR		L	TR		L	TR	
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol			6			10			10			10
Adj Flow	70	391		153	861		96	526		109	602	
%InSharedLn												
Prop Turns			0.10			0.11			0.10			0.10
NumPeds			0			0			0			0
NumBus	0	0		0	0		0	0		0	0	

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Arriv. Type	3	3		3	3		3	3		3	3	
Unit Ext.	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Ext of g	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Ped Min g		0.0			0.0			0.0			0.0	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Ped	X		
WB Left	P				SB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Ped	X		
NB Right					EB Right			
SB Right					WB Right			
Green	30.0					60.0		
Yellow	3.0					3.0		
All Red	2.0					2.0		

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT WORKSHEET

Appr./ Movement	Mvt Volume	PHF	Flow Rate	No. Lanes	Lane Group	RTOR	Adjusted Flow Rate In Lane Grp	Prop. Left Turns	Prop. Right Turns
Eastbound									
Left	63	0.90	70	1	L		70		
Thru	316	0.90	351	2	TR		391		0.10
Right	42	0.90	40	0		6			
Westbound									
Left	138	0.90	153	1	L		153		
Thru	693	0.90	770	2	TR		861		0.11
Right	92	0.90	91	0		10			
Northbound									
Left	86	0.90	96	1	L		96		
Thru	427	0.90	474	3	TR		526		0.10
Right	57	0.90	52	0		10			
Southbound									
Left	98	0.90	109	1	L		109		
Thru	487	0.90	541	2	TR		602		0.10
Right	65	0.90	61	0		10			

* Value entered by user.

SATURATION FLOW ADJUSTMENT WORKSHEET

Appr/ Lane Group	Ideal Sat Flow	f W	f HV	f G	f P	f BB	f A	f LU	f RT	f LT	Adj Sat Flow
Eastbound							Sec LT Adj/LT Sat:				
L	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	----	0.133	241
TR	1900	1.000	0.952	1.000	1.000	1.000	1.00	0.95	0.985	1.000	3385

Westbound							Sec LT Adj/LT Sat:				
L	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	----	0.451	816
TR	1900	1.000	0.952	1.000	1.000	1.000	1.00	0.95	0.984	1.000	3384

Northbound							Sec LT Adj/LT Sat:				
L	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	----	0.399	722
TR	1900	1.000	0.952	1.000	1.000	1.000	1.00	0.91	0.985	1.000	4867

Southbound							Sec LT Adj/LT Sat:				
L	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	----	0.447	808
TR	1900	1.000	0.952	1.000	1.000	1.000	1.00	0.95	0.985	1.000	3386

CAPACITY ANALYSIS WORKSHEET

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Pri.							
Sec.							
Left	L	70	241	# 0.29	0.300	72	0.97
Thru	TR	391	3385	0.12	0.300	1016	0.38
Right							
Westbound							
Pri.							
Sec.							
Left	L	153	816	0.19	0.300	245	0.62
Thru	TR	861	3384	0.25	0.300	1015	0.85
Right							
Northbound							
Pri.							
Sec.							
Left	L	96	722	0.13	0.600	433	0.22
Thru	TR	526	4867	0.11	0.600	2920	0.18
Right							
Southbound							
Pri.							
Sec.							
Left	L	109	808	0.13	0.600	485	0.22
Thru	TR	602	3386	# 0.18	0.600	2032	0.30
Right							

Sum (v/s) critical = 0.47

Lost Time/Cycle, L = 10.00 sec Critical v/c(X) = 0.52

LEVEL OF SERVICE WORKSHEET

Appr/ Lane Grp	Ratios v/c	Ratios g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Incremental Del d2	Res Del d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound												
L	0.97	0.300	34.6	1.000	72	0.50	98.5	0.0	133.1	F		
TR	0.38	0.300	27.7	1.000	1016	0.50	1.1	0.0	28.8	C	44.6	D
Westbound												
L	0.62	0.300	30.1	1.000	245	0.50	11.4	0.0	41.6	D		
TR	0.85	0.300	32.9	1.000	1015	0.50	8.8	0.0	41.6	D	41.6	D
Northbound												
L	0.22	0.600	9.2	1.000	433	0.50	1.2	0.0	10.4	B		
TR	0.18	0.600	9.0	1.000	2920	0.50	0.1	0.0	9.1	A	9.3	A
Southbound												
L	0.22	0.600	9.2	1.000	485	0.50	1.1	0.0	10.3	B		
TR	0.30	0.600	9.7	1.000	2032	0.50	0.4	0.0	10.1	B	10.1	B

Intersection Delay = 27.0 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

APPROACH	EB	WB	NB	SB
Cycle Length, C 100.0 sec				
Actual Green Time for Lane Group, G	30.0	30.0	60.0	60.0
Effective Green Time for Lane Group, g	30.00	30.00	60.00	60.00
Opposing Effective Green Time, go	30.0	30.0	60.0	60.0
Number of Lanes in Lane Group, N	1	1	1	1
Number of Opposing Lanes, No	2	2	2	3
Adjusted Left-Turn Flow Rate, Vlt	70	153	96	109
Proportion of Left Turns in Opposing Flow, Plto	0.00	0.00	0.00	0.00
Adjusted Opposing Flow Rate, Vo	861	391	602	526
Lost Time for Lane Group, tl	5.00	5.00	5.00	5.00
Left Turns per Cycle: LTC=VltC/3600	1.94	4.25	2.67	3.03
Opposing Flow per Lane, Per Cycle: Volc=VoC/3600fluo	12.59	5.72	8.80	5.35
Opposing Platoon Ratio, Rpo (Table 9-2 or Eqn 9-7)	1.00	1.00	1.00	1.00
gf=[Gexp(- a * (LTC ** b))]-tl, gf<=g	0.0	0.0	0.0	0.0
Opposing Queue Ratio: qro=1-Rpo(go/C)	0.70	0.70	0.40	0.40
gq=(4.943Volc**0.762)[(qro**1.061)-tl], gq<=g	18.55	4.04	3.55	0.00
gu =g-gq if gq>=gf, =g-gf if gq<gf	11.45	25.96	56.45	60.00
n=(gq-gf)/2, n>=0	9.28	2.02	1.77	0.00
Ptho=1-Plto	1.00	1.00	1.00	1.00
Pl*=Plt[1+{(N-1)g/(gf+gu/El1+4.24)))	1.00	1.00	1.00	1.00
El1 (Figure 9-7)	3.04	1.92	2.36	2.24
El2=(1-Ptho**n)/Plto, El2>=1.0	1.00	1.00	1.00	1.00
fmin=2(1+Plt)/g or fmin=2(1+Pl)/g	0.13	0.13	0.07	0.07
gdiff=max(gq-gf,0)	0.00	0.00	0.00	0.00
fm=[gf/g]+[gu/g][1/{1+Pl(El1-1)}], (min=fmin;max=1.00)	0.13	0.45	0.40	0.45
flt=fm=[gf/g]+gdiff[1/{1+Plt(El2-1)}] +[gu/g][1/(1+Plt(El1-1)],(min=fmin;max=1.0) or flt=[fm+0.91(N-1)]/N**				
flt	0.133	0.451	0.399	0.447

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

APPROACH	EB	WB	NB	SB
Cycle Length, C 100.0 sec				
Actual Green Time for Lane Group, G				
Effective Green Time for Lane Group, g				
Opposing Effective Green Time, go				
Number of Lanes in Lane Group, N				
Number of Opposing Lanes, No				
Adjusted Left-Turn Flow Rate, Vlt				
Proportion of Left Turns in Lane Group, Plt				
Proportion of Left Turns in Opposing Flow, Plto				
Adjusted Opposing Flow Rate, Vo				
Lost Time for Lane Group, tl				
Left Turns per Cycle: LTC=VltC/3600				
Opposing Flow per Lane, Per Cycle: Volc=VoC/3600fluo				
Opposing Platoon Ratio, Rpo (Table 9-2 or Eqn 9-7)				
gf=[Gexp(- a * (LTC ** b))]-tl, gf<=g				
Opposing Queue Ratio: qro=1-Rpo(go/C)				
gq=(4.943Volc**0.762)[(qro**1.061)-tl], gq<=g				
gu =g-gq if gq>=gf, =g-gf if gq<gf				
n=(gq-gf)/2, n>=0				
Ptho=1-Plto				
Pl*=Plt[1+{(N-1)g/(gf+gu/El1+4.24))}				
El1 (Figure 9-7)				
El2=(1-Ptho**n)/Plto, El2>=1.0				
fmin=2(1+Plt)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g][1/{1+Pl(El1-1)}], (min=fmin;max=1.00)				
flt=fm=[gf/g]+gdiff[1/{1+Plt(El2-1)}]				
+[gu/g][1/(1+Plt(El1-1)],(min=fmin;max=1.0) or flt=[fm+0.91(N-1)]/N**				
flt Primary				

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.

For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Adj. LT Vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Primary phase effective green, g				
Secondary phase effective green, gq				
(From Supplemental Permitted LT Worksheet), gu				
Cycle length, C 100.0 Red =(C-g-gq-gu), r				
Arrivals: v/(3600(max(X,1.0))), qa				
Primary ph. departures: s/3600, sp				
Secondary ph. departures: s(gq+gu)/(gu*3600), ss				
XPerm				
XProt				
XCase				
Queue at begining of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
Westbound								
Northbound								
Southbound								

Intersection Delay 27.0 sec/veh Intersection LOS C

ERROR MESSAGES

No errors to report.

HCS: Signals Release 3.1a

Inter:
Analyst: Howard Olien
Date: 5/5/99
E/W St: Osborn

City/St: Scottsdale
Proj #: Osborn Road Outfall
Period: 1999 Construction Peak Hour
N/S St: Civic Center

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	0	1	0	0	1	0
LGConfig		LTR			LTR			LTR			LTR	
Volume	63	316	42	138	693	92	86	427	57	98	487	65
Lane Width		12.0			12.0			12.0			12.0	
RTOR Vol			6			10			10			10

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Ped	X		
WB Left	P				SB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Ped	X		
NB Right					EB Right			
SB Right					WB Right			
Green	30.0					60.0		
Yellow	3.0					3.0		
All Red	2.0					2.0		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capcity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LTR	298	994	1.55	0.300	297.2	F	297.2	F
Westbound								
LTR	338	1127	3.00	0.300	942.9	F	942.9	F
Northbound								
LTR	781	1301	0.80	0.600	23.6	C	23.6	C
Southbound								
LTR	794	1324	0.90	0.600	32.1	C	32.1	C

Intersection Delay = 402.6 (sec/veh) Intersection LOS = F

HCS: Signals Release 3.1a

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OPERATIONAL ANALYSIS

Intersection:	
City/State:	Scottsdale
Analyst:	Howard Olien
Project No:	Osborn Road Outfall
Time Period Analyzed:	1999 Construction Peak Hour
Date:	5/5/99
East/West Street Name:	Osborn
North/South Street Name:	Civic Center

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	63	316	42	138	693	92	86	427	57	98	487	65
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PK 15 Vol	18	88	12	38	193	26	24	119	16	27	135	18
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat		1900			1900			1900			1900	
ParkExist												
NumPark												
% Heavy Veh	5	5	5	5	5	5	5	5	5	5	5	5
No. Lanes	0	1	0	0	1	0	0	1	0	0	1	0
LGConfig		LTR			LTR			LTR			LTR	
Lane Width		12.0			12.0			12.0			12.0	
RTOR Vol			6			10			10			10
Adj Flow		461			1014			622			711	
%InSharedLn												
Prop Turns	0.15		0.09	0.15		0.09	0.15		0.08	0.15		0.09
NumPeds			0			0			0			0
NumBus		0			0			0			0	

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0			0.0			0.0			0.0	
Arriv. Type		3			3			3			3	
Unit Ext.		3.0			3.0			3.0			3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time		2.0			2.0			2.0			2.0	
Ext of g		2.0			2.0			2.0			2.0	
Ped Min g		0.0			0.0			0.0			0.0	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P							
Thru	P							
Right	P							
Peds	X							
WB Left	P							
Thru	P							
Right	P							
Peds	X							
NB Right								
SB Right								
Green	30.0				60.0			
Yellow	3.0				3.0			
All Red	2.0				2.0			

NB	Left	P	
	Thru	P	
	Right	P	
	Ped	X	
SB	Left	P	
	Thru	P	
	Right	P	
	Ped	X	
EB	Right		
WB	Right		

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT WORKSHEET

Appr./ Movement	Mvt Volume	PHF	Flow Rate	No. Lanes	Lane Group	RTOR	Adjusted Flow Rate In Lane Grp	Prop. Left Turns	Prop. Right Turns
Eastbound									
Left	63	0.90	70	0					
Thru	316	0.90	351	1	LTR		461	0.15	0.09
Right	42	0.90	40	0		6			
Westbound									
Left	138	0.90	153	0					
Thru	693	0.90	770	1	LTR		1014	0.15	0.09
Right	92	0.90	91	0		10			
Northbound									
Left	86	0.90	96	0					
Thru	427	0.90	474	1	LTR		622	0.15	0.08
Right	57	0.90	52	0		10			
Southbound									
Left	98	0.90	109	0					
Thru	487	0.90	541	1	LTR		711	0.15	0.09
Right	65	0.90	61	0		10			

* Value entered by user.

SATURATION FLOW ADJUSTMENT WORKSHEET

Appr/ Lane Group	Ideal Sat Flow	f W	f HV	f G	f P	f BB	f A	f LU	f RT	f LT	Adj Sat Flow
Eastbound									Sec LT Adj/LT Sat: ----		
LTR	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.888	0.618 ----	994
Westbound									Sec LT Adj/LT Sat: ----		
LTR	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.888	0.702 ----	1127
Northbound									Sec LT Adj/LT Sat: ----		
LTR	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.889	0.809 ----	1301
Southbound									Sec LT Adj/LT Sat: ----		
LTR	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.888	0.824 ----	1324

CAPACITY ANALYSIS WORKSHEET

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Pri.								
Sec.								
Left								
Thru	LTR	461	994		0.46	0.300	298	1.55
Right								
Westbound								
Pri.								
Sec.								
Left								
Thru	LTR	1014	1127	#	0.90	0.300	338	3.00
Right								
Northbound								
Pri.								
Sec.								
Left								
Thru	LTR	622	1301		0.48	0.600	781	0.80
Right								
Southbound								
Pri.								
Sec.								
Left								
Thru	LTR	711	1324	#	0.54	0.600	794	0.90
Right								

Sum (v/s) critical = 1.44

Lost Time/Cycle, L = 10.00 sec Critical v/c(X) = 1.60

LEVEL OF SERVICE WORKSHEET

Appr/ Lane Grp	Ratios v/c	Ratios g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Incremental Del d2	Res Del d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound												
LTR	1.55	0.300	35.0	1.000	298	0.50	262.2	0.0	297.2	F	297.2	F
Westbound												
LTR	3.00	0.300	35.0	1.000	338	0.50	907.9	0.0	942.9	F	942.9	F
Northbound												
LTR	0.80	0.600	15.3	1.000	781	0.50	8.3	0.0	23.6	C	23.6	C
Southbound												
LTR	0.90	0.600	17.3	1.000	794	0.50	14.8	0.0	32.1	C	32.1	C

Intersection Delay = 402.6 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

APPROACH	EB	WB	NB	SB
Cycle Length, C 100.0 sec				
Actual Green Time for Lane Group, G				
Effective Green Time for Lane Group, g				
Opposing Effective Green Time, go				
Number of Lanes in Lane Group, N				
Number of Opposing Lanes, No				
Adjusted Left-Turn Flow Rate, Vlt				
Proportion of Left Turns in Opposing Flow, Plto				
Adjusted Opposing Flow Rate, Vo				
Lost Time for Lane Group, tl				
Left Turns per Cycle: LTC=VltC/3600				
Opposing Flow per Lane, Per Cycle: Volc=VoC/3600fluo				
Opposing Platoon Ratio, Rpo (Table 9-2 or Eqn 9-7)				
gf=[Gexp(- a * (LTC ** b))]-tl, gf<=g				
Opposing Queue Ratio: qro=1-Rpo(go/C)				
gq=(4.943Volc**0.762)[(qro**1.061)-tl], gq<=g				
gu =g-gq if gq>=gf, =g-gf if gq<gf				
n=(gq-gf)/2, n>=0				
Ptho=1-Plto				
Pl*=Plt[1+{(N-1)g/(gf+gu/El1+4.24)))				
El1 (Figure 9-7)				
El2=(1-Ptho**n)/Plto, El2>=1.0				
fmin=2(1+Plt)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g][1/{1+Pl(El1-1)}], (min=fmin;max=1.00)				
flt=fm=[gf/g]+gdiff[1/{1+Plt(El2-1)}]				
+[gu/g][1/(1+Plt(El1-1)],(min=fmin;max=1.0) or flt=[fm+0.91(N-1)]/N**				
flt				

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.

For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

APPROACH	EB	WB	NB	SB
Cycle Length, C 100.0 sec				
Actual Green Time for Lane Group, G	30.0	30.0	60.0	60.0
Effective Green Time for Lane Group, g	30.00	30.00	60.00	60.00
Opposing Effective Green Time, go	30.0	30.0	60.0	60.0
Number of Lanes in Lane Group, N	1	1	1	1
Number of Opposing Lanes, No	1	1	1	1
Adjusted Left-Turn Flow Rate, Vlt	70	153	96	109
Proportion of Left Turns in Lane Group, Plt	0.15	0.15	0.15	0.15
Proportion of Left Turns in Opposing Flow, Plto	0.15	0.15	0.15	0.15
Adjusted Opposing Flow Rate, Vo	1014	461	711	622
Lost Time for Lane Group, tl	5.00	5.00	5.00	5.00
Left Turns per Cycle: LTC=VltC/3600	1.94	4.25	2.67	3.03
Opposing Flow per Lane, Per Cycle: Volc=VoC/3600fluo	28.17	12.81	19.75	17.28
Opposing Platoon Ratio, Rpo (Table 9-2 or Eqn 9-7)	1.00	1.00	1.00	1.00
gf=[Gexp(- a * (LTC ** b))]-tl, gf<=g	3.1	0.0	7.2	5.7
Opposing Queue Ratio: qro=1-Rpo(go/C)	0.70	0.70	0.40	0.40
gq=(4.943Volc**0.762)[(qro**1.061)-tl], gq<=g	30.00	18.63	13.16	11.40
gu =g-gq if gq>=gf, =g-gf if gq<gf	0.00	11.37	46.84	48.60
n=(gq-gf)/2, n>=0	13.44	9.32	2.98	2.86
Ptho=1-Plto	0.85	0.85	0.85	0.85
Pl*=Plt[1+{(N-1)g/(gf+gu/El1+4.24))]	0.15	0.15	0.15	0.15
El1 (Figure 9-7)	3.78	2.21	2.83	2.59
El2=(1-Ptho**n)/Plto, El2>=1.0	5.89	5.17	2.55	2.47
fmin=2(1+Plt)/g or fmin=2(1+Pl)/g	0.08	0.08	0.04	0.04
gdiff=max(gq-gf,0)	26.88	18.63	5.97	5.72
fm=[gf/g]+[gu/g][1/{1+Pl(El1-1)}], (min=fmin;max=1.00)	0.62	0.70	0.81	0.82
flt=fm=[gf/g]+gdiff[1/{1+Plt(El2-1)}] +[gu/g][1/(1+Plt(El1-1)],(min=fmin;max=1.0) or flt=[fm+0.91(N-1)]/N**				
flt Primary	0.618	0.702	0.809	0.824

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Adj. LT Vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Primary phase effective green, g				
Secondary phase effective green, gq				
(From Supplemental Permitted LT Worksheet), gu				
Cycle length, C 100.0 Red =(C-g-gq-gu), r				
Arrivals: v/(3600(max(X,1.0))), qa				
Primary ph. departures: s/3600, sp				
Secondary ph. departures: s(gq+gu)/(gu*3600), ss				
XPerm				
XProt				
XCase				
Queue at begining of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
Westbound								
Northbound								
Southbound								

Intersection Delay 402.6 sec/veh Intersection LOS F

ERROR MESSAGES

No errors to report.

HCS: Signals Release 3.1a

Inter:
Analyst: Howard Olien
Date: 5/5/99
E/W St: Osborn

City/St: Scottsdale
Proj #: Osborn Road Outfall
Period: 1999 Peak Hour
N/S St: Miller

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	1	1	0	1	1	0
LGConfig	L	TR		L	TR		L	TR		L	TR	
Volume	63	316	42	147	738	98	114	573	76	132	660	88
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol			6			10			10			10

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Ped	X		
WB Left	P				SB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Ped	X		
NB Right					EB Right			
SB Right					WB Right			
Green	30.0					60.0		
Yellow	3.0					3.0		
All Red	2.0					2.0		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capcity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	72	241	0.97	0.300	133.1	F		
TR	1016	3385	0.38	0.300	28.8	C	44.6	D
Westbound								
L	245	816	0.67	0.300	44.0	D		
TR	1015	3383	0.90	0.300	46.5	D	46.2	D
Northbound								
L	203	339	0.63	0.600	26.5	C		
TR	1069	1782	0.66	0.600	16.6	B	18.1	B
Southbound								
L	278	464	0.53	0.600	18.8	B		
TR	1069	1781	0.77	0.600	20.1	C	19.9	B

Intersection Delay = 31.3 (sec/veh) Intersection LOS = C

HCS: Signals Release 3.1a

Howard Olien
Parsons Brinckerhoff
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OPERATIONAL ANALYSIS

Intersection:	
City/State:	Scottsdale
Analyst:	Howard Olien
Project No:	Osborn Road Outfall
Time Period Analyzed:	1999 Peak Hour
Date:	5/5/99
East/West Street Name:	Osborn
North/South Street Name:	Miller

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	63	316	42	147	738	98	114	573	76	132	660	88
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PK 15 Vol	18	88	12	41	205	27	32	159	21	37	183	24
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900		1900	1900		1900	1900		1900	1900	
ParkExist												
NumPark												
% Heavy Veh	5	5	5	5	5	5	5	5	5	5	5	5
No. Lanes	1	2	0	1	2	0	1	1	0	1	1	0
LGConfig	L	TR		L	TR		L	TR		L	TR	
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol			6			10			10			10
Adj Flow	70	391		163	918		127	710		147	820	
%InSharedLn												
Prop Turns			0.10			0.11			0.10			0.11
NumPeds			0			0			0			0
NumBus	0	0		0	0		0	0		0	0	

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Arriv. Type	3	3		3	3		3	3		3	3	
Unit Ext.	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Ext of g	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Ped Min g		0.0			0.0			0.0			0.0	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P							
EB Thru	P							
EB Right	P							
EB Peds	X							
WB Left	P							
WB Thru	P							
WB Right	P							
WB Peds	X							
NB Right					EB Right			
SB Right					WB Right			
Green	30.0				60.0			
Yellow	3.0				3.0			
All Red	2.0				2.0			

NB Left					P			
NB Thru					P			
NB Right					P			
NB Ped					X			
SB Left					P			
SB Thru					P			
SB Right					P			
SB Ped					X			

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT WORKSHEET

Appr./ Movement	Mvt Volume	PHF	Flow Rate	No. Lanes	Lane Group	RTOR	Adjusted Flow Rate In Lane Grp	Prop. Left Turns	Prop. Right Turns
Eastbound									
Left	63	0.90	70	1	L		70		
Thru	316	0.90	351	2	TR		391		0.10
Right	42	0.90	40	0		6			
Westbound									
Left	147	0.90	163	1	L		163		
Thru	738	0.90	820	2	TR		918		0.11
Right	98	0.90	98	0		10			
Northbound									
Left	114	0.90	127	1	L		127		
Thru	573	0.90	637	1	TR		710		0.10
Right	76	0.90	73	0		10			
Southbound									
Left	132	0.90	147	1	L		147		
Thru	660	0.90	733	1	TR		820		0.11
Right	88	0.90	87	0		10			

* Value entered by user.

SATURATION FLOW ADJUSTMENT WORKSHEET

Appr/ Lane Group	Ideal Sat Flow	f W	f HV	f G	f P	f BB	f A	f LU	f RT	f LT	Adj Sat Flow
Eastbound							Sec LT Adj/LT Sat:				
L	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	----	0.133	241
TR	1900	1.000	0.952	1.000	1.000	1.000	1.00	0.95	0.985	1.000	3385

Westbound							Sec LT Adj/LT Sat:				
L	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	----	0.451	816
TR	1900	1.000	0.952	1.000	1.000	1.000	1.00	0.95	0.984	1.000	3383

Northbound							Sec LT Adj/LT Sat:				
L	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	----	0.187	339
TR	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.985	1.000	1782

Southbound							Sec LT Adj/LT Sat:				
L	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	----	0.257	464
TR	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.984	1.000	1781

CAPACITY ANALYSIS WORKSHEET

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Pri.								
Sec.								
Left	L	70	241	#	0.29	0.300	72	0.97
Thru	TR	391	3385		0.12	0.300	1016	0.38
Right								
Westbound								
Pri.								
Sec.								
Left	L	163	816		0.20	0.300	245	0.67
Thru	TR	918	3383		0.27	0.300	1015	0.90
Right								
Northbound								
Pri.								
Sec.								
Left	L	127	339		0.37	0.600	203	0.63
Thru	TR	710	1782		0.40	0.600	1069	0.66
Right								
Southbound								
Pri.								
Sec.								
Left	L	147	464		0.32	0.600	278	0.53
Thru	TR	820	1781	#	0.46	0.600	1069	0.77
Right								

Sum (v/s) critical = 0.75

Lost Time/Cycle, L = 10.00 sec Critical v/c(X) = 0.83

LEVEL OF SERVICE WORKSHEET

Appr/ Lane Grp	Ratios v/c	Ratios g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Incremental Del d2	Res Del d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound												
L	0.97	0.300	34.6	1.000	72	0.50	98.5	0.0	133.1	F		
TR	0.38	0.300	27.7	1.000	1016	0.50	1.1	0.0	28.8	C	44.6	D
Westbound												
L	0.67	0.300	30.6	1.000	245	0.50	13.4	0.0	44.0	D		
TR	0.90	0.300	33.6	1.000	1015	0.50	12.9	0.0	46.5	D	46.2	D
Northbound												
L	0.63	0.600	12.8	1.000	203	0.50	13.7	0.0	26.5	C		
TR	0.66	0.600	13.3	1.000	1069	0.50	3.3	0.0	16.6	B	18.1	B
Southbound												
L	0.53	0.600	11.7	1.000	278	0.50	7.0	0.0	18.8	B		
TR	0.77	0.600	14.8	1.000	1069	0.50	5.3	0.0	20.1	C	19.9	B

Intersection Delay = 31.3 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

APPROACH	EB	WB	NB	SB
Cycle Length, C 100.0 sec				
Actual Green Time for Lane Group, G	30.0	30.0	60.0	60.0
Effective Green Time for Lane Group, g	30.00	30.00	60.00	60.00
Opposing Effective Green Time, go	30.0	30.0	60.0	60.0
Number of Lanes in Lane Group, N	1	1	1	1
Number of Opposing Lanes, No	2	2	1	1
Adjusted Left-Turn Flow Rate, Vlt	70	163	127	147
Proportion of Left Turns in Opposing Flow, Plto	0.00	0.00	0.00	0.00
Adjusted Opposing Flow Rate, Vo	918	391	820	710
Lost Time for Lane Group, tl	5.00	5.00	5.00	5.00
Left Turns per Cycle: LTC=VltC/3600	1.94	4.53	3.53	4.08
Opposing Flow per Lane, Per Cycle: Volc=VoC/3600fluo	13.42	5.72	22.78	19.72
Opposing Platoon Ratio, Rpo (Table 9-2 or Eqn 9-7)	1.00	1.00	1.00	1.00
gf=[Gexp(- a * (LTC ** b))]-tl, gf<=g	0.0	0.0	0.0	0.0
Opposing Queue Ratio: qro=1-Rpo(go/C)	0.70	0.70	0.40	0.40
gq=(4.943Volc**0.762)[(qro**1.061)-tl], gq<=g	20.68	4.04	28.47	21.06
gu =g-gq if gq>=gf, =g-gf if gq<gf	9.32	25.96	31.53	38.94
n=(gq-gf)/2, n>=0	10.34	2.02	14.23	10.53
Ptho=1-Plto	1.00	1.00	1.00	1.00
Pl*=Plt[1+{(N-1)g/(gf+gu/El1+4.24))}	1.00	1.00	1.00	1.00
El1 (Figure 9-7)	3.22	1.92	2.80	2.53
El2=(1-Ptho**n)/Plto, El2>=1.0	1.00	1.00	1.00	1.00
fmin=2(1+Plt)/g or fmin=2(1+Pl)/g	0.13	0.13	0.07	0.07
gdiff=max(gq-gf,0)	0.00	0.00	0.00	0.00
fm=[gf/g]+[gu/g][1/{1+Pl(El1-1)}], (min=fmin;max=1.00)	0.13	0.45	0.19	0.26
flt=fm=[gf/g]+gdiff[1/{1+Plt(El2-1)}] +[gu/g][1/(1+Plt(El1-1)],(min=fmin;max=1.0) or flt=[fm+0.91(N-1)]/N**				
flt	0.133	0.451	0.187	0.257

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

APPROACH	EB	WB	NB	SB
Cycle Length, C 100.0 sec				
Actual Green Time for Lane Group, G				
Effective Green Time for Lane Group, g				
Opposing Effective Green Time, go				
Number of Lanes in Lane Group, N				
Number of Opposing Lanes, No				
Adjusted Left-Turn Flow Rate, Vlt				
Proportion of Left Turns in Lane Group, Plt				
Proportion of Left Turns in Opposing Flow, Plto				
Adjusted Opposing Flow Rate, Vo				
Lost Time for Lane Group, tl				
Left Turns per Cycle: LTC=VltC/3600				
Opposing Flow per Lane, Per Cycle: Volc=VoC/3600fluo				
Opposing Platoon Ratio, Rpo (Table 9-2 or Eqn 9-7)				
gf=[Gexp(- a * (LTC ** b))]-tl, gf<=g				
Opposing Queue Ratio: qro=1-Rpo(go/C)				
gq=(4.943Volc**0.762)[(qro**1.061)-tl], gq<=g				
gu =g-gq if gq>=gf, =g-gf if gq<gf				
n=(gq-gf)/2, n>=0				
Ptho=1-Plto				
Pl*=Plt[1+{(N-1)g/(gf+gu/El1+4.24))}				
El1 (Figure 9-7)				
El2=(1-Ptho**n)/Plto, El2>=1.0				
fmin=2(1+Plt)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g][1/{1+Pl(El1-1)}], (min=fmin;max=1.00)				
flt=fm=[gf/g]+gdiff[1/{1+Plt(El2-1)}]				
+[gu/g][1/(1+Plt(El1-1)],(min=fmin;max=1.0) or flt=[fm+0.91(N-1)]/N**				
flt Primary				

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.

For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Adj. LT Vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Primary phase effective green, g				
Secondary phase effective green, gq				
(From Supplemental Permitted LT Worksheet), gu				
Cycle length, C 100.0 Red =(C-g-gq-gu), r				
Arrivals: v/(3600(max(X,1.0))), qa				
Primary ph. departures: s/3600, sp				
Secondary ph. departures: s(gq+gu)/(gu*3600), ss				
XPerm				
XProt				
XCase				
Queue at begining of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
Westbound								
Northbound								
Southbound								

Intersection Delay 31.3 sec/veh Intersection LOS C

ERROR MESSAGES

No errors to report.

HCS: Signals Release 3.1a

Inter: Miller/Osborn
Analyst: Howard Olien
Date: 5/5/99
E/W St: Osborn

City/St: Scottsdale
Proj #: Osborn Road Outfall
Period: 1999 Construction Peak Hour
N/S St: Miller

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	0	1	0	0	1	0
LGConfig		LTR			LTR			LTR			LTR	
Volume	63	316	42	147	738	98	114	573	76	132	660	88
Lane Width		12.0			12.0			12.0			12.0	
RTOR Vol			6			10			10			10

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Ped	X		
WB Left	P				SB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Ped	X		
NB Right					EB Right			
SB Right					WB Right			
Green	30.0					60.0		
Yellow	3.0					3.0		
All Red	2.0					2.0		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capcity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LTR	298	993	1.55	0.300	297.2	F	297.2	F
Westbound								
LTR	338	1127	3.20	0.300				
Northbound								
LTR	694	1157	1.21	0.600	126.0	F	126.0	F
Southbound								
LTR	715	1191	1.35	0.600	187.7	F	187.7	F

Intersection Delay = (sec/veh) Intersection LOS =

HCS: Signals Release 3.1a

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OPERATIONAL ANALYSIS

Intersection:	Miller/Osborn
City/State:	Scottsdale
Analyst:	Howard Olien
Project No:	Osborn Road Outfall
Time Period Analyzed:	1999 Construction Peak Hour
Date:	5/5/99
East/West Street Name:	Osborn
North/South Street Name:	Miller

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	63	316	42	147	738	98	114	573	76	132	660	88
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PK 15 Vol	18	88	12	41	205	27	32	159	21	37	183	24
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat		1900			1900			1900			1900	
ParkExist												
NumPark												
% Heavy Veh	5	5	5	5	5	5	5	5	5	5	5	5
No. Lanes	0	1	0	0	1	0	0	1	0	0	1	0
LGConfig		LTR			LTR			LTR			LTR	
Lane Width		12.0			12.0			12.0			12.0	
RTOR Vol			6			10			10			10
Adj Flow		461			1081			837			967	
%InSharedLn												
Prop Turns	0.15		0.09	0.15		0.09	0.15		0.09	0.15		0.09
NumPeds			0			0			0			0
NumBus		0			0			0			0	

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0			0.0			0.0			0.0	
Arriv. Type		3			3			3			3	
Unit Ext.		3.0			3.0			3.0			3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time		2.0			2.0			2.0			2.0	
Ext of g		2.0			2.0			2.0			2.0	
Ped Min g		0.0			0.0			0.0			0.0	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Ped	X		
WB Left	P				SB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Ped	X		
NB Right					EB Right			
SB Right					WB Right			
Green	30.0					60.0		
Yellow	3.0					3.0		
All Red	2.0					2.0		

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT WORKSHEET

Appr./ Movement	Mvt Volume	PHF	Flow Rate	No. Lanes	Lane Group	RTOR	Adjusted Flow Rate In Lane Grp	Prop. Left Turns	Prop. Right Turns
Eastbound									
Left	63	0.90	70	0					
Thru	316	0.90	351	1	LTR		461	0.15	0.09
Right	42	0.90	40	0		6			
Westbound									
Left	147	0.90	163	0					
Thru	738	0.90	820	1	LTR		1081	0.15	0.09
Right	98	0.90	98	0		10			
Northbound									
Left	114	0.90	127	0					
Thru	573	0.90	637	1	LTR		837	0.15	0.09
Right	76	0.90	73	0		10			
Southbound									
Left	132	0.90	147	0					
Thru	660	0.90	733	1	LTR		967	0.15	0.09
Right	88	0.90	87	0		10			

* Value entered by user.

SATURATION FLOW ADJUSTMENT WORKSHEET

Appr/ Lane Group	Ideal Sat Flow	f W	f HV	f G	f P	f BB	f A	f LU	f RT	f LT	Adj Sat Flow
Eastbound							Sec LT Adj/LT Sat:		----		
LTR	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.888	0.618	993

Westbound							Sec LT Adj/LT Sat:		----		
LTR	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.888	0.702	1127

Northbound							Sec LT Adj/LT Sat:		----		
LTR	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.888	0.720	1157

Southbound							Sec LT Adj/LT Sat:		----		
LTR	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.888	0.741	1191

CAPACITY ANALYSIS WORKSHEET

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Pri.								
Sec.								
Left								
Thru	LTR	461	993		0.46	0.300	298	1.55
Right								
Westbound								
Pri.								
Sec.								
Left								
Thru	LTR	1081	1127	#	0.96	0.300	338	3.20
Right								
Northbound								
Pri.								
Sec.								
Left								
Thru	LTR	837	1157		0.72	0.600	694	1.21
Right								
Southbound								
Pri.								
Sec.								
Left								
Thru	LTR	967	1191	#	0.81	0.600	715	1.35
Right								

Sum (v/s) critical = 1.77

Lost Time/Cycle, L = 10.00 sec Critical v/c(X) = 1.97

LEVEL OF SERVICE WORKSHEET

Appr/ Lane Grp	Ratios v/c	Ratios g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Incremental Del d2	Res Del d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound												
LTR	1.55	0.300	35.0	1.000	298	0.50	262.2	0.0	297.2	F	297.2	F
Westbound												
LTR	3.20	0.300	35.0	1.000	338	0.50	996.9	0.0				
Northbound												
LTR	1.21	0.600	20.0	1.000	694	0.50	106.0	0.0	126.0	F	126.0	F
Southbound												
LTR	1.35	0.600	20.0	1.000	715	0.50	167.7	0.0	187.7	F	187.7	F

Intersection Delay = (sec/veh) Intersection LOS =

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

APPROACH	EB	WB	NB	SB
Cycle Length, C 100.0 sec				
Actual Green Time for Lane Group, G				
Effective Green Time for Lane Group, g				
Opposing Effective Green Time, go				
Number of Lanes in Lane Group, N				
Number of Opposing Lanes, No				
Adjusted Left-Turn Flow Rate, Vlt				
Proportion of Left Turns in Opposing Flow, Plto				
Adjusted Opposing Flow Rate, Vo				
Lost Time for Lane Group, tl				
Left Turns per Cycle: LTC=VltC/3600				
Opposing Flow per Lane, Per Cycle: Volc=VoC/3600fluo				
Opposing Platoon Ratio, Rpo (Table 9-2 or Eqn 9-7)				
gf=[Gexp(- a * (LTC ** b))]-tl, gf<=g				
Opposing Queue Ratio: qro=1-Rpo(go/C)				
gq=(4.943Volc**0.762)[(qro**1.061)-tl], gq<=g				
gu =g-gq if gq>=gf, =g-gf if gq<gf				
n=(gq-gf)/2, n>=0				
Ptho=1-Plto				
Pl*=Plt[1+{(N-1)g/(gf+gu/El1+4.24)))				
El1 (Figure 9-7)				
El2=(1-Ptho**n)/Plto, El2>=1.0				
fmin=2(1+Plt)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g][1/{1+Pl(El1-1)}], (min=fmin;max=1.00)				
flt=fm=[gf/g]+gdiff[1/{1+Plt(El2-1)}] +[gu/g][1/(1+Plt(El1-1)],(min=fmin;max=1.0) or flt=[fm+0.91(N-1)]/N** flt				

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.

For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

APPROACH	EB	WB	NB	SB
Cycle Length, C 100.0 sec				
Actual Green Time for Lane Group, G	30.0	30.0	60.0	60.0
Effective Green Time for Lane Group, g	30.00	30.00	60.00	60.00
Opposing Effective Green Time, go	30.0	30.0	60.0	60.0
Number of Lanes in Lane Group, N	1	1	1	1
Number of Opposing Lanes, No	1	1	1	1
Adjusted Left-Turn Flow Rate, Vlt	70	163	127	147
Proportion of Left Turns in Lane Group, Plt	0.15	0.15	0.15	0.15
Proportion of Left Turns in Opposing Flow, Plto	0.15	0.15	0.15	0.15
Adjusted Opposing Flow Rate, Vo	1081	461	967	837
Lost Time for Lane Group, tl	5.00	5.00	5.00	5.00
Left Turns per Cycle: LTC=VltC/3600	1.94	4.53	3.53	4.08
Opposing Flow per Lane, Per Cycle: Volc=VoC/3600fluo	30.03	12.81	26.86	23.25
Opposing Platoon Ratio, Rpo (Table 9-2 or Eqn 9-7)	1.00	1.00	1.00	1.00
gf=[Gexp(- a * (LTC ** b))]-tl, gf<=g	3.1	0.0	4.0	2.5
Opposing Queue Ratio: qro=1-Rpo(go/C)	0.70	0.70	0.40	0.40
gq=(4.943Volc**0.762)[(qro**1.061)-tl], gq<=g	30.00	18.63	17.95	15.56
gu =g-gq if gq>=gf, =g-gf if gq<gf	0.00	11.37	42.05	44.44
n=(gq-gf)/2, n>=0	13.44	9.32	6.99	6.55
Ptho=1-Plto	0.85	0.85	0.85	0.85
Pl*=Plt[1+{(N-1)g/(gf+gu/El1+4.24))}	0.15	0.15	0.15	0.15
El1 (Figure 9-7)	4.03	2.21	3.62	3.19
El2=(1-Ptho**n)/Plto, El2>=1.0	5.89	5.17	4.50	4.35
fmin=2(1+Plt)/g or fmin=2(1+Pl)/g	0.08	0.08	0.04	0.04
gdiff=max(gq-gf,0)	26.88	18.63	13.98	13.09
fm=[gf/g]+[gu/g][1/{1+Pl(El1-1)}], (min=fmin;max=1.00)	0.62	0.70	0.72	0.74
flt=fm=[gf/g]+gdiff[1/{1+Plt(El2-1)}] +[gu/g][1/(1+Plt(El1-1)],(min=fmin;max=1.0) or flt=[fm+0.91(N-1)]/N**				
flt Primary	0.618	0.702	0.720	0.741

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Adj. LT Vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Primary phase effective green, g				
Secondary phase effective green, gq				
(From Supplemental Permitted LT Worksheet), gu				
Cycle length, C 100.0 Red =(C-g-gq-gu), r				
Arrivals: v/(3600(max(X,1.0))), qa				
Primary ph. departures: s/3600, sp				
Secondary ph. departures: s(gq+gu)/(gu*3600), ss				
XPerm				
XProt				
XCase				
Queue at begining of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
Westbound								
Northbound								
Southbound								

Intersection Delay sec/veh Intersection LOS

ERROR MESSAGES

No errors to report.

HCS: Signals Release 3.1a

Inter:
Analyst: Howard Olien
Date: 5/4/99
E/W St: Earll

City/St: Scottsdale
Proj #: Osborn Road Outfall
Period: 1999 Peak Hour
N/S St: Scottsdale

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	1	1	3	0	1	3	0
LGConfig	L	TR		L	T	R	L	TR		L	TR	
Volume	14	71	9	24	123	16	300	1497	200	341	1707	228
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0	12.0		12.0	12.0	
RTOR Vol			1			2			10			10

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination		1	2	3	4	5	6	7	8
EB	Left	P				NB Left P			
	Thru	P				Thru P			
	Right	P				Right P			
	Peds	X				Ped X			
WB	Left	P				SB Left P			
	Thru	P				Thru P			
	Right	P				Right P			
	Peds	X				Ped X			
NB	Right					EB Right			
SB	Right					WB Right			
Green		10.0				80.0			
Yellow		3.0				3.0			
All Red		2.0				2.0			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capcity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	92	919	0.17	0.100	45.3	D		
TR	178	1782	0.49	0.100	52.1	D	51.1	D
Westbound								
L	127	1266	0.21	0.100	45.2	D		
T	181	1810	0.76	0.100	69.0	E	63.0	E
R	154	1538	0.10	0.100	42.3	D		
Northbound								
L	102	128	3.26	0.800				
TR	3886	4857	0.48	0.800	3.7	A		
Southbound								
L	143	179	2.65	0.800	772.3	F		
TR	3885	4856	0.55	0.800	4.1	A	119.8	F

Intersection Delay = (sec/veh) Intersection LOS =

HCS: Signals Release 3.1a

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OPERATIONAL ANALYSIS

Intersection:	
City/State:	Scottsdale
Analyst:	Howard Olien
Project No:	Osborn Road Outfall
Time Period Analyzed:	1999 Peak Hour
Date:	5/4/99
East/West Street Name:	Earll
North/South Street Name:	Scottsdale

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	14	71	9	24	123	16	300	1497	200	341	1707	228
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PK 15 Vol	4	20	3	7	34	4	83	416	56	95	474	63
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900		1900	1900	1900	1900	1900		1900	1900	
ParkExist												
NumPark												
% Heavy Veh	5	5	5	5	5	5	5	5	5	5	5	5
No. Lanes	1	1	0	1	1	1	1	3	0	1	3	0
LGConfig	L	TR		L	T	R	L	TR		L	TR	
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0	12.0		12.0	12.0	
RTOR Vol			1			2			10			10
Adj Flow	16	88		27	137	16	333	1874		379	2139	
%InSharedLn												
Prop Turns			0.10						0.11			0.11
NumPeds			0			0			0			0
NumBus	0	0		0	0	0	0	0		0	0	

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Arriv. Type	3	3		3	3	3	3	3		3	3	
Unit Ext.	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Ext of g	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Ped Min g		0.0			0.0			0.0			0.0	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Ped	X		
WB Left	P				SB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Ped	X		
NB Right					EB Right			
SB Right					WB Right			
Green	10.0					80.0		
Yellow	3.0					3.0		
All Red	2.0					2.0		

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT WORKSHEET

Appr./ Movement	Mvt Volume	PHF	Flow Rate	No. Lanes	Lane Group	RTOR	Adjusted Flow Rate In Lane Grp	Prop. Left Turns	Prop. Right Turns
Eastbound									
Left	14	0.90	16	1	L		16		
Thru	71	0.90	79	1	TR		88		0.10
Right	9	0.90	9	0		1			
Westbound									
Left	24	0.90	27	1	L		27		
Thru	123	0.90	137	1	T		137		
Right	16	0.90	16	1	R	2	16		
Northbound									
Left	300	0.90	333	1	L		333		
Thru	1497	0.90	1663	3	TR		1874		0.11
Right	200	0.90	211	0		10			
Southbound									
Left	341	0.90	379	1	L		379		
Thru	1707	0.90	1897	3	TR		2139		0.11
Right	228	0.90	242	0		10			

* Value entered by user.

SATURATION FLOW ADJUSTMENT WORKSHEET

Appr/ Lane Group	Ideal Sat Flow	f W	f HV	f G	f P	f BB	f A	f LU	f RT	f LT	Adj Sat Flow
Eastbound							Sec LT Adj/LT Sat:				
L	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	----	0.508	919
TR	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.985	1.000	1782

Westbound							Sec LT Adj/LT Sat:				
L	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	----	0.700	1266
T	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	1.000	1.000	1810
R	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.850	----	1538
Northbound							Sec LT Adj/LT Sat:				
L	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	----	0.071	128
TR	1900	1.000	0.952	1.000	1.000	1.000	1.00	0.91	0.983	1.000	4857

Southbound							Sec LT Adj/LT Sat:				
L	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	----	0.099	179
TR	1900	1.000	0.952	1.000	1.000	1.000	1.00	0.91	0.983	1.000	4856

CAPACITY ANALYSIS WORKSHEET

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Pri.							
Sec.							
Left	L	16	919	0.02	0.100	92	0.17
Thru	TR	88	1782	0.05	0.100	178	0.49
Right							
Westbound							
Pri.							
Sec.							
Left	L	27	1266	0.02	0.100	127	0.21
Thru	T	137	1810	# 0.08	0.100	181	0.76
Right	R	16	1538	0.01	0.100	154	0.10
Northbound							
Pri.							
Sec.							
Left	L	333	128	# 2.60	0.800	102	3.26
Thru	TR	1874	4857	0.39	0.800	3886	0.48
Right							
Southbound							
Pri.							
Sec.							
Left	L	379	179	2.12	0.800	143	2.65
Thru	TR	2139	4856	0.44	0.800	3885	0.55
Right							

Sum (v/s) critical = 2.68

Lost Time/Cycle, L = 10.00 sec Critical v/c(X) = 2.97

LEVEL OF SERVICE WORKSHEET

Appr/ Lane Grp	Ratios v/c	Ratios g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Incremental Del d2	Res Del d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound												
L	0.17	0.100	41.2	1.000	92	0.50	4.1	0.0	45.3	D		
TR	0.49	0.100	42.6	1.000	178	0.50	9.5	0.0	52.1	D	51.1	D
Westbound												
L	0.21	0.100	41.4	1.000	127	0.50	3.8	0.0	45.2	D		
T	0.76	0.100	43.8	1.000	181	0.50	25.2	0.0	69.0	E	63.0	E
R	0.10	0.100	40.9	1.000	154	0.50	1.4	0.0	42.3	D		
Northbound												
L	3.26	0.800	10.0	1.000	102	0.50		0.0				
TR	0.48	0.800	3.3	1.000	3886	0.50	0.4	0.0	3.7	A		
Southbound												
L	2.65	0.800	10.0	1.000	143	0.50	762.3	0.0	772.3	F		
TR	0.55	0.800	3.6	1.000	3885	0.50	0.6	0.0	4.1	A	119.8	F

Intersection Delay = (sec/veh) Intersection LOS =

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

APPROACH	EB	WB	NB	SB
Cycle Length, C 100.0 sec				
Actual Green Time for Lane Group, G	10.0	10.0	80.0	80.0
Effective Green Time for Lane Group, g	10.00	10.00	80.00	80.00
Opposing Effective Green Time, go	10.0	10.0	80.0	80.0
Number of Lanes in Lane Group, N	1	1	1	1
Number of Opposing Lanes, No	1	1	3	3
Adjusted Left-Turn Flow Rate, Vlt	16	27	333	379
Proportion of Left Turns in Opposing Flow, Plto	0.00	0.00	0.00	0.00
Adjusted Opposing Flow Rate, Vo	137	88	2139	1874
Lost Time for Lane Group, tl	5.00	5.00	5.00	5.00
Left Turns per Cycle: LTC=VltC/3600	0.44	0.75	9.25	10.53
Opposing Flow per Lane, Per Cycle: Volc=VoC/3600fluo	3.81	2.44	21.76	19.07
Opposing Platoon Ratio, Rpo (Table 9-2 or Eqn 9-7)	1.00	1.00	1.00	1.00
gf=[Gexp(- a * (LTC ** b))]-tl, gf<=g	0.0	0.0	0.0	0.0
Opposing Queue Ratio: qro=1-Rpo(go/C)	0.90	0.90	0.20	0.20
gq=(4.943Volc**0.762)[(qro**1.061)-tl], gq<=g	2.41	0.00	10.42	7.33
gu =g-gq if gq>=gf, =g-gf if gq<gf	7.59	10.00	69.58	72.67
n=(gq-gf)/2, n>=0	1.21	0.00	5.21	3.66
Ptho=1-Plto	1.00	1.00	1.00	1.00
Pl*=Plt[1+{(N-1)g/(gf+gu/El1+4.24)))	1.00	1.00	1.00	1.00
El1 (Figure 9-7)	1.49	1.43	12.28	9.21
El2=(1-Ptho**n)/Plto, El2>=1.0	1.00	1.00	1.00	1.00
fmin=2(1+Plt)/g or fmin=2(1+Pl)/g	0.40	0.40	0.05	0.05
gdiff=max(gq-gf,0)	0.00	0.00	0.00	0.00
fm=[gf/g]+[gu/g][1/{1+Pl(El1-1)}], (min=fmin;max=1.00)	0.51	0.70	0.07	0.10
flt=fm=[gf/g]+gdiff[1/{1+Plt(El2-1)}]				
+[gu/g][1/(1+Plt(El1-1)],(min=fmin;max=1.0) or flt=[fm+0.91(N-1)]/N**				
flt	0.508	0.700	0.071	0.099

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.

For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

APPROACH	EB	WB	NB	SB
Cycle Length, C 100.0 sec				
Actual Green Time for Lane Group, G				
Effective Green Time for Lane Group, g				
Opposing Effective Green Time, go				
Number of Lanes in Lane Group, N				
Number of Opposing Lanes, No				
Adjusted Left-Turn Flow Rate, Vlt				
Proportion of Left Turns in Lane Group, Plt				
Proportion of Left Turns in Opposing Flow, Plto				
Adjusted Opposing Flow Rate, Vo				
Lost Time for Lane Group, tl				
Left Turns per Cycle: LTC=VltC/3600				
Opposing Flow per Lane, Per Cycle: Volc=VoC/3600fluo				
Opposing Platoon Ratio, Rpo (Table 9-2 or Eqn 9-7)				
gf=[Gexp(- a * (LTC ** b))]-tl, gf<=g				
Opposing Queue Ratio: qro=1-Rpo(go/C)				
gq=(4.943Volc**0.762)[(qro**1.061)-tl], gq<=g				
gu =g-gq if gq>=gf, =g-gf if gq<gf				
n=(gq-gf)/2, n>=0				
Ptho=1-Plto				
Pl*=Plt[1+{(N-1)g/(gf+gu/El1+4.24)))				
El1 (Figure 9-7)				
El2=(1-Ptho**n)/Plto, El2>=1.0				
fmin=2(1+Plt)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g][1/{1+Pl(El1-1)}], (min=fmin;max=1.00)				
flt=fm=[gf/g]+gdiff[1/{1+Plt(El2-1)}]				
+[gu/g][1/(1+Plt(El1-1)],(min=fmin;max=1.0) or flt=[fm+0.91(N-1)]/N**				
flt Primary				

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.

For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Adj. LT Vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Primary phase effective green, g				
Secondary phase effective green, gq				
(From Supplemental Permitted LT Worksheet), gu				
Cycle length, C 100.0 Red =(C-g-gq-gu), r				
Arrivals: v/(3600(max(X,1.0))), qa				
Primary ph. departures: s/3600, sp				
Secondary ph. departures: s(gq+gu)/(gu*3600), ss				
XPerm				
XProt				
XCase				
Queue at begining of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
Westbound								
Northbound								
Southbound								

Intersection Delay sec/veh Intersection LOS

ERROR MESSAGES

No errors to report.

HCS: Signals Release 3.1a

Inter:
Analyst: Howard Olien
Date: 5/4/99
E/W St: Earll

City/St: Scottsdale
Proj #: Osborn Road Outfall
Period: 1999 Construction Peak Hour
N/S St: Scottsdale

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	1	1	0	1	1	0
LGConfig		LTR			LTR		L	TR		L	TR	
Volume	14	71	9	24	123	16	300	1497	200	341	1707	228
Lane Width		12.0			12.0		12.0	12.0		12.0	12.0	
RTOR Vol			1			2			10			10

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination		1	2	3	4	5	6	7	8
EB	Left	P				NB Left P			
	Thru	P				Thru P			
	Right	P				Right P			
	Peds	X				Ped X			
WB	Left	P				SB Left P			
	Thru	P				Thru P			
	Right	P				Right P			
	Peds	X				Ped X			
NB	Right					EB Right			
SB	Right					WB Right			
Green		10.0				80.0			
Yellow		3.0				3.0			
All Red		2.0				2.0			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capcity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LTR	121	1208	0.86	0.100	94.9	F	94.9	F
Westbound								
LTR	143	1426	1.26	0.100	205.8	F	205.8	F
Northbound								
L	72	90	4.63	0.800				
TR	1423	1779	1.32	0.800	157.7	F		
Southbound								
L	72	90	5.26	0.800				
TR	1423	1779	1.50	0.800	240.1	F		

Intersection Delay = (sec/veh) Intersection LOS =

HCS: Signals Release 3.1a

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OPERATIONAL ANALYSIS

Intersection:	
City/State:	Scottsdale
Analyst:	Howard Olien
Project No:	Osborn Road Outfall
Time Period Analyzed:	1999 Construction Peak Hour
Date:	5/4/99
East/West Street Name:	Earll
North/South Street Name:	Scottsdale

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	14	71	9	24	123	16	300	1497	200	341	1707	228
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PK 15 Vol	4	20	3	7	34	4	83	416	56	95	474	63
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat		1900			1900		1900	1900		1900	1900	
ParkExist												
NumPark												
% Heavy Veh	5	5	5	5	5	5	5	5	5	5	5	5
No. Lanes	0	1	0	0	1	0	1	1	0	1	1	0
LGConfig		LTR			LTR		L	TR		L	TR	
Lane Width		12.0			12.0		12.0	12.0		12.0	12.0	
RTOR Vol			1			2			10			10
Adj Flow		104			180		333	1874		379	2139	
%InSharedLn												
Prop Turns	0.15		0.09	0.15		0.09			0.11			0.11
NumPeds			0			0			0			0
NumBus		0			0		0	0		0	0	

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0			0.0		0.0	0.0		0.0	0.0	
Arriv. Type		3			3		3	3		3	3	
Unit Ext.		3.0			3.0		3.0	3.0		3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time		2.0			2.0		2.0	2.0		2.0	2.0	
Ext of g		2.0			2.0		2.0	2.0		2.0	2.0	
Ped Min g		0.0			0.0			0.0			0.0	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Ped	X		
WB Left	P				SB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Ped	X		
NB Right					EB Right			
SB Right					WB Right			
Green	10.0					80.0		
Yellow	3.0					3.0		
All Red	2.0					2.0		

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT WORKSHEET

Appr./ Movement	Mvt Volume	PHF	Flow Rate	No. Lanes	Lane Group	RTOR	Adjusted Flow Rate In Lane Grp	Prop. Left Turns	Prop. Right Turns
Eastbound									
Left	14	0.90	16	0					
Thru	71	0.90	79	1	LTR		104	0.15	0.09
Right	9	0.90	9	0		1			
Westbound									
Left	24	0.90	27	0					
Thru	123	0.90	137	1	LTR		180	0.15	0.09
Right	16	0.90	16	0		2			
Northbound									
Left	300	0.90	333	1	L		333		
Thru	1497	0.90	1663	1	TR		1874		0.11
Right	200	0.90	211	0		10			
Southbound									
Left	341	0.90	379	1	L		379		
Thru	1707	0.90	1897	1	TR		2139		0.11
Right	228	0.90	242	0		10			

* Value entered by user.

SATURATION FLOW ADJUSTMENT WORKSHEET

Appr/ Lane Group	Ideal Sat Flow	f W	f HV	f G	f P	f BB	f A	f LU	f RT	f LT	Adj Sat Flow
Eastbound									Sec LT Adj/LT Sat: ----		
LTR	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.888	0.751 ----	1208
Westbound									Sec LT Adj/LT Sat: ----		
LTR	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.888	0.888 ----	1426
Northbound									Sec LT Adj/LT Sat:		
L	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	----	0.050	90
TR	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.983	1.000 ----	1779
Southbound									Sec LT Adj/LT Sat:		
L	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	----	0.050	90
TR	1900	1.000	0.952	1.000	1.000	1.000	1.00	1.00	0.983	1.000 ----	1779

CAPACITY ANALYSIS WORKSHEET

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Pri.								
Sec.								
Left								
Thru	LTR	104	1208		0.09	0.100	121	0.86
Right								
Westbound								
Pri.								
Sec.								
Left								
Thru	LTR	180	1426	#	0.13	0.100	143	1.26
Right								
Northbound								
Pri.								
Sec.								
Left	L	333	90		3.70	0.800	72	4.63
Thru	TR	1874	1779		1.05	0.800	1423	1.32
Right								
Southbound								
Pri.								
Sec.								
Left	L	379	90	#	4.21	0.800	72	5.26
Thru	TR	2139	1779		1.20	0.800	1423	1.50
Right								

Sum (v/s) critical = 4.34

Lost Time/Cycle, L = 10.00 sec Critical v/c(X) = 4.82

LEVEL OF SERVICE WORKSHEET

Appr/ Lane Grp	Ratios v/c	Ratios g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Incremental Del d2	Res Del d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound												
LTR	0.86	0.100	44.3	1.000	121	0.50	50.6	0.0	94.9	F	94.9	F
Westbound												
LTR	1.26	0.100	45.0	1.000	143	0.50	160.8	0.0	205.8	F	205.8	F
Northbound												
L	4.63	0.800	10.0	1.000	72	0.50		0.0				
TR	1.32	0.800	10.0	1.000	1423	0.50	147.7	0.0	157.7	F		
Southbound												
L	5.26	0.800	10.0	1.000	72	0.50		0.0				
TR	1.50	0.800	10.0	1.000	1423	0.50	230.1	0.0	240.1	F		

Intersection Delay = (sec/veh) Intersection LOS =

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

APPROACH	EB	WB	NB	SB
Cycle Length, C 100.0 sec				
Actual Green Time for Lane Group, G			80.0	80.0
Effective Green Time for Lane Group, g			80.00	80.00
Opposing Effective Green Time, go			80.0	80.0
Number of Lanes in Lane Group, N			1	1
Number of Opposing Lanes, No			1	1
Adjusted Left-Turn Flow Rate, Vlt			333	379
Proportion of Left Turns in Opposing Flow, Plto			0.00	0.00
Adjusted Opposing Flow Rate, Vo			2139	1874
Lost Time for Lane Group, tl			5.00	5.00
Left Turns per Cycle: LTC=VltC/3600			9.25	10.53
Opposing Flow per Lane, Per Cycle: Volc=VoC/3600fluo			59.42	52.06
Opposing Platoon Ratio, Rpo (Table 9-2 or Eqn 9-7)			1.00	1.00
gf=[Gexp(- a * (LTC ** b))]-tl, gf<=g			0.0	0.0
Opposing Queue Ratio: qro=1-Rpo(go/C)			0.20	0.20
gq=(4.943Volc**0.762)[(qro**1.061)-tl], gq<=g			80.00	80.00
gu =g-gq if gq>=gf, =g-gf if gq<gf			0.00	0.00
n=(gq-gf)/2, n>=0			40.00	40.00
Ptho=1-Plto			1.00	1.00
Pl*=Plt[1+{(N-1)g/(gf+gu/El1+4.24))}			1.00	1.00
El1 (Figure 9-7)			9.96	7.68
El2=(1-Ptho**n)/Plto, El2>=1.0			1.00	1.00
fmin=2(1+Plt)/g or fmin=2(1+Pl)/g			0.05	0.05
gdiff=max(gq-gf,0)			0.00	0.00
fm=[gf/g]+[gu/g][1/{1+Pl(El1-1)}], (min=fmin;max=1.00)			0.05	0.05
flt=fm=[gf/g]+gdiff[1/{1+Plt(El2-1)}] +[gu/g][1/(1+Plt(El1-1)],(min=fmin;max=1.0) or flt=[fm+0.91(N-1)]/N** flt			0.050	0.050

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

APPROACH	EB	WB	NB	SB
Cycle Length, C 100.0 sec				
Actual Green Time for Lane Group, G	10.0	10.0		
Effective Green Time for Lane Group, g	10.00	10.00		
Opposing Effective Green Time, go	10.0	10.0		
Number of Lanes in Lane Group, N	1	1		
Number of Opposing Lanes, No	1	1		
Adjusted Left-Turn Flow Rate, Vlt	16	27		
Proportion of Left Turns in Lane Group, Plt	0.15	0.15		
Proportion of Left Turns in Opposing Flow, Plto	0.15	0.15		
Adjusted Opposing Flow Rate, Vo	180	104		
Lost Time for Lane Group, tl	5.00	5.00		
Left Turns per Cycle: LTC=VltC/3600	0.44	0.75		
Opposing Flow per Lane, Per Cycle: Volc=VoC/3600fluo	5.00	2.89		
Opposing Platoon Ratio, Rpo (Table 9-2 or Eqn 9-7)	1.00	1.00		
gf=[Gexp(- a * (LTC ** b))]-tl, gf<=g	1.0	0.0		
Opposing Queue Ratio: qro=1-Rpo(go/C)	0.90	0.90		
gq=(4.943Volc**0.762)[(qro**1.061)-tl], gq<=g	10.00	4.92		
gu =g-gq if gq>=gf, =g-gf if gq<gf	0.00	5.08		
n=(gq-gf)/2, n>=0	4.52	2.46		
Ptho=1-Plto	0.85	0.85		
Pl*=Plt[1+{(N-1)g/(gf+gu/El1+4.24))}	0.15	0.15		
El1 (Figure 9-7)	1.66	1.54		
El2=(1-Ptho**n)/Plto, El2>=1.0	3.47	2.19		
fmin=2(1+Plt)/g or fmin=2(1+Pl)/g	0.23	0.23		
gdiff=max(gq-gf,0)	9.03	4.92		
fm=[gf/g]+[gu/g][1/{1+Pl(El1-1)}], (min=fmin;max=1.00)	0.75	0.89		
flt=fm=[gf/g]+gdiff[1/{1+Plt(El2-1)}]				
+[gu/g][1/(1+Plt(El1-1)],(min=fmin;max=1.0) or flt=[fm+0.91(N-1)]/N**				
flt Primary	0.751	0.888		

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Adj. LT Vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Primary phase effective green, g				
Secondary phase effective green, gq				
(From Supplemental Permitted LT Worksheet), gu				
Cycle length, C 100.0 Red =(C-g-gq-gu), r				
Arrivals: v/(3600(max(X,1.0))), qa				
Primary ph. departures: s/3600, sp				
Secondary ph. departures: s(gq+gu)/(gu*3600), ss				
XPerm				
XProt				
XCase				
Queue at begining of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
Westbound								
Northbound								
Southbound								

Intersection Delay sec/veh Intersection LOS

ERROR MESSAGES

No errors to report.

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ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Worksheet 1 - Basic Intersection Information

1. Analyst:	Howard Olien
2. Intersection:	Civic Center/Earll
3. Count Date:	4 May 1999
4. Time Period:	1999 Peak Hour

Worksheet 2 - Volume Adjustments and Site Characteristics

	North Bound		South Bound		East Bound		West Bound	
	L1	L2	L1	L2	L1	L2	L1	L2
1. LT Volume:	86	0	98	0	11	0	24	0
2. TH Volume:	0	427	0	487	0	56	0	123
3. RT Volume:	0	57	0	65	0	7	0	16
4. Peak Hour Factor:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5. Flow Rate LT:	86	0	98	0	11	0	24	0
6. Flow Rate TH:	0	427	0	487	0	56	0	123
7. Flow Rate RT:	0	57	0	65	0	7	0	16
8. Flow Rate Total:	86	484	98	552	11	63	24	139
9. Prop. Heavy Vehicle:	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
10. Subject Approach	2	2	2	2	2	2	2	2
11. Opposing Approach	2	2	2	2	2	2	2	2
12. Conflicting Approach	2	2	2	2	2	2	2	2
13. Geometry Group	5	5	5	5	5	5	5	5
14. T (Time in Hours):	0.250							

Worksheet 3 - Saturation Headway Adjustment Worksheet

	North Bound		South Bound		East Bound		West Bound	
	L1	L2	L1	L2	L1	L2	L1	L2
1. Flow Rate Total:	86	484	98	552	11	63	24	139
2. Flow Rate LT:	86	0	98	0	11	0	24	0
3. Flow Rate RT:	0	57	0	65	0	7	0	16
4. Prop LT in lane:	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
5. Prop RT in lane:	0.00	0.12	0.00	0.12	0.00	0.11	0.00	0.12
6. Prop. Heavy Vehicle:	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
7. Geometry Group	5	5	5	5	5	5	5	5
8. hLT-adj by Table 10-18	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
9. hRT-adj by Table 10-18	-0.70	-0.70	-0.70	-0.70	-0.70	-0.70	-0.70	-0.70
10. hHV-adj Table 10-18	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
11. hadj	0.58	0.00	0.58	0.00	0.58	0.01	0.58	0.00

Worksheet 4 - Departure Headway and Service Time

	North Bound		South Bound		East Bound		West Bound	
	L1	L2	L1	L2	L1	L2	L1	L2
1. Total lane flow rate	86	484	98	552	11	63	24	139
2. hd, initial value	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
3. x, initial	0.08	0.43	0.09	0.49	0.01	0.06	0.02	0.12
4. hd, final value	6.9	6.3	6.8	6.2	8.5	7.9	8.2	7.6
5. x, final value	0.16	0.84	0.18	0.95	0.03	0.14	0.05	0.29
6. Move-up time, m	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
7. Service Time	4.6	4.0	4.5	3.9	6.2	5.6	5.9	5.3

Worksheet 5 - Capacity and Level of Service

	North Bound		South Bound		East Bound		West Bound	
	L1	L2	L1	L2	L1	L2	L1	L2
1. Total lane flow rate	86	484	98	552	11	63	24	139
2. Service Time	4.6	4.0	4.5	3.9	6.2	5.6	5.9	5.3
3. Degree Utilization, x	0.16	0.84	0.18	0.95	0.03	0.14	0.05	0.29
4. Departure headway, hd	6.9	6.3	6.8	6.2	8.5	7.9	8.2	7.6
5. Capacity	518	572	523	583	405	432	421	452
6. Delay	10.9	33.9	11.0	49.7	11.4	11.9	11.4	13.5
7. Level Of Service	B	D	B	E	B	B	B	B
8. Delay Approach	30.4		43.9		11.8		13.1	
9. LOS, approach	D		E		B		B	
10. Delay, Intersection	33.5							

11. LOS, Intersection D

HCS: Unsignalized Intersections Release 3.1a

ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Worksheet 1 - Basic Intersection Information

1. Analyst:	Howard Olien
2. Intersection:	Civic Center/Earll
3. Count Date:	4 May 1999
4. Time Period:	1999 Construction Peak Hour

Worksheet 2 - Volume Adjustments and Site Characteristics

	North Bound	South Bound	East Bound	West Bound
	L1	L1	L1	L1
1. LT Volume:	86	98	11	24
2. TH Volume:	427	487	56	123
3. RT Volume:	57	65	7	24
4. Peak Hour Factor:	1.00	1.00	1.00	1.00
5. Flow Rate LT:	86	98	11	24
6. Flow Rate TH:	427	487	56	123
7. Flow Rate RT:	57	65	7	24
8. Flow Rate Total:	570	650	74	171
9. Prop. Heavy Vehicle:	0.05	0.05	0.05	0.05
10. Subject Approach	1	1	1	1
11. Opposing Approach	1	1	1	1
12. Conflicting Approach	1	1	1	1
13. Geometry Group	1	1	1	1
14. T (Time in Hours):	0.250			

Worksheet 3 - Saturation Headway Adjustment Worksheet

	North Bound	South Bound	East Bound	West Bound
	L1	L1	L1	L1
1. Flow Rate Total:	570	650	74	171
2. Flow Rate LT:	86	98	11	24
3. Flow Rate RT:	57	65	7	24
4. Prop LT in lane:	0.15	0.15	0.15	0.14
5. Prop RT in lane:	0.10	0.10	0.09	0.14
6. Prop. Heavy Vehicle:	0.05	0.05	0.05	0.05
7. Geometry Group	1	1	1	1
8. hLT-adj by Table 10-18	0.20	0.20	0.20	0.20
9. hRT-adj by Table 10-18	-0.60	-0.60	-0.60	-0.60
10. hHV-adj Table 10-18	1.70	1.70	1.70	1.70
11. hadj	0.06	0.06	0.06	0.03

Worksheet 4 - Departure Headway and Service Time

	North Bound	South Bound	East Bound	West Bound
	L1	L1	L1	L1
1. Total lane flow rate	570	650	74	171
2. hd, initial value	3.2	3.2	3.2	3.2
3. x, initial	0.51	0.58	0.07	0.15
4. hd, final value	5.7	5.7	7.3	7.0
5. x, final value	0.91	1.03	0.15	0.33
6. Move-up time, m	2.0	2.0	2.0	2.0
7. Service Time	3.7	3.7	5.3	5.0

Worksheet 5 - Capacity and Level of Service

	North Bound	South Bound	East Bound	West Bound
	L1	L1	L1	L1
1. Total lane flow rate	570	650	74	171
2. Service Time	3.7	3.7	5.3	5.0
3. Degree Utilization, x	0.91	1.03	0.15	0.33
4. Departure headway, hd	5.7	5.7	7.3	7.0
5. Capacity	624	632	470	499
6. Delay	40.9	67.3	11.6	13.4
7. Level Of Service	E	F	B	B
8. Delay Approach	40.9	67.3	11.6	13.4
9. LOS, approach	E	F	B	B
10. Delay, Intersection	47.9			

11. LOS, Intersection E

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ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Worksheet 1 - Basic Intersection Information

1. Analyst:	Howard Olien
2. Intersection:	Miller/Earll
3. Count Date:	4 May 1999
4. Time Period:	1999 Peak Hour

Worksheet 2 - Volume Adjustments and Site Characteristics

	North Bound	South Bound	East Bound	West Bound
	L1	L1	L1	L1
1. LT Volume:	114	130	11	14
2. TH Volume:	573	652	56	73
3. RT Volume:	76	87	7	10
4. Peak Hour Factor:	1.00	1.00	1.00	1.00
5. Flow Rate LT:	114	130	11	14
6. Flow Rate TH:	573	652	56	73
7. Flow Rate RT:	76	87	7	10
8. Flow Rate Total:	763	869	74	97
9. Prop. Heavy Vehicle:	0.05	0.05	0.05	0.05
10. Subject Approach	1	1	1	1
11. Opposing Approach	1	1	1	1
12. Conflicting Approach	1	1	1	1
13. Geometry Group	1	1	1	1
14. T (Time in Hours):	0.250			

Worksheet 3 - Saturation Headway Adjustment Worksheet

	North Bound	South Bound	East Bound	West Bound
	L1	L1	L1	L1
1. Flow Rate Total:	763	869	74	97
2. Flow Rate LT:	114	130	11	14
3. Flow Rate RT:	76	87	7	10
4. Prop LT in lane:	0.15	0.15	0.15	0.14
5. Prop RT in lane:	0.10	0.10	0.09	0.10
6. Prop. Heavy Vehicle:	0.05	0.05	0.05	0.05
7. Geometry Group	1	1	1	1
8. hLT-adj by Table 10-18	0.20	0.20	0.20	0.20
9. hRT-adj by Table 10-18	-0.60	-0.60	-0.60	-0.60
10. hHV-adj Table 10-18	1.70	1.70	1.70	1.70
11. hadj	0.06	0.05	0.06	0.05

Worksheet 4 - Departure Headway and Service Time

	North Bound	South Bound	East Bound	West Bound
	L1	L1	L1	L1
1. Total lane flow rate	763	869	74	97
2. hd, initial value	3.2	3.2	3.2	3.2
3. x, initial	0.68	0.77	0.07	0.09
4. hd, final value	5.4	5.4	7.3	7.2
5. x, final value	1.15	1.31	0.15	0.19
6. Move-up time, m	2.0	2.0	2.0	2.0
7. Service Time	3.4	3.4	5.3	5.2

Worksheet 5 - Capacity and Level of Service

	North Bound	South Bound	East Bound	West Bound
	L1	L1	L1	L1
1. Total lane flow rate	763	869	74	97
2. Service Time	3.4	3.4	5.3	5.2
3. Degree Utilization, x	1.15	1.31	0.15	0.19
4. Departure headway, hd	5.4	5.4	7.3	7.2
5. Capacity	664	664	490	497
6. Delay	106.5	169.7	11.5	11.9
7. Level Of Service	F	F	B	B
8. Delay Approach	106.5	169.7	11.5	11.9
9. LOS, approach	F	F	B	B
10. Delay, Intersection	128.0			

11. LOS, Intersection F

HCS: Unsignalized Intersections Release 3.1a

ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Worksheet 1 - Basic Intersection Information

1. Analyst:	Howard Olien
2. Intersection:	Miller/Earll
3. Count Date:	4 May 1999
4. Time Period:	1999 Construction Peak Hour

Worksheet 2 - Volume Adjustments and Site Characteristics

	North Bound	South Bound	East Bound	West Bound
	L1	L1	L1	L1
1. LT Volume:	114	130	11	14
2. TH Volume:	573	652	56	73
3. RT Volume:	76	87	7	10
4. Peak Hour Factor:	1.00	1.00	1.00	1.00
5. Flow Rate LT:	114	130	11	14
6. Flow Rate TH:	573	652	56	73
7. Flow Rate RT:	76	87	7	10
8. Flow Rate Total:	763	869	74	97
9. Prop. Heavy Vehicle:	0.05	0.05	0.05	0.05
10. Subject Approach	1	1	1	1
11. Opposing Approach	1	1	1	1
12. Conflicting Approach	1	1	1	1
13. Geometry Group	1	1	1	1
14. T (Time in Hours):	0.250			

Worksheet 3 - Saturation Headway Adjustment Worksheet

	North Bound	South Bound	East Bound	West Bound
	L1	L1	L1	L1
1. Flow Rate Total:	763	869	74	97
2. Flow Rate LT:	114	130	11	14
3. Flow Rate RT:	76	87	7	10
4. Prop LT in lane:	0.15	0.15	0.15	0.14
5. Prop RT in lane:	0.10	0.10	0.09	0.10
6. Prop. Heavy Vehicle:	0.05	0.05	0.05	0.05
7. Geometry Group	1	1	1	1
8. hLT-adj by Table 10-18	0.20	0.20	0.20	0.20
9. hRT-adj by Table 10-18	-0.60	-0.60	-0.60	-0.60
10. hHV-adj Table 10-18	1.70	1.70	1.70	1.70
11. hadj	0.06	0.05	0.06	0.05

Worksheet 4 - Departure Headway and Service Time

	North Bound	South Bound	East Bound	West Bound
	L1	L1	L1	L1
1. Total lane flow rate	763	869	74	97
2. hd, initial value	3.2	3.2	3.2	3.2
3. x, initial	0.68	0.77	0.07	0.09
4. hd, final value	5.4	5.4	7.3	7.2
5. x, final value	1.15	1.31	0.15	0.19
6. Move-up time, m	2.0	2.0	2.0	2.0
7. Service Time	3.4	3.4	5.3	5.2

Worksheet 5 - Capacity and Level of Service

	North Bound	South Bound	East Bound	West Bound
	L1	L1	L1	L1
1. Total lane flow rate	763	869	74	97
2. Service Time	3.4	3.4	5.3	5.2
3. Degree Utilization, x	1.15	1.31	0.15	0.19
4. Departure headway, hd	5.4	5.4	7.3	7.2
5. Capacity	664	664	490	497
6. Delay	106.5	169.7	11.5	11.9
7. Level Of Service	F	F	B	B
8. Delay Approach	106.5	169.7	11.5	11.9
9. LOS, approach	F	F	B	B
10. Delay, Intersection	128.0			

11. LOS, Intersection F