Hermosa Vista - Hawes Road Storm Drain and Basin

DESIGN CONCEPT REPORT

PREPARED FOR:

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Contract No: FCD 2004 C054

OCTOBER 2005

WP#042284.01

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HERMOSA VISTA – HAWES ROAD
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1.0 EXECUTIVE SUMMARY

1.1 Project Background

The Flood Control District of Maricopa County (District) contracted Wood, Patel & Associates, Inc. (Wood/Patel) to update the Spook Hill Area Drainage Master Plan (ADMP); FCD Contract #99-43 dated September 2002 with a supplemental document. At the completion of the ADMP, the District learned that the basin area located at the northwest corner of McDowell Road and 88th Street was being subdivided by a developer and subsequently has had single family homes constructed on the site. A new location for this basin was identified at the northeast corner of Culver Street and Hawes Road. The supplement was prepared to document the relocation of a flood control storage basin that was planned at the northeast corner of McDowell Road and 88th Street to the northeast corner of Culver Street and Hawes Road.

Also, since the completion of the ADMP, a new detention basin has been constructed along McDowell Road near 90th Street. The basin was constructed as a part of the Madrid subdivision located along the south side of McDowell Road. The District requested that this analysis utilize the detention basin constructed with the Madrid subdivision. This basin has been referred to as the "Madrid detention basin" in this report.

The total area of Spook Hill study was approximately 35 square miles. This study concentrates on a local area that is bounded to the west by Hawes Road, to the east by 90th Street, to the south by Culver Street, and to the north by McDowell Road.

The purpose of this report is to refine the hydrology, hydraulics, basin layout and landscaping for the proposed basin located at Culver Street and Hawes Road (Culver – Hawes basin). This document contains preliminary information and conceptual designs developed within the ADMP supplement as well as the final preferred alternative. Design plans were also prepared for the preferred alternative to the 15% level.

The successful completion of this project required the active participation of multiple agencies. These include the District, the City of Mesa (City), and the Maricopa County Department of Transportation (MCDOT). The consultant and the District have held regular monthly meetings. A public meeting was held on August 18, 2005 where display boards were presented of the preferred alternative. A meeting was also held with the HOA for the Madrid subdivision to discuss potential modifications to the existing basin within the Madrid subdivision for this project.

1.2 Development of Alternatives

As part of the ADMP update, Wood/Patel was initially contracted to investigate three alternatives. Upon, beginning the alternative analysis, it was determined that additional alternatives should be modeled. In total, six alternatives were evaluated and then presented to the District.

Five of the alternatives utilized the Madrid detention basin. Five of the alternatives utilized storm drains along McDowell and Hawes Road. One of the alternatives utilized a storm drain along Culver Street with no storm drains proposed along McDowell Road. All the alternatives utilized the proposed basin as an off-line basin.

1.3 Hydrologic Modeling

Several existing condition and future condition models were developed with the ADMP. To be consistent with the intent of ADMP recommendations, this study utilized the future conditions 100-year, 24-hour model developed in the ADMP. The model was modified to reflect the new basin location based on current District methodology.

1.4 Evaluation of Alternatives

Upon completion of the analysis of the six alternatives, the team evaluated the six alternatives to determine a preferred alternative. Criteria used in the evaluation process included items such as: capitol cost, benefited area, public acceptance, implementability, aesthetics and conformance with the original ADMP plan.

The team determined that alternative two did not satisfy the criteria of conforming with the intent of the ADMP's plan for the area. This alternative also presented difficulties with implementation due to the modifications that would be required within the Madrid subdivision to capture flows to be conveyed along Culver Street to the proposed basin site. Alternative three also did not provide a level of flood protection equivalent to the

ADMP and therefore was eliminated. Alternative four was eliminated due to lack of Section 404 conformance. The team felt that alternative four would not satisfy Section 404 requirements for the wash that flows through the Madrid subdivision with the elimination of flows from the Madrid basin that drain into the subdivision. Alternative five was eliminated due to cost considerations. Alternative six was eliminated due to cost considerations and aesthetics. The area available for the basin site is fixed, therefore, the increase in basin size required to implement alternative six would reduce the ability to vary the shape of the basin.

1.5 Preferred Alternative

Upon completion of the analysis of the six alternatives, the team determined that alternative one was the preferred alternative. The team felt that alternative one was the closest to meeting all the criteria used in evaluating the alternatives.

The preferred alternative includes the following elements: an online detention basin at McDowell Road and 90th Street, a storm drain within McDowell Road from 90th Street to Hawes Road, a storm drain within Hawes Road from McDowell Road to Culver Street, and an off-line detention basin at Hawes Road and Culver Street. The plan elements are identified on the Preferred Alternative exhibit (Plate 10) and in plan and profile at the end of this report. The preliminary opinion of probable cost for the preferred alternative is $3,879,800. This cost includes the land acquisition for the Culver-Hawes basins location. Refer to Table 4.

1.6 Conclusions and Recommendations

The preferred drainage system alternative is alternative one and is depicted on Plate 10.

Information was limited for this study as to the vertical location for the utility conflicts identified on the 15% design plans. It is recommended that potholing and designating be done during the design phase of this project to determine a more accurate vertical location of the utilities. Due to the steep slopes along the proposed storm drain alignments, it is believed that the potential utility conflicts could be minimized by increasing the amount of cover over the pipe. The pipe slope could then be lessened downstream of the utility conflict to reduce the pipe cover back to more typical depths.

As mentioned previously, due to steep slopes along the potential alignments and the desire to keep the velocities in the range of 15 ft/sec, CMP was utilized as the primary pipe material for the conceptual design. If the District chooses to utilize Reinforced Concrete Pipe (RGRCP) or other pipe material for the final design, revisions will be required to the design parameters as well as the pipe profiles and the cost estimate. More specifically, for the McDowell Road alignment, the modifications may include the use of drop structures at 200 foot intervals in order to keep the velocities within reasonable limits. RGRCP may be feasible along the Hawes Road alignment. Slopes along Hawes Road tend to be less than along McDowell Road (< 2.0%) and therefore the velocities are reduced.

2.0 STUDY AREA

2.1 Location

The total area of Spook Hill study was approximately 35 square miles. This study concentrates on a local area that is bounded to the west by Hawes Road, to the east by 90th Street, to the south by Culver Street, and to the north by McDowell Road. Plate 1 shows the project location.

2.2 Characteristics

The contributing watershed is mostly comprised of undeveloped and sparsely developed natural desert with slopes of approximately 2.0 percent toward the south and west. The offsite watershed contributing to the Madrid detention basin at the upstream end of the project study area is approximately 0.67 square miles.

2.3 Utilities

The City of Mesa provided both water and sewer service quarter section maps for the study area. A significant portion of the homes within the study area are on septic systems, therefore, only three potential sewer conflicts were identified. Two are located along McDowell Road at the eastern edge of the Thunder Mountain subdivision at the 88th Street alignment. Both sewers end within the McDowell Road right-of-way. One of the sewers enters McDowell Road from the north side and the other enters from the south side of McDowell Road. The other potential sewer conflict is located at the proposed outfall location of the Madrid detention basin. This sewer ends at the northern edge of McDowell Road. The sewer flows east and then south in the Madrid subdivision. Limited information identifying the vertical location of the three sewers was available for this study. Therefore, it is recommended that potholing be done during the design phase to properly locate the sewer. Due to the steep slopes within the study area, it is believed that potential conflicts could be avoided with the three crossings. It is also unclear at this time what the ultimate intent is for these three sewer systems. Further investigations are recommended to determine if these systems will ever be used.

Several waterline crossings were identified along McDowell Road and Hawes Road as potential conflicts. Four crossings were identified at the Waterbury Road alignment along McDowell Road. Three crossings were identified along Hawes Road. Two at

Willetta Street alignment and one at the Culver Street alignment were identified along Hawes Road.

There are two potential storm drain conflicts along McDowell Road. One occurs at the Madrid detention basin. The contributing area to the inlet for this storm drain appears to have been cut-off by the construction of the basin; therefore, the storm drain may not need to be maintained. If the storm drain needs to be maintained for 404 purposes, accommodations will need to be made in the final design. The other storm drain conflict occurs along McDowell Road east of the 86th Street entrance to the Thunder Mountain subdivision.

Several potential dry utility conflicts were also identified along McDowell Road. The utilities identified include television and telephone lines.

2.4 Jurisdictional Delineation

The firm of CMG Engineering, Inc. was contracted by the District to identify the regulatory washes within the project boundary of the ADMP and this study, entitled *Jurisdictional Boundary Delineation for the Spook Hill ADMP,* was completed on July 9, 2001. The study identified two US Army Corps of Engineers (Corps) Section 404 washes that would be impacted by the activities proposed within this update. The system proposed within this update will maintain low flows to these washes. Refer to Plate 2 for the jurisdictional delineation.

2.5 FEMA FIRM Panel

Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panel 04013C2210 E (Maricopa County), dated July 19, 2001, identifies the study area as Zone "X" (shaded). Refer to Plate 3 for the FEMA FIRM Panel.

> Zone "X" (shaded) is defined by FEMA as follows:
>
> *Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.*

3.0 PREVIOUS STUDIES

This section briefly describes studies and reports that contain information pertinent to this project.

3.1 Spook Hill Area Drainage Master Study

In the mid 1980s the District contracted with Parsons, Brinkerhoff, Quade, & Douglass (PBQD) to prepare an Area Drainage Master Study (ADMS) to identify flooding problems in the watershed and propose solutions for possible implementation. However, the proposed alternative was never implemented, the area continued to develop, and the drainage issues remained.

3.2 Spook Hill ADMP

The *Spook Hill Area Drainage Master Plan (ADMP) Update* completed by Wood/Patel in September, 2002, expanded the existing Spook Hill ADMS completed in July 1987 by quantifying the extent of flooding problems, incorporated existing drainage structures into the model, developed alternative solutions to flooding problems for the contributing watershed and determined the feasibility of removing the jurisdictional status of the Buckhorn-Mesa Structures. It is important to note that this study utilized a vertical datum of NAVD 1988.

3.3 Spook Hill ADMP Supplement

Wood/Patel prepared a supplemental document to update the ADMP dated October 2005, for the relocation of a proposed detention structure originally located at the northeast corner of McDowell Road and 88th Street. The new basin location is at the northeast corner of Hawes Road and Culver Street.

3.4 Revised Drainage Report for Madrid

JMI & Associates, Inc. updated the drainage report for Madrid in June, 2004. The update to the report included the addition of the detention basin at the intersection of McDowell Road and 90th Street. The report contained stage-storage rating curves for the basin that were incorporated into HEC-1 modeling developed with this study.

3.5 Existing Conditions Sediment Yield

Sediment deposition was analyzed based on JE Fuller's report, *Spook Hill Area Drainage Master Plan Update Existing Conditions Sedimentation Analysis*, dated March 29, 2000. This report provided sediment yield estimates on a per year basis and also for various design storm events. These sediment yield estimates were incorporated into the modeling of the Madrid detention basin to account for sediment deposition from the natural watershed. The watershed contributing to the basin is approximately 0.67 square miles (HEC-1 ID 370). A 100-year storm event produces on average 0.82 ac-ft/sq. mile of sediment. Therefore, a 1.0 ac-ft reduction accounts for two potential 100-year storm events occurring within the same year if the basin is maintained annually.

3.6 Storm Drain Material Analysis

An analysis and data compilation prepared for the City of Mesa to aid in their decision regarding the use of a modified Corrugated Metal Pipe for the storm drain analysis and cost estimates. Report and data compilation was completed by Wood/Patel, April 2000.

4.0 DEVELOPMENT OF ALTERNATIVES

4.1 Constraints to the Drainage System Alternatives

Each alternative studied for the supplement to the ADMP was limited by the same boundary constraints. The boundary constraints included flows developed in the ADMP for proposed storm drain systems downstream of the Hermosa Vista - Hawes system. One system begins at the intersection of McDowell Road and Hawes Road. This system drains to the west along McDowell Road to the Spook Hill Flood Retarding Structure (F.R.S.). The design flow for this system as reported in the ADMP is 783 cfs. The other storm drain system originates along Hawes Road. This system continues along Hawes Road to Hermosa Vista Road where it drains west to the Spook Hill F.R.S. The design flow for this system as reported in the ADMP is 165 cfs.

Sediment deposition into the Madrid detention basin was also taken into account for each alternative modeled. The overall storage volume of the Madrid detention basin was reduced by 1.0 acre-foot of volume to account for sediment. This was a conservative volume reduction. The watershed contributing to the basin is approximately 0.67 square miles (HEC-1 ID 370). A 100-year storm event produces on average 0.82 ac-ft/sq. mile of sediment. Therefore, a 1.0 ac-ft reduction accounts for two potential 100-year storm events occurring within the same year if the basin is maintained annually.

4.2 Design Parameters

In all the alternatives studied, the Culver - Hawes basin was designed as an off-line basin. A junction structure is proposed on the proposed 78" pipe on Hawes Road adjacent to the basin with a splitter structure to allow a pre-determined design bypass flow. Refer to Sheet P-3 in Appendix A for a depiction of the basin and splitter structure. Once the design bypass flow rate is exceeded, the splitter structure will allow flow to enter the basin. A detailed design and analysis of the splitter structure will be required at the final design level to ensure proper functioning.

Minimum side slopes of 6:1 are used inside the basin and adjacent to right-of-ways and minimum fill embankment slopes of 4:1 is used outside of the basin. In order to maximize storage volume and minimize land requirements for the basin, it is designed with a minimal slope bottom. The basin is dewatered via gravity flow to a low-flow pipe outlet. The low-flow pipe outfalls into a proposed storm drain in Hawes Road and will dewater the basin within 36 hours.

A 12-foot wide path is provided at the top of the basin to accommodate a maintenance access road around the basin. Provisions have also been made for access to the basin bottom via an access ramp.

The detention basin is designed to limit the embankment fill to ensure that basin is classified as a "non-jurisdictional dam". In accordance with the Arizona Department of Water Resources (ADWR) regulations, embankment fills of six feet or less are classified as non-jurisdictional dams regardless of storage capacity. Embankment fills of less than 25 feet are classified as non-jurisdictional if the storage capacity is less than 50 acre-feet. If the storage volume is less than 15 acre-feet, regardless of embankment height, the basin is classified as non-jurisdictional. The dam height for purposes of ADWR dam classification is the vertical difference between the lowest point on the downstream toe (at natural ground) and the emergency spillway crest.

The design of the detention basin also incorporates aesthetic considerations such as terracing and re-vegetation. Multi-use considerations were not considered for this basin site.

Storm drains were designed for the 100-year discharge. Due to the steep slopes along the storm drain alignments and the desire to keep the velocities in the range of 15 ft/sec, CMP was utilized as the primary pipe material for the conceptual design. In order to alleviate any concerns as to its durability, the invert of the CMP will be paved with 3" of 5000psi concrete (reinforced with welded wire fabric which is welded to the CMP itself) and the pipe will be slurry backfilled to 1' above the crown of the pipe. A minimum of 3-feet of cover was used over the storm drains to allow for full pavement structural section over the top of the pipe. It should be noted that the use of CMP pipe material is consistent with the recommendations from the ADMP.

The District may, however, choose to utilize Reinforced Concrete Pipe (RGRCP) or other pipe material for the final design based on the design standards applicable at the time of final design as well as input from the partnering community. This will require revisions to the design parameters as well as the pipe profiles and the cost estimate.

Although the costs for a pipe installation of this type are higher than a standard CMP installation, they are still lower than the cost of RGRCP. This is largely due to the fact that the higher roughness factor of CMP allows the designer to eliminate the drop structures at 200 foot intervals required along the storm drain alignment if RGRCP is used (these drop structures would be required with RGRCP in order to keep the velocities within reasonable limits).

4.3 Development of Alternatives

Wood/Patel was initially contracted to investigate three alternatives as part of the ADMP supplement. Upon, beginning the alternative analysis, it was determined that additional alternatives should be modeled. In total, six alternatives were evaluated and then presented to the District. Tables 2A and 2B provide design summary data for each of the alternatives analyzed and Table 3 provides a summary of costs for each alternative. The following information has been provided as a summary of each alternative that was studied.

Alternative One

Alternative one (Plate 4) utilizes the Madrid detention basin. A minor flow of 40 cfs is released through the existing outlet structure into the Madrid subdivision to meet the Section 404 requirements for the wash. The remainder of the flow produced by the stage-storage routing of the Madrid detention basin is taken west along McDowell Road within a proposed 72" storm drain. At Hawes Road, the system turns south and continues south within a 78" storm drain system along Hawes Road to the proposed Culver - Hawes basin.

Alternative Two

Alternative two (Plate 5) utilizes the Madrid detention basin and releases the entire reduced flow produced by the stage-storage routing into the Madrid subdivision. The flow is then collected within the Madrid subdivision in the vicinity of 87th Street and Culver Street. The flow is directed west within 2-66" storm drains to the Culver - Hawes basin site.

Alternative Three

Alternative three (Plate 6) utilizes the Madrid detention basin. Alternative three allows 108 cfs to be released into the Madrid subdivision. The remaining flow produced by the stage-storage routing through the Madrid detention basin is taken west within a 66" storm drain along McDowell Road. At Hawes Road, the system turns south and continues south along Hawes Road in a 72" storm drain to the proposed Culver - Hawes basin.

Alternative Four

Alternative four (Plate 7) utilizes the Madrid detention basin. The outflow produced by the stage-storage routing from the basin is taken west along McDowell Road within a 78" storm drain. At Hawes Road, the system turns south and continues south along Hawes Road in an 84" storm drain to the proposed Culver - Hawes basin.

Alternative Five

Alternative five (Plate 8) does not utilize the Madrid detention basin. The entire flow that reaches the basin site is routed west along McDowell Road in 2-78" storm drains. The flow continues south along Hawes Road in 2-84" storm drains to the proposed basin site. This model is intended to determine the overall effect utilizing the Madrid detention basin has on the volume requirements for the proposed Culver - Hawes basin.

Alternative Six

Alternative six (Plate 9) utilizes the Madrid detention basin. A minor flow of 40 cfs is released through the Madrid subdivision to meet the Section 404 requirements. The remainder of the flow produced by the stage-storage routing of the Madrid detention basin is taken west along McDowell Road within a 72" storm drain. At Hawes Road, the system turns south and continues south along Hawes Road in a 78" storm drain to the proposed Culver - Hawes basin. In an attempt to provide cost savings to the Hermosa Vista–Hawes Road storm drain system downstream of the basin, this alternative maximizes the size of the Culver - Hawes basin.

4.4 Hydrologic Modeling

Several existing condition and future condition models were developed with the ADMP.

Existing Conditions

100-year/24-hour, 100-year/6-hour and 10-year/6-hour, with sub-basins and points of concentration defined for the 100-year frequency.

Future Conditions

100-year/24-hour, 100-year/6-hour, 100-year/2-hour, 10-year/6-hour, with sub-basins and points of concentration defined for the 100-year frequency.

To be consistent with the intent or recommendations of the ADMP, this study utilized the future conditions 100-year, 24-hour model developed in the ADMP. The model was modified to reflect the new basin location based on current District methodology. Refer to Table 1 for a summary of the peak flows for each alternative.

5.0 PREFERRED ALTERNATIVE SELECTION

Upon completion of the analysis of the six alternatives, the team evaluated the six alternatives to determine a preferred alternative. Refer to Plate 10 for the preferred alternative. Criteria used in the evaluation process included items such as: capitol cost, benefited area, public acceptance, implementability, aesthetics and conformance with the original ADMP plan.

The team determined that alternative two, although it was clearly the least cost option, did not satisfy the criteria of conforming with the intent of the ADMP's plan for the area. This alternative also presented difficulties with implementation due to the modifications that would be required within the Madrid subdivision to capture flows to be conveyed along Culver Street to the proposed basin site. Alternative three also did not supply a level of flood protection equivalent to the ADMP and therefore was eliminated. Alternative four was eliminated due to conformance. The team felt that alternative four would not satisfy Section 404 requirements for the wash that flows through the Madrid subdivision with the elimination of flows from the Madrid detention basin that drain into the subdivision. Alternative five was eliminated due to cost considerations. Alternative six was eliminated due to cost considerations and aesthetics. The size of the basin site is fixed, therefore, the increase in basin size required to implement alternative six would reduce the ability to vary the shape of the basin.

Upon completion of the analysis of the six alternatives, the team determined that alternative one was the preferred alternative. The team felt that alternative one was the closest to meeting all the criteria used in evaluating the alternatives. The alternative is described further in detail in Section 6.0 – Preliminary Design Plans.

6.0 PRELIMINARY DESIGN PLANS

The ADMP supplement documented the alternatives studied for the relocation of the detention basin originally planned at the northeast corner of 88th Street and McDowell Road to the northeast corner of Culver Street and Hawes Road. This report provides a more detailed summary of the hydrology, hydraulics, landscape plans, and costs associated with the relocation of the basin. This report also provides 15% plans for the preferred alternative. A hydrologic summary is given in Appendix B. A hydraulic analysis for the storm drain is provided in Appendix C. A detailed cost estimate is provided on Table 4.

6.1 System Description of the Preferred Alternative

The preferred alternative includes the following elements: an online detention basin at McDowell Road and 90th Street (Madrid Detention Basin), a 72" storm drain within McDowell Road from 90th Street to Hawes Road, a 78" storm drain within Hawes Road from McDowell Road to Culver Street, and an off-line detention basin at Hawes Road and Culver Street. The basin will outlet into the proposed storm drain in the Hawes / Hermosa Vista alignment per the ADMP. The plan elements are identified on the Preferred Alternative exhibit (Plate 10) and in plan and profile at the end of this report. The purpose of this section of the report is to discuss, in further detail, the planned improvements, project costs, and special issues to be considered during final design. Each section includes a description of a particular project element, and discussions of 404 permit impacts, right-of-way requirements, and potential utility conflicts.

6.2 Madrid Detention Basin and Outlet

The Madrid detention basin is located within an unincorporated portion Maricopa County at the northwest corner of the intersection of McDowell Road and 90th Street The existing basin attenuates the peak discharge from the offsite watershed (sub-basin 370 on Plate 11 as identified in the future conditions model) before it enters the proposed McDowell Road storm drain.

The existing on-line basin has a footprint of approximately 6.5 acres, a total storage volume of 33.7 acre-feet, and is located on a 9.4 acre parcel. To create a redistribution of outlet flows per the preferred alternative, modifications are proposed to the existing culvert outlet. The existing outlet structure will need to be modified to limit flows through it to the initial Section 404 low flows required for the downstream wash and flows in excess of the 100-year, 24-hour design event. An inlet structure will be required to allow flows to enter the proposed McDowell Road storm drain.

Madrid Detention Basin

Due to the basin functioning as an on-line structure, sediment deposition needs to be accounted for in the design. An agreement needs to also be worked out regarding the maintenance requirements for the basin.

No utility conflicts are anticipated within the basin area.

During this study, the District learned that flows from the offsite watershed that were modeled to reach the Madrid detention basin are not properly reaching it. Residents in the area reported that the basin appeared to be receiving only minor flows during rainfall events. Therefore, some additional survey work was done at the upstream end of the basin to better understand what is occurring. It was determined flows from the major wash that enters the basin from east of 90th Street are being diverted south along 90th Street rather than crossing 90th Street and flowing into the basin. 90th Street is maintained by MCDOT.

90th Street wash crossing north of Madrid Detention Basin

Therefore, three to six months prior to the construction of the Hermosa Vista – Hawes Road Basin and Storm Drain project, MCDOT will modify 90th Street in the area of the wash crossing to create a dip section (low flow crossing) that directs runoff to the Madrid detention basin. The modification to 90th Street may also include grading between the Madrid detention basin and 90th Street by MCDOT.

6.3 McDowell/Hawes Road Storm Drains

Located in Maricopa County, the proposed storm drain extends along McDowell Road from approximately 90th Street to Hawes Road and within Hawes Road from McDowell Road to Culver Street.

The storm drain will convey stormwater from the Madrid detention basin to the Culver – Hawes basin. The proposed system consists of a buried storm drain pipe. The 100-year, 24-hour discharge in the storm drain is approximately 335 cfs along McDowell Rd. and 328 cfs along Hawes Road. The storm drain sizes vary from 72" along McDowell Road to 78" along Hawes Road. Currently a 90 degree bend is shown at the McDowell / Hawes Road intersection for the storm drain. The final design would incorporate two 45 degree bends to improve the hydraulic efficiency.

Entire improvements are anticipated to be accomplished within the existing right-of-way.

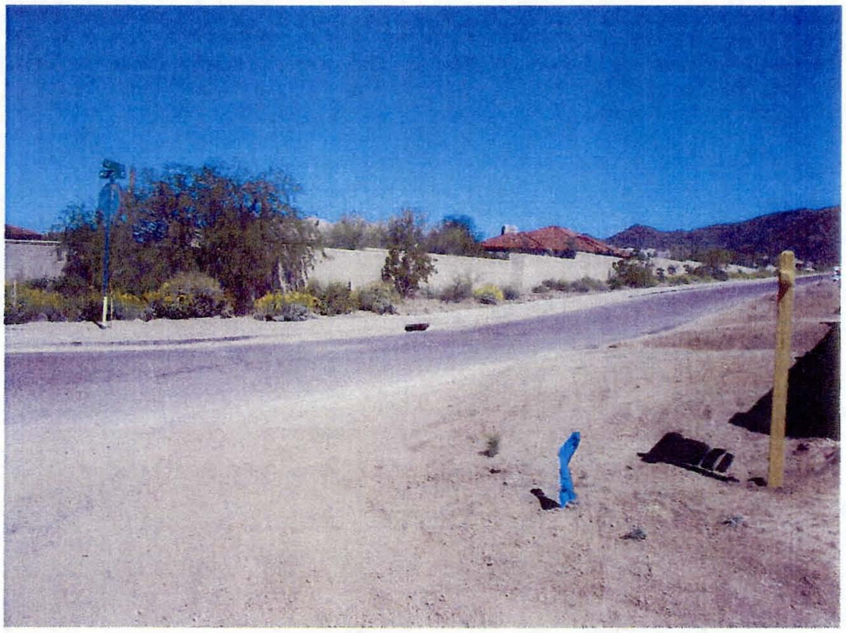
The pipe installation will impact one wash which has been identified by the Corps as regulatory waters. The wash is supplied by a culvert that crosses McDowell Road east of the 86th Street entrance to the Thunder Mountain subdivision. A low or vegetative flow will be maintained to the downstream wash following construction (this flow is based on the size of the existing downstream wash and may be equivalent to the bank full flow). A diversion structure will need to be constructed to maintain these flows. The remainder of the flow will be conveyed within the proposed 72" storm drain to the proposed Culver – Hawes basin.

There is one additional culvert conflict along McDowell Road. It occurs at the Madrid detention basin. The contributing area to the inlet for this culvert appears to have been cut-off by the construction of the basin; therefore, the culvert may not need to be maintained. If the culvert needs to be maintained for 404 purposes, accommodations will need to be made in the final design.

In addition to the culvert conflicts, there are water, sewer, gas, telephone, power, and cable TV lines present along the alignment. A total of four waterline crossings occur along McDowell Road and three along Hawes Road.

There are three potential sewer line conflicts. Two are located along McDowell Road at the eastern edge of the Thunder Mountain subdivision at the 88th Street alignment. Both sewers end within the McDowell Road right-of-way. One of the sewers enters McDowell Road from the north side and the other enters from the south side of McDowell Road. The other potential sewer conflict is located at the proposed outfall location of the Madrid detention basin. This sewer ends at the northern edge of McDowell Road. The sewer flows east and then south into the Madrid subdivision. Limited information identifying the vertical location of the three sewers was available for this study. Therefore, it is recommended that potholing be done during the design phase to properly locate the sewer. Due to the steep slopes within the study area, it is believed that potential conflicts could be avoided with the three crossings. It is also unclear at this time what the ultimate intent is for these three sewer systems. Further investigations are recommended to determine if these systems will ever be used.

The ADMP HEC-1 model identifies the downstream boundary of sub-basin 395 as 88th Street. Flows that reach this sub-basin boundary were modeled to continue through the Thunder Mountain subdivision to an existing channel along the southern boundary of the subdivision adjacent to McDowell Road. It was determined during this study that flows that reach 88th Street do not continue as modeled in the hydrologic model through the Thunder Mountain subdivision. Instead, a major portion of the flows would be intercepted by 88th Street and routed south to McDowell Road where it would then continue south and west. Wood/Patel was requested to develop design options to capture the runoff and direct it to the Thunder mountain subdivision channel to follow the intent of the ADMP.



88th Street and McDowell Road intersection

Wood/Patel developed three options to redirect flows into the channel. Due to steep longitudinal slopes along 88th Street, it was determined that the addition of curb openings along 88th Street to allow more runoff to flow through the subdivision would not provide a significant benefit. Therefore, it was determined that the design solution should be focused immediately north of McDowell Road along 88th Street at the inlet to the existing channel. Option 1 consists of regrading 88th Street north of the McDowell Road intersection and installing a depressed curb opening along the west side of the street. The pavement would be warped in the area of the depressed curb to direct runoff towards it. Option 2 utilizes a grated inlet (similar to a cattle guard) across the road. Flows are collected through the grate and then outlet into the existing channel. Both options would require regrading of 88th Street to create a high point that would limit runoff from flowing directly out on to McDowell Road. Option 3 consists of a collection channel along the east side of 88th Street that would outlet to a culvert under 88th Street and ultimately to the existing Thunder Mountain channel. The collection channel may require the acquisition of right-of-way from existing homes along 88th Street and a guardrail adjacent to 88th Street. At the time of the completion of this study a preferred option was not chosen. A final recommendation will need to be made as part of the Hermosa Vista – Hawes Road basin and storm drain design project. It is important to note that the preferred alternative cost summary includes the cost of option 3. Refer to Appendix C for the three options and Appendix D for the preliminary cost estimates for each option.

6.4 Culver – Hawes Basin

The proposed off-line basin has a footprint of 8.6 acres, a peak storage volume of 25 acre-feet, and is located on a 9.6 acre parcel. The diversion of stormwater into the basin is accomplished via an underground splitter structure and an at-grade side-weir which allow more frequent (smaller) flows to pass by unimpeded but diverts less frequent (larger) flows into the basin for temporary storage. The bypass flow is estimated to be 70 cfs and the peak diversion into the basin during the 100-year, 24-hour event is 265 cfs. A 78" storm drain is proposed for the diversion of flows into the basin.

A preliminary geotechnical investigation (Reference 8) of the basin site did not identify bedrock at the proposed basin depths. Therefore the excavation costs are based on no bedrock excavation.

The existing wash that enters the basin along the northern edge has been designated as a Section 404 regulatory wash by the Corps. The jurisdictional delineation ends within the basin area. The basin will be graded to maintain the wash in a manner similar to its existing flow pattern into the basin. The proposed natural design of the basin may be utilized as potential mitigation measures for 404 disturbances.

No utility conflicts are anticipated within the basin area.

Proposed Culver – Hawes Basin site

6.5 Probable Cost of Construction

The preliminary opinion of probable cost for the preferred alternative is summarized in Table 4. The preliminary opinion of probable cost for the preferred alternative is $3,879,800. This cost includes the cost for the acquisition of the Culver-Hawes basin site.

7.0 LANDSCAPE AESTHETICS

The District has a Landscape Aesthetics policy for developing their facilities, where feasible, in such a manner that they are aesthetically responsive to or compatible with the character of the existing site and the surrounding area. To meet this objective, among others, the Spook Hill ADMP provides a characterization of the existing corridor, which includes a description of the natural and physical environment that identifies (among other items) the regional and local setting, geology, and ecological and visual resources of the area. Furthermore, the plan identifies environmental and aesthetic considerations, as well as Landscape Design Themes & Aesthetic Design Guidelines to minimize the impacts and enhance the development of the proposed flood control facilities within the Spook Hill ADMP study area.

In order to develop the Culver - Hawes basin to be compatible with the character of its site and surroundings, further assessment of the natural and physical environment of the basin site was conducted. This understanding of the topography, ecology and vegetation, and visual resources and landscape character of the site was then used in the development of the design for the basin. Specifically, the consideration of these resources has assisted in the design of the: basin configuration, elements to control site lines and views, shape of landforms (grading design), density and layout of proposed plant material and landscape revegetation.

7.1 Landscape Characteristics

This section summarizes the assessments, considerations and recommendations that were followed to address the resources in the conceptual design of the basin.

Topography

The site naturally slopes from the northeast corner to the southwest corner with roughly 26 feet of fall across the site, producing an average slope of 2.7 percent across the entire site with slopes ranging from 1 percent to 4 percent. Large flat areas are dissected by several washes of varying sizes, often braided, which run across the site (Plate 12). These drainages have created a topographic pattern that is generally angular in character with relatively sharp transitions. The site has been characterized into three landform areas based on these topographic and drainage patterns as follows (Plate 13):

Open Flats – Open flat topography with both clearly defined dissected washes and shallow wide washes with sandy bottoms

Central Washes – Heavily dissected area with numerous braided washes and undulating topography

Northeastern Drainages – Gently falling grade with rolling topography and undulating wash corridors

The basin concept has been designed to emulate the existing undulating and angular character of the site's topography and landform by developing a contour-grading plan for the basin that transitions out of and mimics these existing landform patterns where possible (Plates 14.1 and 14.2).

Ecology

The ecology of the site is classified as Sonoran Desert Biome, Arizona Upland Subdivision, Sonoran Palo Verde Mixed Cacti, Mixed Shrub Community – Xeroriparian Desert Habitat (Plate 15). In general, these areas may provide suitable habitat for noted species including cactus ferruginous pygmy-owl, lesser long-nosed bat, Sonoran desert tortoise, and American peregrine falcon. Prominent species observed on the site have included Gambel's quail, desert cottontail, and hummingbird.

The ecology of the site will be maintained, to the degree possible, through preservation and reestablishment of this existing vegetation found on the site in similar densities and patterns.

Circulation of wildlife is also an important consideration in protecting wildlife both during construction as well as once construction is completed. A four stranded smooth wire fence will allow wildlife to pass to and from the site. Also, major excavations (trenches) during construction that present hazards to wildlife will be monitored and/or covered during construction.

Vegetation

Several mature trees (primarily palo verde and ironwood), shrubs (bursage and creosote), and cacti (cholla cacti, barrel cacti, and saguaro) make up the dominant vegetation and are dispersed fairly evenly across the site. Interwoven into this foundation are a variety of other species native to the Sonoran Desert. Groupings of cholla occupy large portions of the flat areas of the site, while large and small shrubs are evenly distributed throughout. The northeast corner is relatively open and absent of large species. Several mature saguaros are found across the entire site but primarily concentrated across the center of the site. A small stand of relatively young saguaros is located near the southwest corner of the site. Figure 6 illustrates areas delineated by dominant species the locations of saguaro and large trees. Less dominant vegetation found throughout the site includes jojoba, desert milkweed, ragweed, brittlebush, wolfberry, mariola, desert lupine, and beavertail prickly pear.

The District is proposing to revegetate the Culver - Hawes basin site as shown on the conceptual landscape plan (Plates 16.1, 16.2, and 16.3). Existing vegetation will be preserved where possible. Areas of the site that are disturbed by construction of the basin will be revegetated through the use of hydroseed, tallpot plantings, container material, and/or other similar methods. Additionally, plant material located within disturbance areas that can be successfully and economically salvaged will be reused on the site to help maintain the site's character. It is anticipated that cacti such as cholla and saguaro will be the primary plants salvaged from the site. Plantings will be designed to emulate the existing vegetation in density, location, pattern, and type to the greatest degree possible.

Irrigation

At this time, an automatic irrigation system is not proposed as part of the project. However, a form of irrigation will be provided in order to establish plant material on site. Potential methods being considered for temporary irrigation include the use of DriWater canisters installed at the time the vegetation is planted, watering trucks, and/or a temporary irrigation system.

City of Mesa Uplands Requirements

The site is located within the jurisdiction of Maricopa County. All pertinent zoning and ordinance requirements will be followed. As discussed, the District is committed to developing the basin site in a manner that is consistent with the natural Sonoran Desert and the surrounding character of the site. The design will follow the guidelines identified in the City of Mesa Desert Uplands Development Standards in that the project is designed to minimize disturbance and encourage preservation of the natural character and aesthetic value of the site. This will be achieved through (1) the use of native plant material consistent with the Upper Sonoran Desert community and in accordance with the Preferred and Acceptable Desert Uplands Plant Lists provided in the ordinance, and (2) grading the site to reflect the natural landforms of the surrounding area including varied slopes and berming in and around the basin as opposed to typical retention basins designed with landforms having consistent and straight side slopes.

7.2 Visual Resources and Landscape Character Assessment

Landscape Setting

The Culver - Hawes basin site is located in Maricopa County within the Sonoran Desert Landscape Character Type, Mountain Lands Subtype, and Natural Bajada Landscape Unit (Natural and Suburban Bajada Landscape Units surrounding) in an area transitioning to the Tonto Landscape Character Type (Plate 17). The Natural Bajada Landscape Unit is comprised of the characteristics of the Bajada Physical Division and those of the Natural Cultural Setting. Similarly, the Suburban Bajada Landscape Unit is comprised of the characteristics of the Bajada Physical Division and those of the Suburban Cultural Setting (FCDMC, Preliminary Existing Landscape Character Assessment Report, 2003). This area in which the site is located is characterized by slightly sloping landforms that exhibit braided networks of washes and arroyos with saguaro, palo verde, and mixed cacti vegetation. Cultural modifications in the immediate site vicinity include dispersed rural and suburban residences.

Prominent Views

For the purposes of this study, several existing key views have been identified (Plate 18). These include: (1) views from the intersection of Culver Street and Hawes Road looking north/northeast toward Usery Mountain; (2) views onto the site from residents along

Culver Street looking north across the site; (3) views from residents along Hawes Road looking northwest across the site; and (4) multiple viewpoints across the site looking north/northwest towards the transition zone between the Sonoran Desert Landscape Character Type in the middle ground to the Tonto Landscape Character Type in the background. Additionally, development proposed to the north and east of the site creates the potential for future views looking south and east onto and across the site.

Designing the basin to emulate the landform (topography) and vegetative patterns and densities found on the site and the adjacent parcels will help to maintain the visual character of the site. The grading design has been developed to preserve and enhance the key views into and across the site. Landform and vegetation have also been used to screen undesirable elements such as rooftops and structures and frame focal points such as distant views like that of Usery Mountain (Plates 19 and 20).

Multi-Use Opportunities

The Culver - Hawes basin site is currently undeveloped and appears to have no multi-use functions. The conceptual basin design does not propose a multi-use component at this time, however, there is the potential for the City of Mesa to utilize the proposed maintenance roads for trails and develop seating nodes along the upper portions of the basin.

Cultural Environment

A Class I cultural resource study based on results of an archaeological inventory and site records review from various federal, state, and local agencies was conducted as a part of the Spook Hill ADMP. The study identifies several Hohokam archaeological sites and numerous historic sites located in the Spook Hill study area; however, the cultural resources identified in the ADMP are not associated with the Culver - Hawes basin site, and therefore consideration of cultural resources was not addressed in detail in this study. The completion of a Class III intensive cultural resource survey is recommended in the Spook Hill ADMP for those sites that are relatively undisturbed, such as the Culver - Hawes basin site. If cultural resources were encountered during construction, work would stop at that location and the District would contact the respective agencies to arrange for the proper assessment or treatment of those resources.

8.0 FINAL DESIGN – ISSUES AND RECOMMENDATIONS

The recommended drainage system alternative is alternative one. The recommended alternative includes the following elements: an existing online detention basin at McDowell Road and 90th Street (Madrid Detention Basin), a 72" storm drain within McDowell Road from 90th Street to Hawes Road, a 78" storm drain within Hawes Road from McDowell Road to Culver Street, and an off-line detention basin at Hawes Road and Culver Street.

Information was limited for this study as to the vertical location for the utility conflicts identified on the 15% design plans. It is recommended that potholing be done during the design phase of this project to determine a more accurate vertical location of the utilities. Due to the steep slopes along the proposed alignments, it is believed that the potential utility conflicts could be minimized by increasing the amount of cover over the pipe. The pipe slope could then be lessened downstream of the utility conflict to reduce the pipe cover back to more typical depths.

As mentioned previously, due to steep slopes along the potential alignments and the desire to keep the velocities in the range of 15 ft/sec, CMP was utilized as the primary pipe material for the conceptual design. If the District chooses to utilize Reinforced Concrete Pipe (RGRCP) or other pipe material for the final design, revisions will be required to the design parameters as well as the pipe profiles and the cost estimate. For the McDowell Road alignment, the modifications may include the use of drop structures at 200 foot intervals in order to keep the velocities within reasonable limits. RGRCP may be feasible along the Hawes Road alignment. Slopes along Hawes Road tend to be less than along McDowell Road (< 2.0%) and therefore the velocities are reduced.

9.0 REFERENCES

1. Wood, Patel & Associates, Inc., *Spook Hill Area Drainage Master Plan,* September 2002.

2. JE Fuller/Hydrology & Geomorphology, Inc., *Spook Hill Area Drainage Master Plan Update Existing Conditions Sedimentation Analysis*, dated March 29, 2000.

3. JMI & Associates, Inc., *Revised Drainage Report for Madrid*, June, 2004.

4. JMI & Associates, Inc., *Revised Paving and Grading Plans at Madrid Mesa, Arizona,* May 20, 2004.

5. FEMA, *Flood Insurance Study, Maricopa County and Incorporated Areas, Arizona,* 2001.

6. Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County, Arizona; Volume I – Hydrology,* Revised January 1995.

7. Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County, Arizona; Volume II – Hydraulics,* January 1996.

8. Kleinfelder, Inc., *Geotechnical Report Hermosa Vista Basin NEC Hawes Road and Culver Street Maricopa County, Arizona Contract FCD 2003C012 Assignment No. 5,* June 17, 2005.

9. Wood, Patel & Associates, Inc., *Spook Hill ADMP Supplement*, August, 2005.

TABLE 1

HEC-1 Modeling Results Summary

Table 1
HEC-1 Modeling Results Summary

Major concentration point/Location	Hydrograph Name	REC_FC24.DAT	OPTION1.DAT	OPTION2.DAT	OPTION3.DAT	OPTION4.DAT	OPTION5.DAT	OPTION6.DAT	FINAL.DAT	Comments
		HEC-1 Model Names								
Model number		0	1	2	3	4	5	6	7	
Flow to west from the basin	D370	175	**335**	0	**266**	**374**	**817**	**335**	**335**	McDowell Pipe
Flow to southwest from the basin	S370	N/A	39	500	108	0	0	39	39	
Flow to west along McDowell at Hawes	B390W	783	700	700	700	700	700	700	700	
Flow to south along Hawes at McDowell	C370	N/A	**328**	**101**	**261**	**367**	**773**	**328**	**330**	Hawes Pipe
Flow to Culver/Hawes basin along Culver Rd.	C38B3b	N/A	**N/A**	**522**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	Culver Pipe
Flow to west at NWC of Hermosa & Hawes	C38B3c	165	143	141	142	143	145	94	154	
Detention Basin Data										
Madrid Basin flood depth (ft)		N/A	7	7	7	7	N/A	7	7	
Madrid Basin peak volume (ac-ft)		N/A	17	17	17	17	N/A	17	17	
Culver/Hawes Basin area (acres)		N/A	7.5	7.9	7.5	7.5	9.1	9.5	7.5	
Culver/Hawes Basin peak volume (ac-ft)		N/A	25	26	25	25	30	32	25	

Model Explanation

0 REC_FC24.DAT = Spook Hill ADMP Update recommended HEC-1 model for the future conditions of the 100-year 24-hour storm;
1 OPTION1.DAT = HEC-1 model of the 100-year 24-hour storm for alternative number 1;
2 OPTION2.DAT = HEC-1 model of the 100-year 24-hour storm for alternative number 2;
3 OPTION3.DAT = HEC-1 model of the 100-year 24-hour storm for alternative number 3;
4 OPTION4.DAT = HEC-1 model of the 100-year 24-hour storm for alternative number 4;
5 OPTION5.DAT = HEC-1 model of the 100-year 24-hour storm for alternative number 5;
6 OPTION6.DAT = Same as alternatvie number 1 with bypass flow to Culver/Hawes Basin reduced to 50 cfs from 100 cfs.
7 FINAL.DAT = HEC-1 model of the 100-year 24-hour storm for the preferred alternative.

Other Storm Events*

Return Period (Year)	24-Hr Rainfall (in)	Basin Inflow (cfs)	Basin Outflow (cfs)	Flood Vol (Ac-Ft)
1	1.1	0	0	0
2	1.51	0	0	0
5	2.08	71	7	4
10	2.46	124	10	8
100	3.81	265	22	25

* - Rainfall change only

TABLE 2

Drainage Element Preliminary Geometric Data

Table 2A
Hermosa Vista/Hawes Road Basin Alternatives

Basin Option Name	Design WSEL	Flood Depth	Dike Condition	Basin Length	Basin Width	Basin Area	Total Area*	Storage Volume	Cut Volume	
	(ft)	(ft)		(ft)	(ft)	(Acre)	(Acre)	(Ac-Ft)	(CY)	(Ac-Ft)
1	8	8	Yes	572	572	5.8	7.5	25	56,000	35
2	8	8	Yes	587	587	6.1	7.9	26	61,000	38
3	8	8	Yes	572	572	5.8	7.5	25	56,000	35
4	8	8	Yes	572	572	5.8	7.5	25	56,000	35
5	8	8	Yes	630	630	7.0	9.1	30	73,000	45
6	8	8	Yes	644	644	7.3	9.5	32	77,000	48

* -- Total area includes about 30% additional land for K & G purpose.

Table 2B
Pipe Design Element Summary (CMP)

Element and Option	Design Flow	Diameter	Slope	Length	Unit Price per foot	Total Cost
	(cfs)	(in)	(ft/ft)	(ft)		
1A	335	72	0.02	3300	$190	$627,000
1B	328	78	0.015	1400	$210	$294,000
2B	101	54	0.015	1400	$140	$196,000
2C	522	2-66	0.02	5000	$170	$850,000
3A	266	66	0.02	3300	$170	$561,000
3B	261	72	0.015	1400	$190	$266,000
4A	374	78	0.02	3300	$210	$693,000
4B	367	84	0.015	1400	$240	$336,000
5A	817	2-78	0.02	6600	$210	$1,386,000
5B	773	2-84	0.015	2800	$240	$672,000
6A	335	72	0.02	3300	$190	$627,000
6B	328	78	0.015	1400	$210	$294,000

TABLE 3

Cost Summary Table

TABLE 3 COST SUMMARY (CMP)
(Estimate of Probable Cost Based on Concept Analysis,
Certain Common Items to All Alternatives Are Excluded from This Estimate)

ALTERNATIVE	MAJOR ELEMENTS	LAND REQUIREMENT (acre)	TOTAL WITH LAND	COMMENTS
1	$2,576,000	7.5	$3,491,494	
2	$2,669,000	7.9	$3,584,041	
3	$2,438,000	7.5	$3,353,408	
4	$2,735,000	7.5	$3,650,146	
5	$4,397,000	9.1	$5,311,585	
6	$2,762,000	9.5	$3,676,588	

TABLE 4

Probable Cost for Preferred Alternative

Table 4 - Probable Cost for Preferred Alternative

Hermosa Vista/Hawes Road Storm Drain and Basin Drainage Improvements October 19, 2005
Flood Control District of Maricopa County W/P # 042284.01
FCD 2004 C045

MAJOR SYSTEM ELEMENTS

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Madrid Detention Basin Outlet Modification	$50,000	EA	1	$50,000
2	72" CMP Pipe	$190	LF	3,550	$674,500
3	72" Inlet Headwall	$5,000	EA	1	$5,000
4	78" CMP Pipe	$210	LF	900	$189,000
5	Export	$2.50	CY	9,485	$23,713
6	Manholes	$6,000	EA	13	$78,000
7	48" RCP Conflict Structure	$5,000	EA	1	$5,000
8	Hermosa Vista Hawes Road Basin Diversion Structure	$150,000	EA	1	$150,000
9	48" CMP Pipe	$135	LF	660	$89,100
10	Basin "D" Excavation	$6	CY	56,000	$336,000
11	78" Outet Headwall	$6,000	EA	1	$6,000
12	Outlet Rip rap	$65	CY	90	$5,850
13	Low Flow Channel Rip rap	$65	CY	150	$9,750
14	Basin Operations and Maintenance Road	$1	SF	24400	$24,400
15	18" Bleed-off Pipe	$45	LF	330	$14,850
16	Utility Relocations (W,G,T,C)	$6,000	EA	14	$84,000
17	Landscaping	$0.50	SF	326,700	$163,350
18	88th Street Collection System	$123,000	LS	1	$123,000
		SUBTOTAL MAJOR SYSTEM ELEMENTS			$2,031,513
		CONTINGENCIES:			
		Construction		25%	$507,878
		Engineering		7%	$177,757
		Construction Admin.		6%	$152,363
		TOTAL MAJOR SYSTEM ELEMENTS			**$2,869,511**

1. Construction Contingencies @ 25% of the Total Construction Cost
2. Engineering Costs @ 7% of the sum of Total Construction Cost and Construction Contingencies
3. Construction Admin. @ 6% of the sum of Total Construction Cost and Construction Contingencies

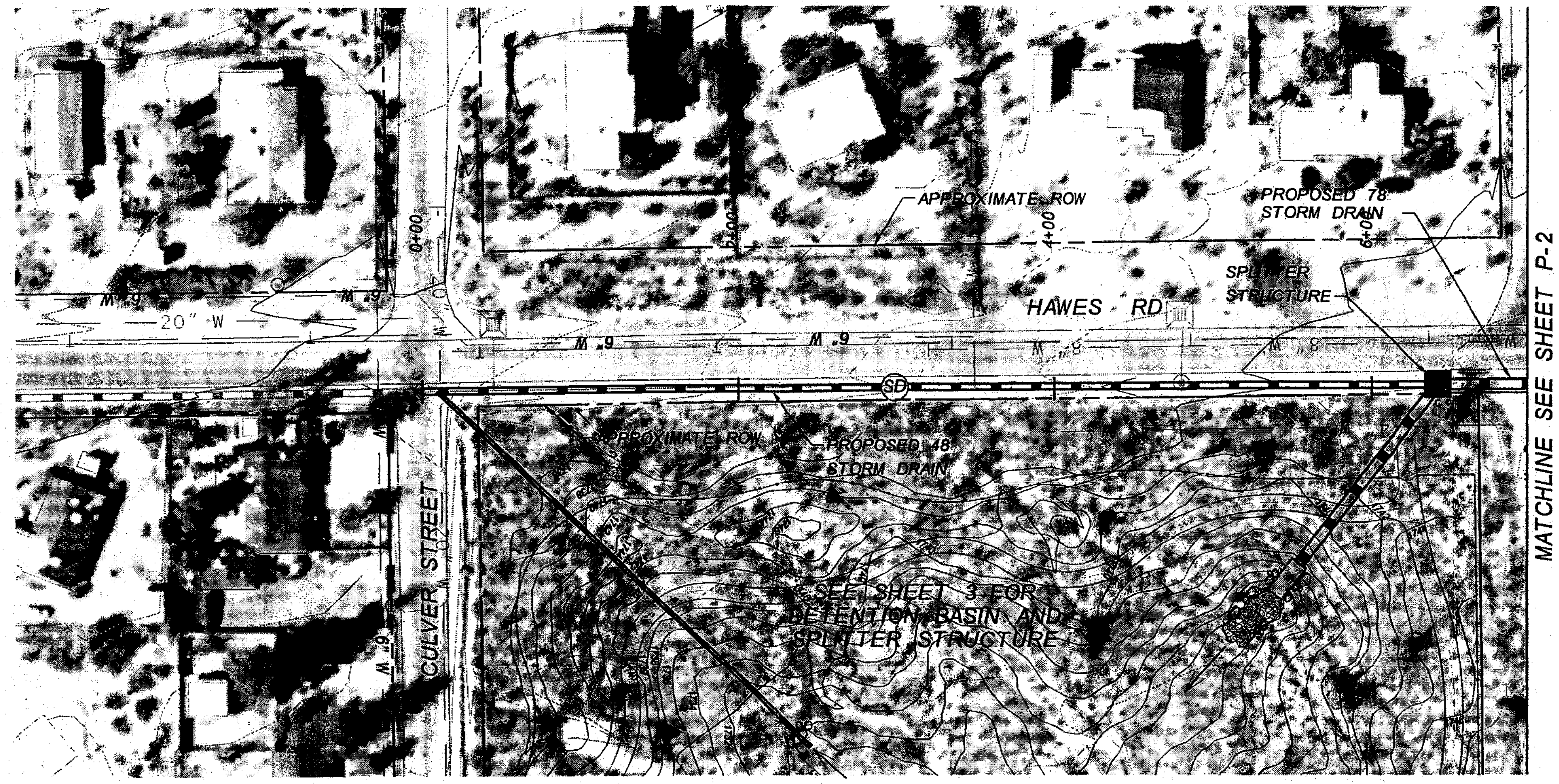
LAND ACQUISITION:

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Basin Land Acquisition[1]	$915,000	LS	1	$915,000
2	88th Street ROW	$95,300	AC	0.20	$95,300
			TOTAL LAND ACQUISITION		**$1,010,300**
			TOTAL		**$3,879,811**

1. Land Acquisition cost supplied by FCDMC

APPENDIX A

15% Design Plans



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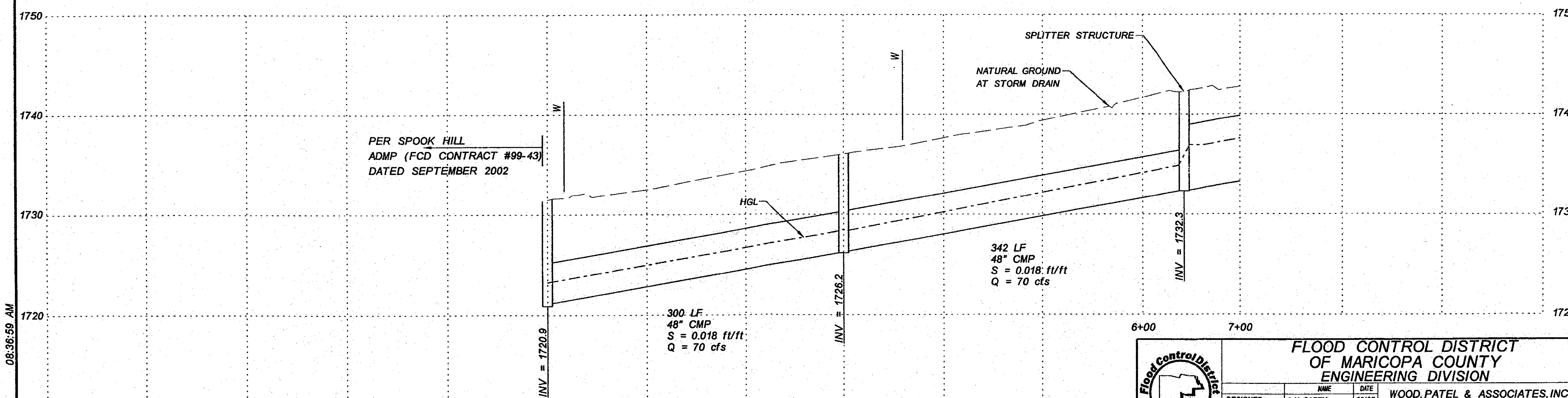

NOTE:
THESE PLANS ARE PRELIMINARY AND ARE PROVIDED FOR PLANNING PURPOSES ONLY. THE LOCATIONS OF ALL STRUCTURES, UTILITIES AND RIGHT-OF-WAY ARE APPROXIMATE AND ARE BASED UPON RECORD DOCUMENTS. AERIAL TOPOGRAPHY WAS PRODUCED AT A SCALE OF 1 INCH = 200 FEET WITH A 2 FOOT CONTOUR INTERVAL. MAPPING WAS PREPARED BY KENNEY AERIAL MAPPING AND WAS PROVIDED BY THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY.

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FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

Flood Control District of Maricopa County

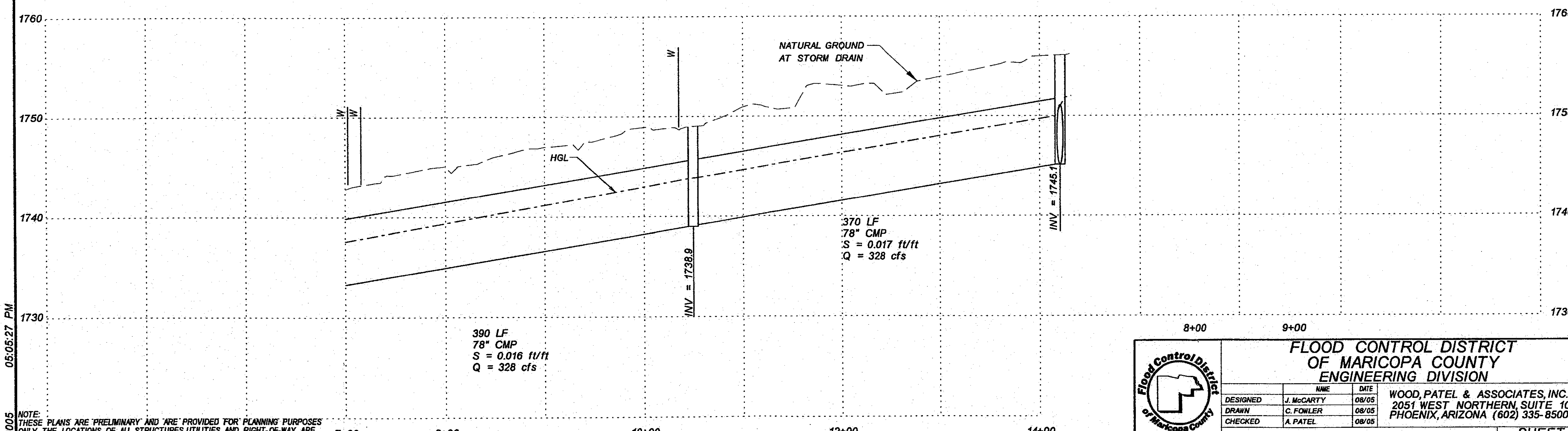
	NAME	DATE
DESIGNED	J. McCARTY	08/05
DRAWN	C. FOWLER	08/05
CHECKED	A. PATEL	08/05

WOOD, PATEL & ASSOCIATES, INC.
2051 WEST NORTHERN, SUITE 100
PHOENIX, ARIZONA (602) 335-8500

STORM DRAIN
HAWES ROAD ALIGNMENT

FIGURE:

SHEET
DWG. P-1



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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

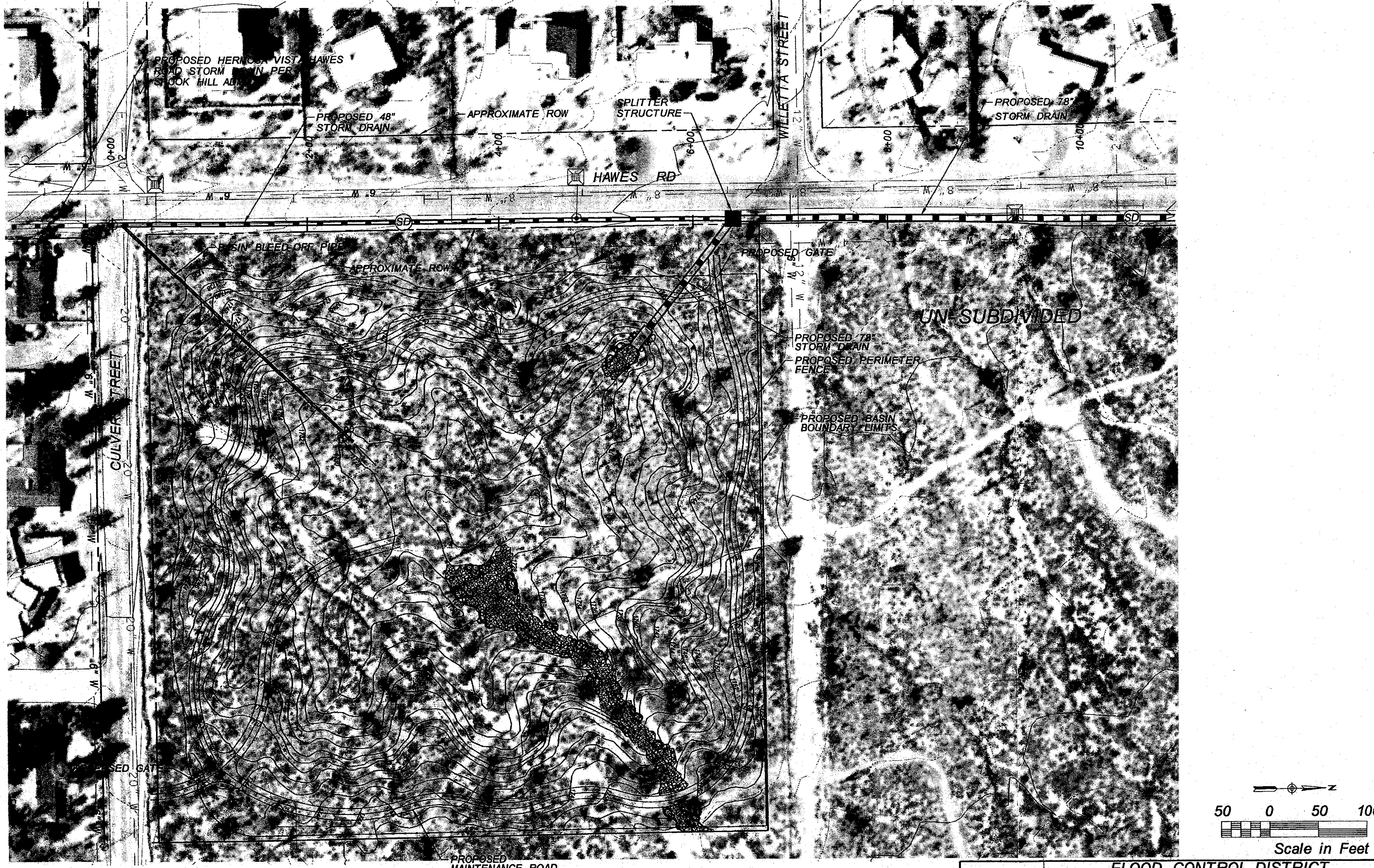
	NAME	DATE
DESIGNED	J. McCARTY	08/05
DRAWN	C. FOWLER	08/05
CHECKED	A. PATEL	08/05

WOOD, PATEL & ASSOCIATES, INC.
2051 WEST NORTHERN, SUITE 100
PHOENIX, ARIZONA (602) 335-8500

STORM DRAIN
HAWES ROAD ALIGNMENT

FIGURE:

SHEET
DWG. P-2



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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

	NAME	DATE
DESIGNED	J. McCARTY	07/05
DRAWN	C. FOWLER	07/05
CHECKED	A. PATEL	07/05

WOOD, PATEL & ASSOCIATES, INC.
2051 WEST NORTHERN, SUITE 100
PHOENIX, ARIZONA (602) 335-8500

BASIN PLAN

HAWES ROAD ALIGNMENT

FIGURE:

SHEET
DWG. P-3

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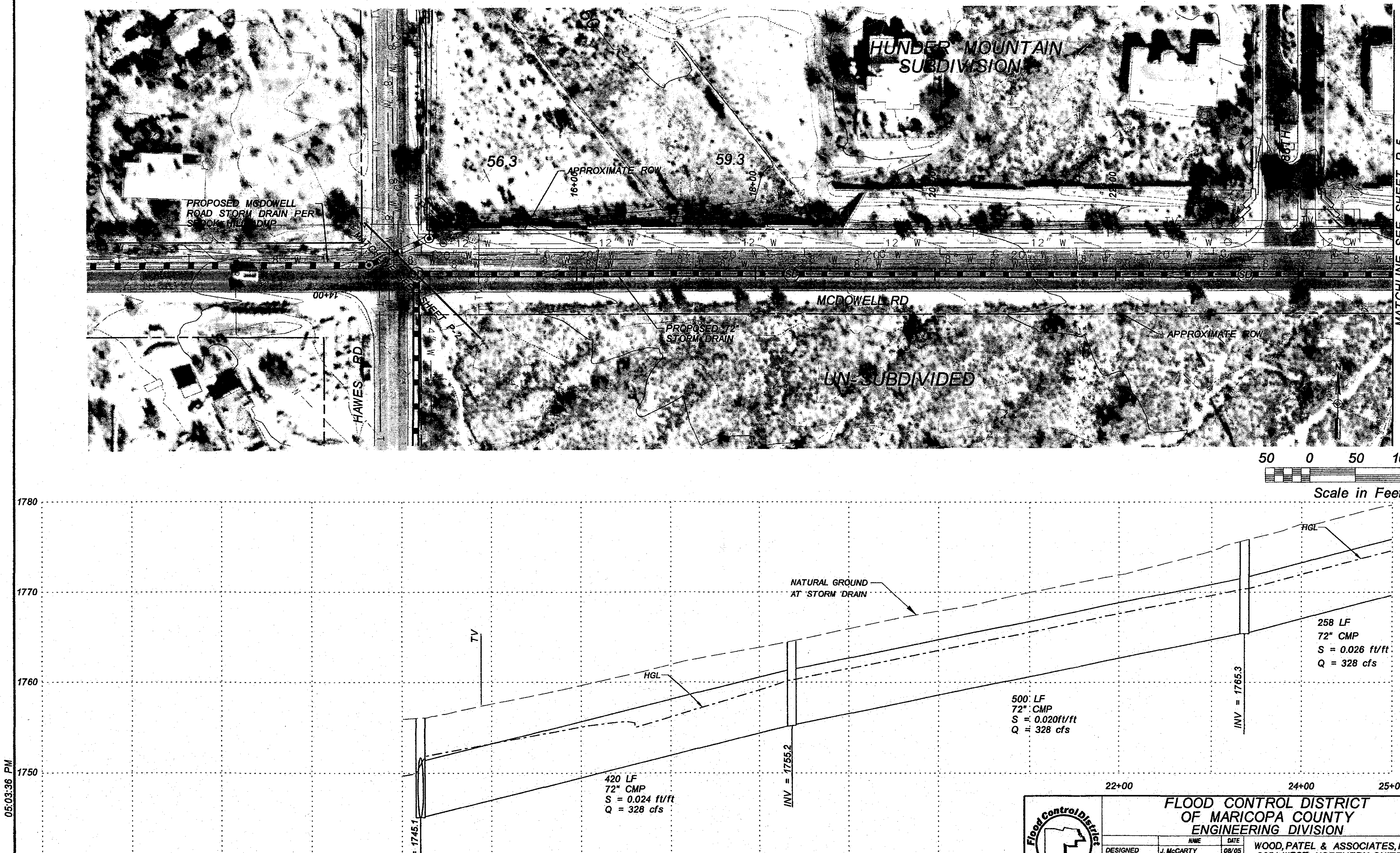

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

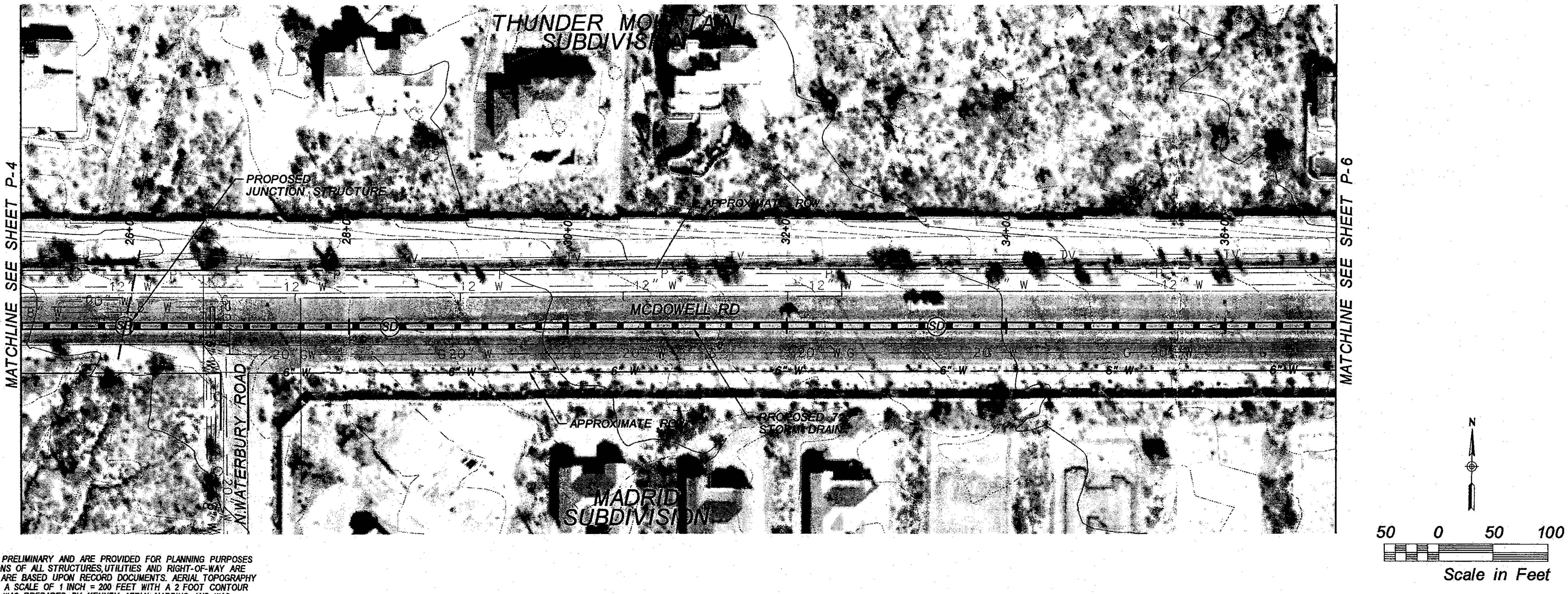
	NAME	DATE
DESIGNED	J. McCARTY	08/05
DRAWN	C. FOWLER	08/05
CHECKED	A. PATEL	08/05

WOOD, PATEL & ASSOCIATES, INC.
2051 WEST NORTHERN, SUITE 100
PHOENIX, ARIZONA (602) 335-8500

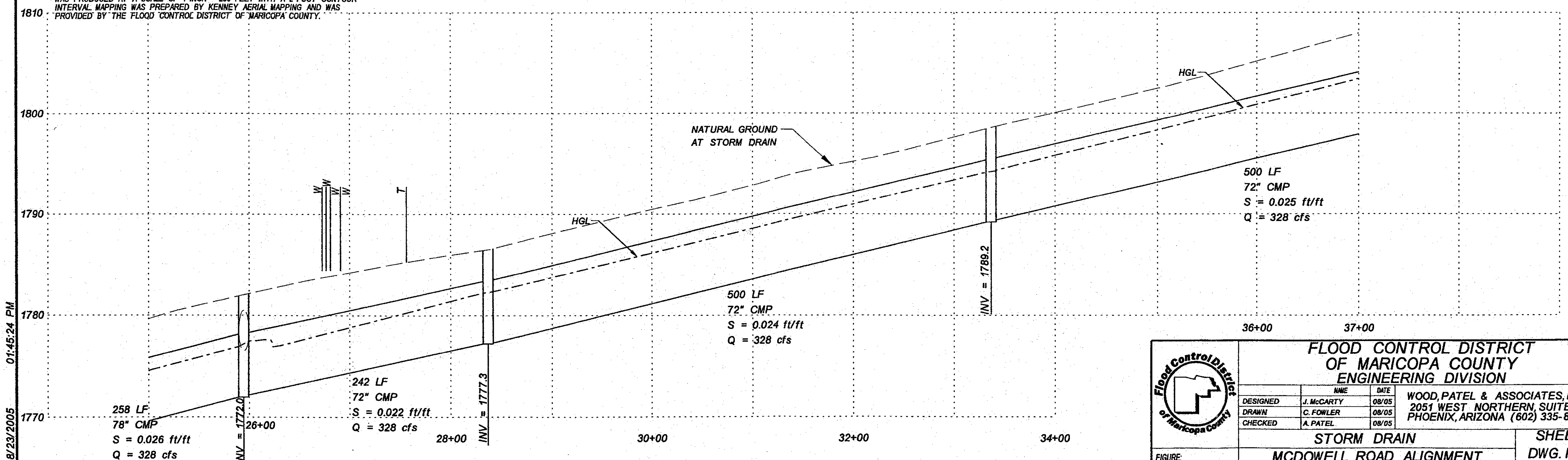
FIGURE:

STORM DRAIN
MCDOWELL ROAD ALIGNMENT

SHEET
DWG. P-4



NOTE:
THESE PLANS ARE PRELIMINARY AND ARE PROVIDED FOR PLANNING PURPOSES ONLY. THE LOCATIONS OF ALL STRUCTURES, UTILITIES AND RIGHT-OF-WAY ARE APPROXIMATE AND ARE BASED UPON RECORD DOCUMENTS. AERIAL TOPOGRAPHY WAS PRODUCED AT A SCALE OF 1 INCH = 200 FEET WITH A 2 FOOT CONTOUR INTERVAL MAPPING WAS PREPARED BY KENNEY AERIAL MAPPING AND WAS PROVIDED BY THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY.



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

	NAME	DATE
DESIGNED	J. McCARTY	08/05
DRAWN	C. FOWLER	08/05
CHECKED	A. PATEL	08/05

WOOD, PATEL & ASSOCIATES, INC.
2051 WEST NORTHERN, SUITE 100
PHOENIX, ARIZONA (602) 335-8500

FIGURE:
STORM DRAIN
MCDOWELL ROAD ALIGNMENT
SHEET DWG. P-5

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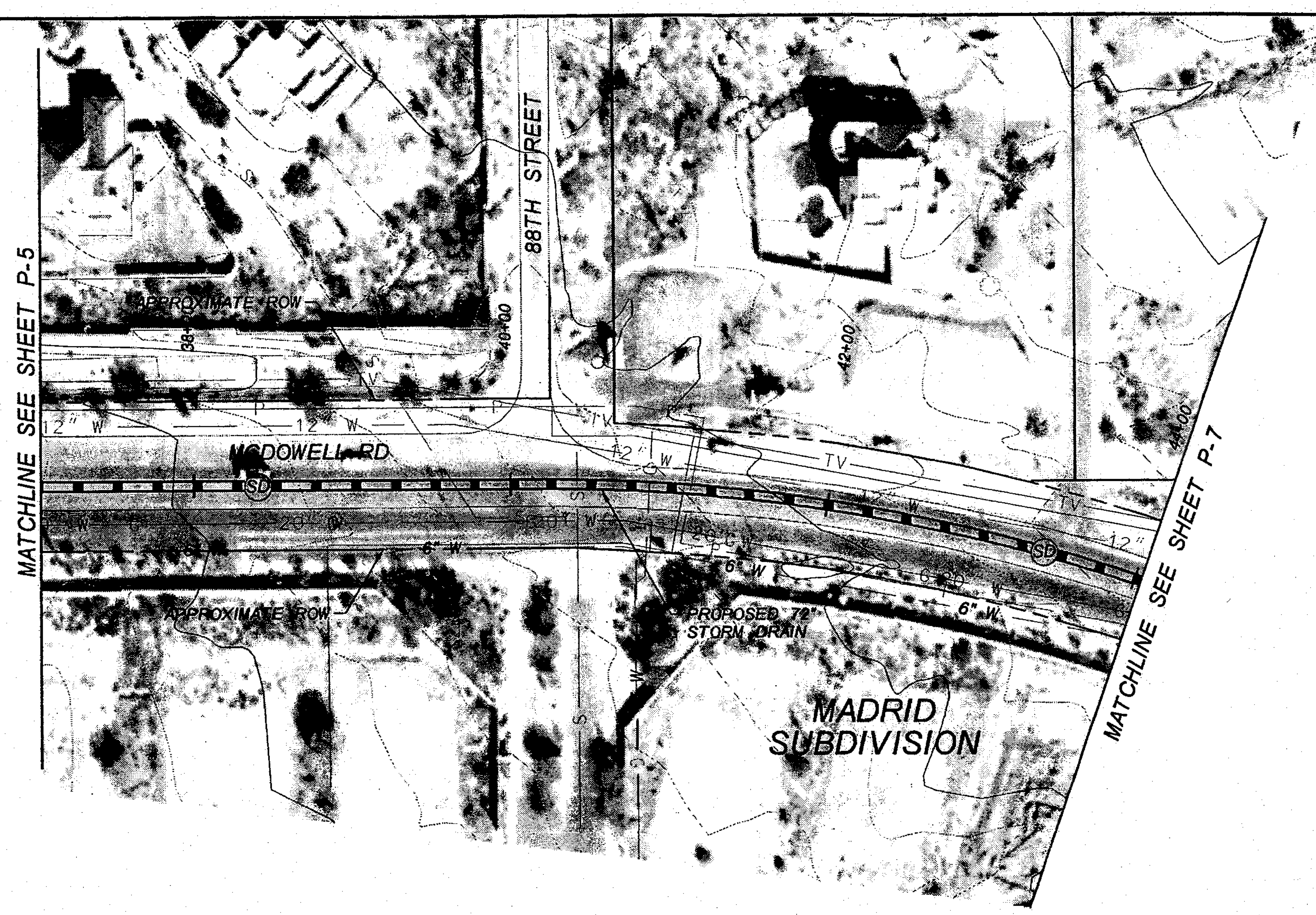

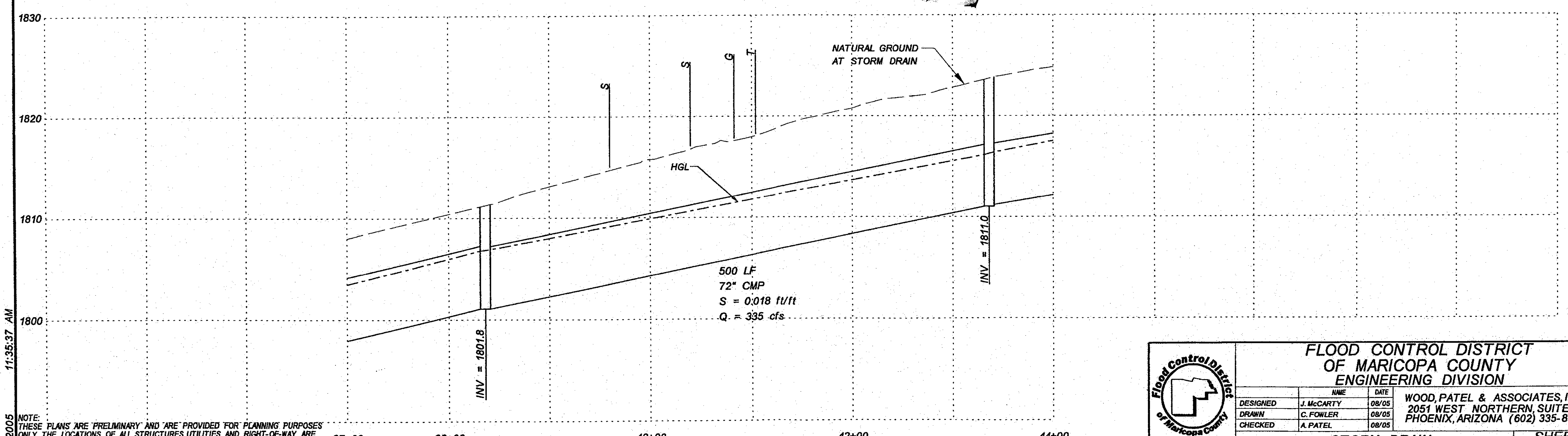

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

	NAME	DATE
DESIGNED	J. McCARTY	08/05
DRAWN	C. FOWLER	08/05
CHECKED	A. PATEL	08/05

WOOD, PATEL & ASSOCIATES, INC.
2051 WEST NORTHERN, SUITE 100
PHOENIX, ARIZONA (602) 335-8500

FIGURE: STORM DRAIN
MCDOWELL ROAD ALIGNMENT

SHEET DWG. P-6

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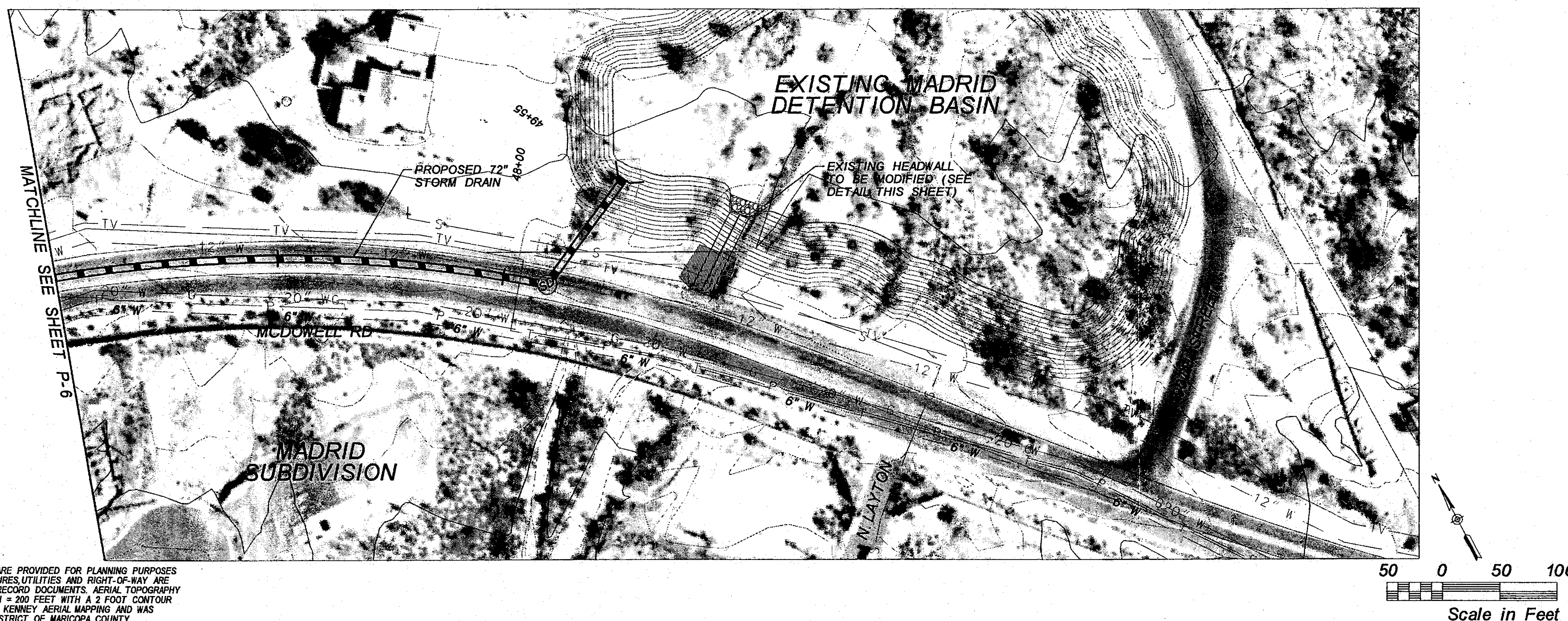
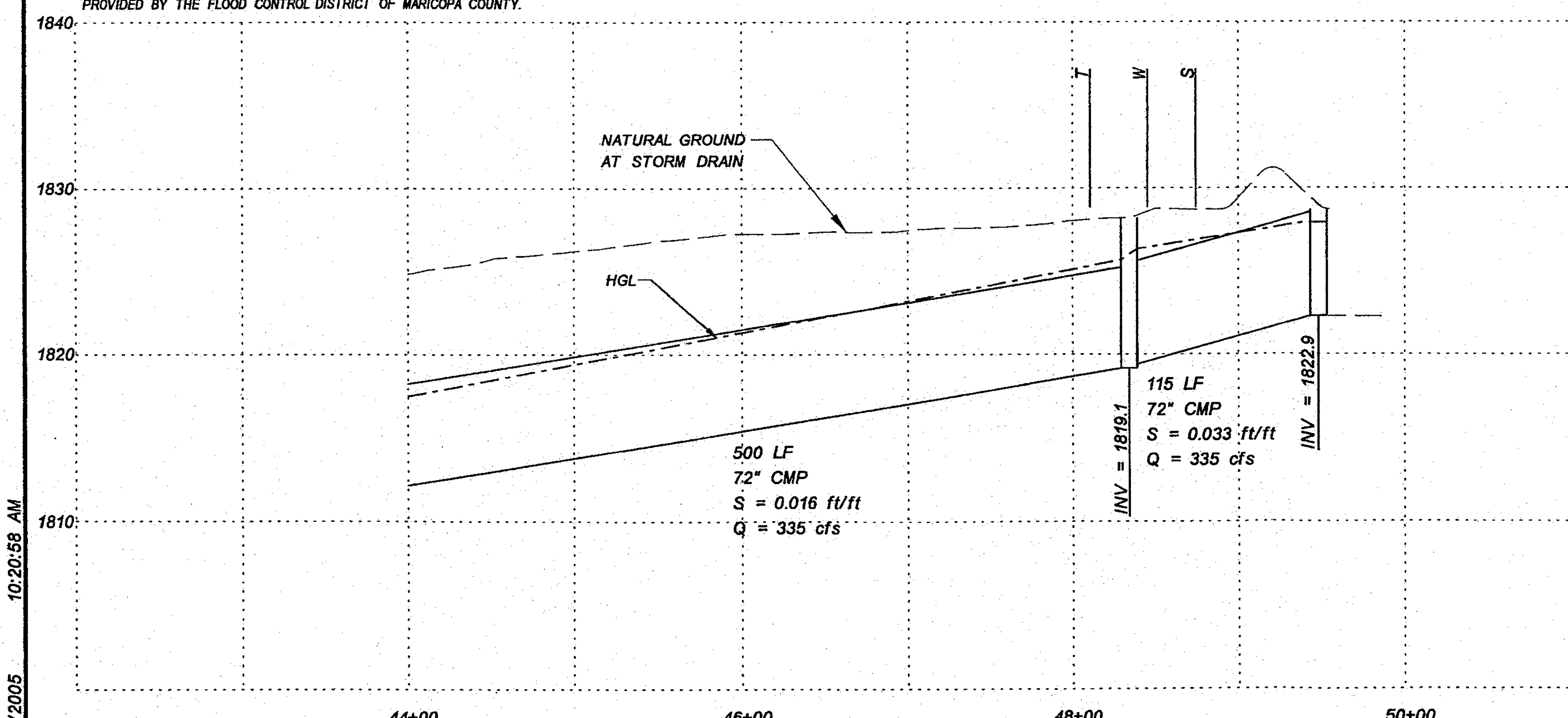
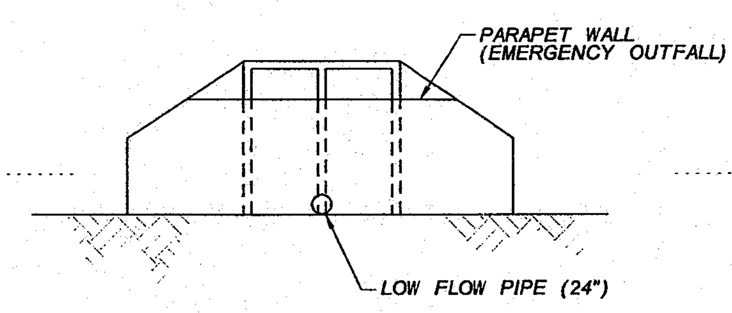


NOTE:
THESE PLANS ARE PRELIMINARY AND ARE PROVIDED FOR PLANNING PURPOSES ONLY. THE LOCATIONS OF ALL STRUCTURES, UTILITIES AND RIGHT-OF-WAY ARE APPROXIMATE AND ARE BASED UPON RECORD DOCUMENTS. AERIAL TOPOGRAPHY WAS PRODUCED AT A SCALE OF 1 INCH = 200 FEET WITH A 2 FOOT CONTOUR INTERVAL. MAPPING WAS PREPARED BY KENNEY AERIAL MAPPING AND WAS PROVIDED BY THE FLOOD CONTROL DISTRICT OF MARICOPA COUNTY.





DETAIL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION			
	NAME	DATE	
DESIGNED	J. McCARTY	08/05	WOOD, PATEL & ASSOCIATES, INC. 2051 WEST NORTHERN, SUITE 100 PHOENIX, ARIZONA (602) 335-8500
DRAWN	C. FOWLER	08/05	
CHECKED	A. PATEL	08/05	
STORM DRAIN			SHEET
MCDOWELL ROAD ALIGNMENT			DWG. P-7

FIGURE:

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APPENDIX B

Hydrologic Analysis for Preferred Alternative

```
1****************************************                                              ****************************************
 *                                      *                                              *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                              *   U.S. ARMY CORPS OF ENGINEERS       *
 *             JUN   1998               *                                              *   HYDROLOGIC ENGINEERING CENTER      *
 *           VERSION 4.1                *                                              *         609 SECOND STREET            *
 *                                      *                                              *      DAVIS, CALIFORNIA 95616         *
 * RUN DATE   25OCT05  TIME  09:27:53   *                                              *         (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

        1          ID   Spook Hill ADMP Update
        2          ID   Future Condition Preferred Model with Spook Hill FRS Storage Routing
        3          ID   Return Period = 100 Years, Rainfall Duration = 24 Hours
        4          ID   Original File Name: REC_EC24.DAT, Wood/Patel, April 2002, SZ
        5          ID   Hermosa Vista Hawes Road Basin Alternative Analysis
        6          ID   Final Option Model Name: FINAL.DAT, Wood/Patel, April 2005, SZ
        7          ID  STAGE STORAGE AND ELEVATION INFORMATION BASED ON NAVD 1988 VERTICAL DATUM
                   *
                   *  Major Changes:
                   *  Subbasin 380B3 is Divided into 3 Smaller Subbasins;
                   *  Flow from basin through 24" pipe going to "380B1"(approx. 40 cfs);
                   *  "C390" Divert less than 783 cfs to west;
                   *  "C38B3C" is less than 165 cfs;
                   *  Madrid Basin diversion to west by 72" pipe;
                   *  Madrid Basin has 1.0 Ac-Ft Sediment Storage.
                   *
        8          ID   METHODOLOGY
        9          ID   THE US CORPS OF ENGINEERS FLOW HYDROGRAPH PACKAGE HEC-1 DATED JUNE 1998 V4.1
       10          ID   SCS TYPE II RAINFALL DISTRIBUTION
       11          ID   CLARK UNIT HYDROGRAPH
       12          ID   GREEN AND AMPT INFILTRATION EQUATION USED FOR CALCULATING LOSSES
       13          ID   NORMAL DEPTH STORAGE CHANNEL ROUTING
                   *
                   *DIAGRAM
       14          IT       2                       2000
       15          IO       5
       16          IN      15
       17          JD    3.81    0.01
       18          PC    .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
       19          PC    .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
       20          PC    .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
       21          PC    .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
       22          PC    .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
       23          PC    .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
       24          PC    .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
       25          PC    .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
       26          PC    .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
       27          PC    .983    .986    .989    .992    .995    .998   1.000
       28          JD   3.787    1.00
       29          JD   3.677    5.80
       30          JD   3.574   10.66
       31          JD   3.539   13.70
       32          JD   3.467   20.00
       33          JD   3.315   50.00
                   *
                   * DDM    ***** Updated *****

       34          KK      10
       35          KM   SUB-BASIN 10
       36          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
       37          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
       38          KM     L = 2.00  Kb = .044  Adj. Slope =  165.0
       39          BA    .690
       40          LG    .350    .310   7.600    .090  16.000
       41          UC    .421    .305
1                                            HEC-1 INPUT                                                PAGE  2
```

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

  42          UA     100
              *
              * DDM    ***** Preserved *****

  43          KK     R10
  44          KM   ROUTING OF FLOW FROM SUB-BASIN 10 TO R12
  45          RS       4    FLOW      -1
  46          RC    .045     .03    .045    8700    .021
  47          RX       0       1       2      17      27      42      43      44
  48          RY       5       5       5       0       0       5       5       5
              * DDM    ***** Preserved *****

  49          KK     R12
  50          KM   ROUTING OF FLOW FROM R12 TO SUB-BASIN 20
  51          RS       7    FLOW      -1
  52          RC    .045     .03    .045    4500     .01
  53          RX       0       1      45    52.5    72.5      80     124     125
  54          RY       4     2.5     2.5       0       0     2.5     2.5       4
              * DDM    ***** Updated *****

  55          KK      20
  56          KM   SUB-BASIN 20
  57          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
  58          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .993
  59          KM     L = 2.50  Kb = .040  Adj. Slope =   88.0
  60          BA   1.167
  61          LG    .310    .290   5.800    .220  11.000
  62          UC    .629    .422
  63          UA       0       5      16      30      65      77      84      90      94      97
  64          UA     100
              * DDM    ***** Preserved *****

  65          KK     D20
  66          KM         100-YEAR 2-HOUR ONSITE RETENTION BASIN
  67          KM         MAXIMUM VOLUME DIVERSION = 47.8 acre-feet
  68          DT    BS20    47.8
  69          DI       0   10000
  70          DQ       0   10000
              * DDM    ***** Preserved *****

  71          KK    RT20
  72          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
  73          DR    BS20
              * DDM    ***** Preserved *****

  74          KK     S20
  75          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
  76          KM   BLEEDOFF FLOW = 17 CFS
  77          RS       1    STOR       0
  78          SV       0     .01    47.8      70
  79          SQ       0     0.5    17.0      50
              * DDM    ***** Preserved *****
```



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

  80          KK     C20
  81          KM   HYDROGRAPH COMBINATION
  82          HC       3
              * DDM    ***** Preserved *****

  83          KK     R20
  84          KM         ROUTE FLOW THROUGH BULLDOG FLOODWAY FROM APACHE JUNCTION FRS
  85          RS       1    FLOW      -1
  86          RC    .016    .016    .016     990    .004
  87          RX       0       5       7    14.5    34.5      42      44      50
  88          RY       4       2       2       0       0       2       2       4
              * DDM    ***** Updated *****

  89          KK      40
  90          KM   SUB-BASIN 40
  91          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
  92          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .987
  93          KM     L = 3.08  Kb = .036  Adj. Slope =  189.0
  94          BA   2.227
  95          LG    .320    .300   4.900    .310  11.000
  96          UC    .492    .262
  97          UA       0       3       5       8      12      20      43      75      90      96
  98          UA     100
              * DDM    ***** Preserved *****

  99          KK     D40
 100          KM         100-YEAR 2-HOUR ONSITE RETENTION BASIN
 101          KM         MAXIMUM VOLUME DIVERSION = 39.1 acre-feet
 102          DT    BS40    39.1
 103          DI       0   10000
 104          DQ       0   10000
              * DDM    ***** Preserved *****

 105          KK    RT40
 106          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
 107          DR    BS40
```

```
           * DDM   ***** Preserved *****

108        KK     S40
109        KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
110        KM   BLEEDOFF FLOW = 14 CFS
111        RS      1    STOR      0
112        SV      0     .01    39.1     60
113        SQ      0     0.5    14.0     40
           * DDM   ***** Preserved *****

114        KK     C40
115        KM   HYDROGRAPH COMBINATION
116        HC      3
           * DDM   ***** Updated *****
1                                         HEC-1 INPUT                                          PAGE  4

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


117        KK      60
118        KM   SUB-BASIN 60
119        KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
120        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .989
121        KM     L = 4.19  Kb = .038  Adj. Slope =  209.6
122        BA   1.751
123        LG    .320    .340   5.800    .190  10.000
124        UC    .592    .472
125        UA      0       3       5       8      12      20      43      75      90      96
126        UA    100
           *
           * DDM   ***** Preserved *****

127        KK     D60
128        KM         100-YEAR 2-HOUR ONSITE RETENTION BASIN
129        KM         MAXIMUM VOLUME DIVERSION = 4.60 acre-feet
130        DT    BS60     4.6
131        DI       0   10000
132        DQ       0   10000
           * DDM   ***** Preserved *****

133        KK     RT60
134        KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
135        DR     BS60
           * DDM   ***** Preserved *****

136        KK    SB60
137        KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
138        KM   BLEEDOFF FLOW = 2 CFS
139        RS      1    STOR      0
140        SV      0     .01     4.6     10
141        SQ      0     0.5     2.0     10
           * DDM   ***** Preserved *****

142        KK     C60
143        KM   HYDROGRAPH COMBINATION
144        HC      3
           *
           * DDM   ***** Preserved *****

145        KK     S60
146        KM   APACHE JUNCTION FRS AS-BUILT PLANS 12/19/88
147        KM   OUTLET PIPE=30"RCP; L=136.6'; INLET INV.=1783.5; OUTLET INV.=1783
148        KM   EMERGENCY SPILLWAY ELEV.=1799.77'; PRINCIPLE SPILLWAY ELEV.=1793.5'
149        KM   STORAGE VOLUME BELOW PRINCIPLE SPILLWAY FOR SEDIMENT = 100 ACRE-FEET
150        RS      1    STOR      0
151        SV      0   46.80   73.71   130.0  170.70  322.23  584.06  812.88  1121.9
152        SQ    0.0    0.01    0.02   26.30   91.20  102.42  347.66  1650.0  7700.0
153        SE 794.09  795.15  795.65  796.65  797.29  799.29  801.92  803.87  806.15
           * DDM   ***** Preserved *****
1                                         HEC-1 INPUT                                          PAGE  5

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


154        KK     R60
155        KM         ROUTE FLOW THROUGH BULLDOG FLOODWAY FROM APACHE JUNCTION FRS
156        RS      2    FLOW      -1
157        RC   .016    .016    .016    2850    .012
158        RX      0       1       2     2.1     5.6     5.7       6       7
159        RY    4.5     3.5     3.5       0       0     3.5     3.5     4.5
           * DDM   ***** Preserved *****

160        KK    RR60
161        KM   ROUTE FLOW FROM BULLDOG FLOODWAY TO SUB-BASIN 80
162        RS      3    FLOW      -1
163        RC   .016    .016    .016    3500    .005
164        RX      0       1       2     2.1     7.1     7.2       8       9
165        RY    4.5     3.5     3.5       0       0     3.5     3.5     4.5
           * DDM   ***** Updated *****

166        KK      80
167        KM   SUB-BASIN 80
168        KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
169        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .991
170        KM     L = 2.69  Kb = .039  Adj. Slope =  229.8
```

```
 171          BA   1.493
 172          LG    .320     .300    5.600     .220    7.000
 173          UC    .429     .254
 174          UA      0        5       16       30       65       77       84       90       94       97
 175          UA    100
              * DDM   ***** Preserved *****

 176          KK    D80
 177          KM         100-YEAR 2-HOUR ONSITE RETENTION BASIN
 178          KM         MAXIMUM VOLUME DIVERSION = 18.9 acre-feet
 179          DT   BS80    18.9
 180          DI      0   10000
 181          DQ      0   10000
              * DDM   ***** Preserved *****

 182          KK    RT80
 183          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
 184          DR    BS80
              * DDM   ***** Preserved *****

 185          KK    S80
 186          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
 187          KM   BLEEDOFF FLOW =  7 CFS
 188          RS      1     STOR      0
 189          SV      0      .01     18.9      30
 190          SQ      0      1.0      7.0      20
              * DDM   ***** Preserved *****
```



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

 191          KK    C80
 192          KM   HYDROGRAPH COMBINATION
 193          HC      2
              * DDM   ***** Preserved *****

 194          KK   CC80
 195          KM   HYDROGRAPH COMBINATION FOR FLOW FROM APACHE JUNCTION FRS & SUB-BASIN 80
 196          HC      2   1.493
              * DDM   ***** Preserved *****

 197          KK    R80
 198          KM   ROUTE FLOW FROM SUB-BASIN 80 TO SUB-BASIN 100
 199          RS      2     FLOW      -1
 200          RC    .025     .016     .025     1200     .003
 201          RX      0        2        6      6.1     41.1     41.2     56.2     58.2
 202          RY    5.5      4.5      4.5        0        0      4.5      4.5      5.5
              * DDM   ***** Updated *****

 203          KK    100
 204          KM   SUB-BASIN 100
 205          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 206          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
 207          KM     L = 1.94  Kb = .045  Adj. Slope =  108.0
 208          BA    .488
 209          LG    .300     .250    5.100     .280    9.000
 210          UC    .517     .455
 211          UA      0        5       16       30       65       77       84       90       94       97
 212          UA    100
              * DDM   ***** Preserved *****

 213          KK   D100
 214          KM         100-YEAR 2-HOUR ONSITE RETENTION BASIN
 215          KM         MAXIMUM VOLUME DIVERSION = 10.0 acre-feet
 216          DT   BS100    10.0
 217          DI      0   10000
 218          DQ      0   10000
              * DDM   ***** Preserved *****

 219          KK   RT100
 220          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
 221          DR   BS100
              * DDM   ***** Preserved *****

 222          KK   S100
 223          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
 224          KM   BLEEDOFF FLOW =  4 CFS
 225          RS      1     STOR      0
 226          SV      0      .01     10.0      20
 227          SQ      0      1.0      4.0      10
              * DDM   ***** Preserved *****
```



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

 228          KK   C100
 229          KM   HYDROGRAPH COMBINATION FOR FLOW FROM SUB-BASIN 80 & 100
 230          HC      3
              * DDM   ***** Preserved *****

 231          KK   R100
 232          KM   ROUTE FLOW FROM SUB-BASIN 100 TO SUB-BASIN 120
 233          RS      1     FLOW      -1
```

```
234        RC    .016    .016    .016     940    .004
235        RX       0       1       2     2.1    52.1    52.2      53      54
236        RY     4.5     4.5     4.5       0       0     4.5     4.5     4.5
           * DDM   ***** Updated *****

237        KK     120
238        KM   SUB-BASIN 120
239        KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
240        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF   .987
241        KM     L = 3.07  Kb = .037  Adj. Slope =  239.0
242        BA   2.197
243        LG    .330    .280   6.800    .130  12.000
244        UC    .429    .227
245        UA       0       3       5       8      12      20      43      75      90      96
246        UA     100
           * DDM   ***** Preserved *****

247        KK    D120
248        KM        100-YEAR 2-HOUR ONSITE RETENTION BASIN
249        KM        MAXIMUM VOLUME DIVERSION = 5.7 acre-feet
250        DT   BS120     5.7
251        DI       0   10000
252        DQ       0   10000
           * DDM   ***** Preserved *****

253        KK   RT120
254        KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
255        DR   BS120
           * DDM   ***** Preserved *****

256        KK    S120
257        KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
258        KM   BLEEDOFF FLOW =  2 CFS
259        RS       1    STOR       0
260        SV       0     .01     5.7      15
261        SQ       0     1.0     2.0      10
           * DDM   ***** Preserved *****

262        KK    C120
263        KM   HYDROGRAPH COMBINATION FOR FLOW FROM SUB-BASIN 100 & 120
264        HC       3
           * DDM   ***** Preserved *****
```



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

265        KK    R120
266        KM   ROUTE FLOW FROM SUB-BASIN 120 TO SIGNAL BUTTE FRS
267        RS       2    FLOW      -1
268        RC    .025    .016    .025    2100    .005
269        RX       0       6      10    10.1    60.1    60.2    74.2    80.2
270        RY       8       5       5       0       0       5       5       8
           * DDM   ***** Updated *****

271        KK     140
272        KM   SUB-BASIN 140
273        KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
274        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF   .996
275        KM     L = 1.61  Kb = .044  Adj. Slope =  149.0
276        BA    .598
277        LG    .310    .280   4.200    .440   5.000
278        UC    .421    .278
279        UA       0       5      16      30      65      77      84      90      94      97
280        UA     100
           *
           * DDM   ***** Preserved *****

281        KK    D140
282        KM        100-YEAR 2-HOUR ONSITE RETENTION BASIN
283        KM        MAXIMUM VOLUME DIVERSION = 5.9 acre-feet
284        DT   BS140     5.9
285        DI       0   10000
286        DQ       0   10000
           * DDM   ***** Preserved *****

287        KK   RT140
288        KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
289        DR   BS140
           * DDM   ***** Preserved *****

290        KK    S140
291        KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
292        KM   BLEEDOFF FLOW =  2 CFS
293        RS       1    STOR       0
294        SV       0     .01     5.9      15
295        SQ       0     1.0     2.0      10
           *
           * DDM   ***** Preserved *****

296        KK    C140
297        KM   HYDROGRAPH COMBINATION
298        HC       3
           *
           * DDM   ***** Updated *****
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 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  299          KK    150
  300          KM   SUB-BASIN 150
  301          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
  302          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
  303          KM     L = 1.50  Kb = .047  Adj. Slope =  314.6
  304          BA    .407
  305          LG    .350    .360   5.100    .260   7.000
  306          UC    .296    .221
  307          UA      0       3       5       8      12      20      43      75      90      96
  308          UA    100
               * DDM   ***** Preserved *****

  309          KK   R150
  310          KM   ROUTING OF FLOW FROM SUB-BASIN 150 TO R152
  311          RS      2    FLOW      -1
  312          RC    .045     .04    .045    3100    .032
  313          RX      0       1       2      23      33      54      55      56
  314          RY      7       7       7       0       0       7       7       7
               * DDM   ***** Preserved *****

  315          KK   R152
  316          KM   ROUTING OF FLOW FROM R152 TO SUB-BASIN 160
  317          RS      3    FLOW      -1
  318          RC    .045     .03    .045    5900    .019
  319          RX      0       1       2       8      33      39      40      41
  320          RY      2       2       2       0       0       2       2       2
               * DDM   ***** Updated *****

  321          KK    160
  322          KM   SUB-BASIN 160
  323          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
  324          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
  325          KM     L = 2.10  Kb = .047  Adj. Slope =  129.0
  326          BA    .365
  327          LG    .340    .330   4.150    .440   1.000
  328          UC    .587    .659
  329          UA      0       3       5       8      12      20      43      75      90      96
  330          UA    100
               *
               * DDM   ***** Preserved *****

  331          KK   D160
  332          KM         100-YEAR 2-HOUR ONSITE RETENTION BASIN
  333          KM         MAXIMUM VOLUME DIVERSION = 1.2 acre-feet
  334          DT   BS160     1.2
  335          DI      0   10000
  336          DQ      0   10000
               * DDM   ***** Preserved *****
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 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  337          KK   RT160
  338          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
  339          DR   BS160
               * DDM   ***** Preserved *****

  340          KK   S160
  341          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
  342          KM   BLEEDOFF FLOW =  1 CFS
  343          RS      1    STOR       0
  344          SV      0     .01     1.2      10
  345          SQ      0     0.5     1.0      10
               * DDM   ***** Preserved *****

  346          KK   C160
  347          KM   HYDROGRAPH COMBINATION
  348          HC      3
               *
               * DDM   ***** Updated *****

  349          KK    180
  350          KM   SUB-BASIN 180
  351          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
  352          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .994
  353          KM     L = 2.42  Kb = .041  Adj. Slope =  140.0
  354          BA   1.014
  355          LG    .350    .350   4.150    .430    .000
  356          UC    .571    .400
  357          UA      0       3       5       8      12      20      43      75      90      96
  358          UA    100
               * DDM   ***** Preserved *****

  359          KK   C180
  360          KM   HYDROGRAPH COMBINATION FOR SIGNAL BUTTE FRS
  361          HC      3
               * DDM   ***** Updated *****

  362          KK    210
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 363          KM   SUB-BASIN 210
 364          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 365          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .995
 366          KM     L = 1.84  Kb = .043  Adj. Slope =  315.0
 367          BA    .792
 368          LG    .350    .360   6.800    .130   4.000
 369          UC    .313    .189
 370          UA       0       3       5       8      12      20      43      75      90      96
 371          UA     100
              * DDM   ***** Preserved *****

 372          KK     R210
 373          KM   ROUTING OF FLOW FROM SUB-BASIN 210 TO SUB-BASIN 220
 374          RS       2    FLOW      -1
 375          RC    .045     .03    .045    5100    .022
 376          RX       0       1       2      14      34      46      47      48
 377          RY       4       4       4       0       0       4       4       4
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 378          KK      240
 379          KM   SUB-BASIN 240
 380          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 381          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .992
 382          KM     L = 3.50  Kb = .039  Adj. Slope =  298.6
 383          BA   1.408
 384          LG    .350    .370   5.300    .230   2.000
 385          UC    .467    .356
 386          UA       0       3       5       8      12      20      43      75      90      96
 387          UA     100
              * DDM   ***** Preserved *****

 388          KK     C240
 389          KM   HYDROGRAPH COMBINATION FOR SUB-BASIN 240 & 220
 390          HC       2
              * DDM   ***** Preserved *****

 391          KK     S240
 392          KM     WEIR GEOMETRY OBTAINED FROM AS-BUILT PLANS @ PASS MTN. DIVERSION.
 393          KM   WEIR STORAGE DATA OBTAINED FROM 2' CONTOUR MAPPING.
 394          RS       1    STOR       0
 395          SA    1.38    14.2    36.5
 396          SE     1.7       5      11
 397          SS       5      42       3     1.5
              * DDM   ***** Preserved *****

 398          KK     R240
 399          KM   ROUTE FLOW FROM SUB-BASIN 240 TO SUB-BASIN 220
 400          KM   PASS MOUNTAIN DIVERSION
 401          RS       1    FLOW      -1
 402          RC    .035    .025    .035    1800    .005
 403          RX       0      15      30      39      69      81      96     111
 404          RY     3.6     3.3       3       0       0       3       3       4
              * DDM   ***** Updated *****

 405          KK      220
 406          KM   SUB-BASIN 220
 407          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 408          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
 409          KM     L = 1.92  Kb = .046  Adj. Slope =  315.0
 410          BA    .473
 411          LG    .350    .350   7.000    .120   5.000
 412          UC    .333    .282
 413          UA       0       3       5       8      12      20      43      75      90      96
 414          UA     100
              * DDM   ***** Preserved *****

 415          KK     C220
 416          KM   HYDROGRAPH COMBINATION FOR SUB-BASIN 240 & 220
 417          HC       2
              * DDM   ***** Preserved *****
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1 HEC-1 INPUT PAGE 12

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

 418          KK    SW220
 419          KM     WEIR GEOMETRY OBTAINED FROM AS-BUILT PLANS @ PASS MTN. DIVERSION.
 420          KM   WEIR STORAGE DATA OBTAINED FROM 2' CONTOUR MAPPING.
 421          RS       1    STOR       0
 422          SA     .78     4.1    13.7
 423          SE       1       3      10
 424          SS       3      65       3     1.5
              * DDM   ***** Preserved *****

 425          KK     R220
 426          KM   ROUTE FLOW FROM SUB-BASIN 220 TO SUB-BASIN 200
 427          KM   PASS MOUNTAIN DIVERSION
 428          RS       1    FLOW      -1
 429          RC    .035    .025    .035    1250    .005
 430          RX       0      50     100     109     139     148     178     184
 431          RY       5       4       3       0       0       3       3       5
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                  * DDM   ***** Updated *****

 432              KK     190
 433              KM   SUB-BASIN 190
 434              KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 435              KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .994
 436              KM     L = 1.91  Kb = .042  Adj. Slope =  315.0
 437              BA    .918
 438              LG    .350     .390   5.800    .190   8.000
 439              UC    .321     .185
 440              UA      0        3       5       8      12      20      43      75      90      96
 441              UA    100
                  * DDM   ***** Preserved *****

 442              KK    R190
 443              KM   ROUTING OF FLOW FROM SUB-BASIN 190 TO SUB-BASIN 200
 444              RS      2     FLOW      -1
 445              RC    .045     .03    .045    4740     .03
 446              RX      0        1       2      17      37      52      53      54
 447              RY      5        5       5       0       0       5       5       5
                  * DDM   ***** Preserved *****

 448              KK    R192
 449              KM   ROUTING OF FLOW FROM SUB-BASIN 190 TO SUB-BASIN 200
 450              RS      3     FLOW      -1
 451              RC    .045    .035    .045    2200    .018
 452              RX      0        1      50      59      79      88     137     138
 453              RY    4.5        3       3       0       0       3       3     4.5
                  * DDM   ***** Updated *****

 454              KK    200
 455              KM   SUB-BASIN 200
 456              KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 457              KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
 458              KM     L = 1.58  Kb = .045  Adj. Slope =  305.6
 459              BA    .530
 460              LG    .350     .390   5.700    .200  10.000
 461              UC    .300     .201
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LINE              ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 462              UA      0        3       5       8      12      20      43      75      90      96
 463              UA    100
                  * DDM   ***** Preserved *****

 464              KK    C200
 465              KM   HYDROGRAPH COMBINATION FOR SUB-BASIN 220 & 200
 466              HC      3
                  * DDM   ***** Preserved *****

 467              KK    SW200
 468              KM    WEIR GEOMETRY OBTAINED FROM AS-BUILT PLANS @ PASS MTN. DIVERSION.
 469              KM   WEIR STORAGE DATA OBTAINED FROM 2' CONTOUR MAPPING.
 470              RS      1     STOR       0
 471              SA   2.56      3.1     9.4
 472              SE      0        3      10
 473              SS      3      112       3     1.5
                  * DDM   ***** Preserved *****

 474              KK    R200
 475              KM   ROUTE FLOW FROM SUB-BASIN 200 TO SIGNAL BUTTE FRS through storage
 476              RS      1     FLOW      -1
 477              RC    .035    .025    .035     650    .005
 478              RX      0        1       2      17     117     132     133     134
 479              RY      5        5       5       0       0       5       5       5
                  * DDM   ***** Preserved *****

 480              KK    SS200
 481              KM    WEIR GEOMETRY OBTAINED FROM AS-BUILT PLANS @ PASS MTN. DIVERSION.
 482              KM   WEIR STORAGE DATA OBTAINED FROM 2' CONTOUR MAPPING.
 483              RS      1     STOR       0
 484              SA      8      9.2     9.2
 485              SE      0        7      10
 486              SS      7      251       3     1.5
                  * DDM   ***** Preserved *****

 487              KK    RR200
 488              KM   ROUTE FLOW FROM SUB-BASIN 200 TO SIGNAL BUTTE FRS
 489              RS      4     FLOW      -1
 490              RC    .035    .025    .035    3150    .005
 491              RX      0        1       2      17     117     132     133     134
 492              RY      5        5       5       0       0       5       5       5
                  * DDM   ***** Preserved *****

 493              KK    CC180
 494              KM   HYDROGRAPH COMBINATION FOR SIGNAL BUTTE FRS
 495              HC      2
                  * DDM   ***** Preserved *****

 496              KK    S180
 497              KM   SIGNAL BUTTE FRS DATED 1/28/85
 498              KM   OUTLET PIPE=36"RCP; L= 147';  INLET INV.=1690; OUTLET INV.=1687
 499              KM   EMERGENCY SPILLWAY ELEV.=1712.4; PRINCIPLE SPILLWAY ELEV.=1701
 500              KM   STORAGE VOLUME BELOW PRINCIPLE SPILLWAY FOR SEDIMENT = 247 ACRE-FEET
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```
 501        RS      1    STOR       0
 502        SV    0.0  172.10  244.35  482.24  871.30 1101.52 1294.09 1418.10 1578.77 1980.33
1                                          HEC-1 INPUT                                            PAGE 14

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

 503        SQ    0.0   10.20   10.55  121.80  138.40  145.90  151.40  154.67  390.00  1950.0
 504        SE 698.23  702.23  703.23  706.23  710.23  712.23  713.73  714.63  715.73  718.23
            * DDM   ***** Preserved *****

 505        KK    R180
 506        KM    Routing length updated using Signal Butte Floodway plans dated March 1983
 507        KM    Routing length increased 100' from 1500' to 1600'     12/12/00
 508        KM    CHANNEL GEOMETRY FOR SIGNAL BUTTE FRS OBTAINED FROM AS-BUILT PLANS.
 509        KM    ROUTE FLOW FROM SIGNAL BUTTE FRS TO SUB-BASIN 260
 510        RS      1    FLOW      -1
 511        RC   .035    .025    .035    1600    .003
 512        RX      0       1       2    22.6    38.6    59.2      60      61
 513        RY    9.3     9.3     9.3       0       0     9.3     9.3     9.3
            * DDM   ***** Updated *****

 514        KK     260
 515        KM    SUB-BASIN 260
 516        KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 517        KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF   .998
 518        KM      L =  .81  Kb = .046  Adj. Slope =    68.0
 519        BA   .263
 520        LG   .280    .210   6.600    .160  11.000
 521        UC   .350    .209
 522        UA      0       5      16      30      65      77      84      90      94      97
 523        UA    100
            * DDM   ***** Preserved *****

 524        KK    C260
 525        KM    HYDROGRAPH COMBINATION FOR OUTFLOW OF SIGNAL BUTTE FRS & SUB-BASIN 260
 526        HC      2    .263
            * DDM   ***** Preserved *****

 527        KK    R260
 528        KM    Routing length updated using Signal Butte Floodway plans dated March 1983
 529        KM    Routing length unchanged       12/12/00
 530        KM    CHANNEL GEOMETRY FOR SIGNAL BUTTE FRS OBTAINED FROM AS-BUILT PLANS.
 531        KM    ROUTE FLOW FROM SUB-BASIN 260 TO SUB-BASIN 280
 532        RS      3    FLOW      -1
 533        RC   .035    .025    .035    2300    .003
 534        RX      0       1       2    23.4    43.4    64.8      65      66
 535        RY    9.7     9.7     9.7       0       0     9.7     9.7     9.7
            * DDM   ***** Updated *****

 536        KK     280
 537        KM    SUB-BASIN 280
 538        KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 539        KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF   .998
 540        KM      L =  .77  Kb = .048  Adj. Slope =    84.0
 541        BA   .319
 542        LG   .300    .250   5.300    .290  15.000
 543        UC   .329    .168
 544        UA      0       5      16      30      65      77      84      90      94      97
 545        UA    100
            * DDM   ***** Preserved *****
1                                          HEC-1 INPUT                                            PAGE 15

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


 546        KK    C280
 547        KM    HYDROGRAPH COMBINATION FOR SUB-BASIN 260 & SUB-BASIN 280
 548        HC      2
            * DDM   ***** Preserved *****

 549        KK    R280
 550        KM    Routing length updated using Signal Butte Floodway plans dated March 1983
 551        KM    Routing length decreased 400' from 2500' to 2100'     12/12/00
 552        KM    CHANNEL GEOMETRY FOR SIGNAL BUTTE FRS OBTAINED FROM AS-BUILT PLANS.
 553        KM    ROUTE FLOW FROM SUB-BASIN 280 TO SUB-BASIN 300
 554        RS      3    FLOW      -1
 555        RC   .035    .025    .035    2100    .003
 556        RX      0       1       2    23.4    43.4    64.8      65      66
 557        RY    9.7     9.7     9.7       0       0     9.7     9.7     9.7
            * DDM   ***** Updated *****

 558        KK     300
 559        KM    SUB-BASIN 300
 560        KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 561        KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF   .998
 562        KM      L =  .78  Kb = .049  Adj. Slope =   103.0
 563        BA   .289
 564        LG   .300    .250   4.200    .520  16.000
 565        UC   .321    .174
 566        UA      0       5      16      30      65      77      84      90      94      97
 567        UA    100
            * DDM   ***** Preserved *****

 568        KK    C300
 569        KM    HYDROGRAPH COMBINATION OF SUB-BASIN 280 & 300
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 570          HC       2
              *
              * DDM   ***** Preserved *****

 571          KK     R300
 572          KM   Routing length updated using Signal Butte Floodway plans dated March 1983
 573          KM   Routing length increased 300' from 2200' to 2500'     12/12/00
 574          KM   CHANNEL GEOMETRY FOR SIGNAL BUTTE FRS OBTAINED FROM AS-BUILT PLANS.
 575          KM   ROUTE FLOW FROM SUB-BASIN 300 TO START OF FLOODWAY CONCRETE CHANNEL
 576          RS       2    FLOW      -1
 577          RC    .035    .025    .035    2500    .003
 578          RX       0       1       2    23.4    55.4    76.8      77      78
 579          RY     9.7     9.7     9.7       0       0     9.7     9.7     9.7
              *
              * DDM   ***** Updated *****

 580          KK     305A
 581          KM   SUB-BASIN 305A
 582          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 583          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF   .998
 584          KM      L =   .98  Kb = .048  Adj. Slope =    82.0
 585          BA    .316
 586          LG    .340    .320   4.600    .350  12.000
 587          UC    .400    .254
1                                     HEC-1 INPUT                                          PAGE 16

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

 588          UA       0       5      16      30      65      77      84      90      94      97
 589          UA     100
              *
              * DDM   ***** Preserved *****

 590          KK     C305
 591          KM   HYDROGRAPH COMBINATION OF SUB-BASIN 300 AND 305A
 592          HC       2
              * DDM   ***** Preserved *****

 593          KK     R305
 594          KM   Routing length updated using Signal Butte Floodway plans dated March 1983
 595          KM   CHANNEL GEOMETRY FOR SPOOK HILL FRS OBTAINED FROM AS-BUILTS PLANS.
 596          KM   CONTINUE TO ROUTE FLOW WITHIN CONCRETE CHANNEL TO SPOOK HILL FRS
 597          RS       2    FLOW      -1
 598          RC    .016    .016    .016    4000   .0146
 599          RX       0       1       2     2.1    16.1    16.2      17      18
 600          RY     7.5     7.5     7.5       0       0     7.5     7.5     7.5
              *
              * DDM   ***** Updated *****

 601          KK    320B1
 602          KM   SUB-BASIN 320B1
 603          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 604          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF   .997
 605          KM      L = 1.13  Kb = .046  Adj. Slope =   106.0
 606          BA    .454
 607          LG    .300    .260   4.800    .310  17.000
 608          UC    .375    .215
 609          UA       0       5      16      30      65      77      84      90      94      97
 610          UA     100
              *
              * DDM   ***** Preserved *****

 611          KK  D320B1
 612          KM         DIVERT FLOW INTO ONLINE  DETENTION BASIN
 613          KM   DETENTION/RETENTION BASINS LOCATED WITHIN THREE SUBDIVISIONS
 614          KM   SIERRA HEIGHTS        FALCON RIDGE     & MARBLE CREEK
 615          KM         MAXIMUM VOLUME DIVERSION =  9.3 acre-feet
 616          DT  B320B1    9.30
 617          DI       0   10000
 618          DQ       0   10000
              * DDM   ***** Preserved *****

 619          KK  T320B1
 620          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
 621          DR  B320B1
              * DDM   ***** Preserved *****

 622          KK  S320B1
 623          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
 624          KM   9.30 ACRE-FEETx43560/36x3600=4.cfs
 625          RS       1    STOR       0
 626          SV       0     .01     9.3    15.0
 627          SQ       0     0.5     4.0    50.0
              * DDM   ***** Preserved *****
1                                     HEC-1 INPUT                                          PAGE 17

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

 628          KK  C320B1
 629          KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
 630          HC       3
              *
              * DDM   ***** Updated *****
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 631          KK     350
 632          KM    SUB-BASIN 350
 633          KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 634          KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .994
 635          KM      L = 2.22  Kb = .041  Adj. Slope =  315.0
 636          BA    .997
 637          LG    .350    .350   4.550    .340   4.000
 638          UC    .363    .227
 639          UA       0       3       5       8      12      20      43      75      90      96
 640          UA     100
              * DDM   ***** Preserved *****

 641          KK    D350
 642          KM    DIVERT FLOW FROM SUB-BASIN 350. FOR MODELING PURPOSES THE SPLIT FLOW WILL
 643          KM    BE ROUTED BETWEEN SUB-BASINS 355 & 310. THE MAIN FLOW WILL ROUTED TO 310
 644          DT    SF350
 645          DI       0    5000
 646          DQ       0    2500
              * DDM   ***** Preserved *****

 647          KK    R350
 648          KM    CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING
 649          KM    ROUTING OF MAIN FLOW FROM DIVERSION OF SUB-BASIN 350 TO SUB-BASIN 310
 650          RS       7    FLOW      -1
 651          RC    .045    .035    .045    5150    .025
 652          RX       0       1      40      46      56      62     102     103
 653          RY       3       2       2       0       0       2       2       3
              * DDM   ***** Updated *****

 654          KK     310
 655          KM    SUB-BASIN 310
 656          KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 657          KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
 658          KM      L = 2.70  Kb = .045  Adj. Slope =  283.5
 659          BA    .538
 660          LG    .350    .350   3.910    .480    .000
 661          UC    .483    .520
 662          UA       0       3       5       8      12      20      43      75      90      96
 663          UA     100
              * DDM   ***** Preserved *****

 664          KK    C310
 665          KM    HYDROGRAPH COMBINATION OF SUB-BASINS 350 & 310
 666          HC       2    1.04
              * DDM   ***** Preserved *****
1                                         HEC-1 INPUT                                        PAGE 18

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


 667          KK    R310
 668          KM    CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
 669          KM    ROUTING OF FLOW FROM SUB-BASIN 310 TO 320B
 670          RS      10    FLOW      -1
 671          RC    .045    .035    .045    8550    .022
 672          RX       0       1      40      46      56      62     102     103
 673          RY       3       2       2       0       0       2       2       3
              *
              * DDM   ***** Updated *****

 674          KK    305B
 675          KM    SUB-BASIN 305B
 676          KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 677          KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
 678          KM      L = 1.70  Kb = .047  Adj. Slope =  124.0
 679          BA    .386
 680          LG    .350    .350   4.500    .350    .000
 681          UC    .492    .443
 682          UA       0       3       5       8      12      20      43      75      90      96
 683          UA     100
              *
              * DDM   ***** Preserved *****

 684          KK    R305B
 685          KM    CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
 686          KM    ROUTING OF FLOW FROM SUB-BASINS 305B TO SUB-BASIN 320B2.
 687          RS       3    FLOW      -1
 688          RC    .045    .035    .045    1700    .016
 689          RX       0       1      40      46      56      62     102     103
 690          RY       3       2       2       0       0       2       2       3
              *
              * DDM   ***** Updated *****

 691          KK    320B2
 692          KM    SUB-BASIN 320B2
 693          KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 694          KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
 695          KM      L = 1.08  Kb = .050  Adj. Slope =  120.0
 696          BA    .220
 697          LG    .300    .270   4.500    .380   9.000
 698          UC    .375    .314
 699          UA       0       5      16      30      65      77      84      90      94      97
 700          UA     100
              *
              * DDM   ***** Preserved *****
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701            KK  D320B2
702            KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
703            KM   DETENTION/RETENTION BASINS LOCATED WITHIN THREE SUBDIVISIONS
704            KM   SIERRA HEIGHTS        FALCON RIDGE     & MARBLE CREEK
705            KM        MAXIMUM VOLUME DIVERSION =  3.32acre-feet
706            DT  B320B2    3.32
707            DI       0   10000
708            DQ       0   10000
               * DDM   ***** Preserved *****
1                                         HEC-1 INPUT                                          PAGE 19

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


709            KK  T320B2
710            KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
711            DR  B320B2
               * DDM   ***** Preserved *****

712            KK  S320B2
713            KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
714            KM   3.32 ACRE-FEETx43560/36x3600=1.2cfs
715            RS       1    STOR       0
716            SV       0     .01     3.3     5.0
717            SQ       0     0.5     1.2    15.0
               *
               * DDM   ***** Preserved *****

718            KK  C320B2
719            KM    Combine R305B, R310 and 320B2
720            HC       4
               *
               * DDM   ***** Preserved *****

721            KK  R320B2
722            KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
723            KM   ROUTING OF FLOW FROM SUB-BASINS 320B2 TO SUB-BASIN 340B.
724            RS       2    FLOW      -1
725            RC    .045    .035    .045    1000    .016
726            RX       0       1      40      46      56      62     102     103
727            RY       5       2       2       0       0       2       2       5
               *
               * DDM   ***** Updated *****

728            KK     340B
729            KM   SUB-BASIN 340B
730            KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
731            KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
732            KM     L =  .85  Kb = .049  Adj. Slope =  238.5
733            BA    .290
734            LG    .280    .250   4.000    .560  23.000
735            UC    .242    .136
736            UA       0       5      16      30      65      77      84      90      94      97
737            UA     100
               *
               * DDM   ***** Preserved *****

738            KK   D340B
739            KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
740            KM   DETENTION/RETENTION BASINS LOCATED WITHIN THREE SUBDIVISIONS
741            KM   GRANDVIEW ESTATES     BOULDER MOUNTAIN & 33% OF MESA HIGHLANDS
742            KM        MAXIMUM VOLUME DIVERSION = 15.6 acre-feet
743            DT  BS340B    15.6
744            DI       0   10000
745            DQ       0   10000
               * DDM   ***** Preserved *****
1                                         HEC-1 INPUT                                          PAGE 20

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


746            KK  RT340B
747            KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
748            DR  BS340B
               * DDM   ***** Preserved *****

749            KK   S340B
750            KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
751            KM    15.6 ACRE-FEETx43560/36x3600= 5.2cfs
752            RS       1    STOR       0
753            SV       0     .01    15.6      20
754            SQ       0     1.0     5.2      50
               * DDM   ***** Preserved *****

755            KK   C340B
756            KM   HYDROGRAPH COMBINATION
757            HC       3
               *
               * DDM   ***** Preserved *****

758            KK  DD340B
759            KM   DIVERT FLOW INTO OFFLINE DETENTION BASIN LOCATED WITHIN SUB-BASINS 340B.
760            DT   BS340
761            DI       0     200    1000    2000    5000
```

```
DQ       0       0     800    1800    4800
* DDM    ***** Preserved *****

KK   RT340
KM   RETRIEVE FLOW FROM DIVERSION
DR   BS340
* DDM    ***** Preserved *****

KK   SS340B
KM   RETRIEVE FLOW INTO OFFLINE BASIN AND BLEED OFF WITHIN 36 HOURS.
KM      55 ACRE-FEETx43560/36x3600 = 19cfs
RS       1    STOR       0
SV       0     .01      55      60
SQ       0     3.0      50     100
*

KK   CD340B
KM   HYDROGRAPH COMBINATION
HC       2
* DDM    ***** Preserved *****

KK   RT350
KM   RETRIEVE SPLIT FLOW FROM DIVERSION OF SUB-BASIN 350
DR   SF350
* DDM    ***** Preserved *****
```



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

KK   RR350
KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
KM   ROUTING OF FLOW FROM SPLIT OF SUB-BASIN 350 TO 355
RS       7    FLOW      -1
RC    .045    .035    .045    6050    .025
RX       0       1      40      46      56      62     102     103
RY       3       2       2       0       0       2       2       3
*
* DDM    ***** Updated *****

KK     355
KM   SUB-BASIN 355
KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
KM      L = 3.00  Kb = .044  Adj. Slope =  284.0
BA    .676
LG    .340    .340   4.450    .370   4.000
UC    .488    .502
UA       0       3       5       8      12      20      43      75      90      96
UA     100
* DDM    ***** Preserved *****

KK    C355
KM   HYDROGRAPH COMBINATION OF SUB-BASIN 355 AND THE SPLIT FLOW FROM SUB-BASIN 350
HC       2  1.1745
*
* DDM    ***** Preserved *****

KK    D355
KM         DIVERT FLOW INTO OFFLINE BASIN
KM         MAXIMUM VOLUME DIVERSION = 18 acre-feet
DT   BS355
DI       0     100     450    1000    2000    5000
DQ       0       0       0     550    1550    4550
*
* DDM    ***** Preserved *****

KK   RT355
KM   RETRIEVE FLOW FROM DIVERSION INTO OFFLINE BASIN
DR   BS355
*
* DDM    ***** Preserved *****

KK    S355
KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
KM   18.0 ACRE-FEETx43560/36x3600= 6.0CFS
RS       1    STOR       0
SV       0     .01    18.0    25.0
SQ       0     2.0      40      50
*
* DDM    ***** Preserved *****
```



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

KK   CC355
KM   HYDROGRAPH COMBINATION
HC       2
*
* DDM    ***** Preserved *****

KK    R355
KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
KM   ROUTING OF FLOW FROM SUB-BASIN 355 TO SUB-BASIN 340B
```

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 819          RS      1   FLOW     -1
 820          RC   .045   .035   .045   4000   .025
 821          RX      0      1     40     46     56     62    102    103
 822          RY      3      2      2      0      0      2      2      3
              *
              * DDM   ***** Preserved *****

 823          KK  CC340B
 824          KM   HYDROGRAPH COMBINATION
 825          HC      2
              * DDM   ***** Preserved *****

 826          KK   R340B
 827          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
 828          KM   ROUTING OF FLOW FROM SUB-BASIN 340B TO SUB-BASIN 340A2.
 829          RS      2   FLOW     -1
 830          RC   .045   .035   .045   1500   .027
 831          RX      0      1     40     46     56     62    102    103
 832          RY      3      2      2      0      0      2      2      3
              *
              * DDM   ***** Updated *****

 833          KK   340A2
 834          KM   SUB-BASIN 340A2
 835          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 836          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
 837          KM     L =   .48  Kb = .047  Adj. Slope =  297.9
 838          BA   .037
 839          LG   .230   .310  5.300   .250 55.000
 840          UC   .158   .174
 841          UA      0      5     16     30     65     77     84     90     94     97
 842          UA    100
              *
              * DDM   ***** Preserved *****

 843          KK  D340A2
 844          KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
 845          KM        MAXIMUM VOLUME DIVERSION = 2.2 acre-feet
 846          DT  B340A2    2.2
 847          DI      0  10000
 848          DQ      0  10000
              * DDM   ***** Preserved *****
1                                    HEC-1 INPUT                                        PAGE 23

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


 849          KK  T340A2
 850          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
 851          DR  B340A2
              * DDM   ***** Preserved *****

 852          KK  S340A2
 853          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
 854          KM    2.20 ACRE-FEETx43560/36x3600= 1.0cfs
 855          RS      1   STOR      0
 856          SV      0    .01    2.2    5.0
 857          SQ      0    0.5    1.0   10.0
              * DDM   ***** Preserved *****

 858          KK  C340A2
 859          KM   HYDROGRAPH COMBINATION
 860          HC      3
              *
              * DDM   ***** Preserved *****

 861          KK  R340A2
 862          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
 863          KM   ROUTING OF FLOW FROM SUB-BASIN 340A2 TO SUB-BASIN 320B.
 864          RS      5   FLOW     -1
 865          RC   .045   .035   .045   4500   .020
 866          RX      0      1     40     46     56     62    102    103
 867          RY      3      2      2      0      0      2      2      3
              *
              * DDM   ***** Preserved *****

 868          KK  CC320B
 869          KM   HYDROGRAPH COMBINATION
 870          HC      2
              *
              * DDM   ***** Preserved *****

 871          KK   R320B
 872          KM   Routing Flow from 320B1 to 320A
 873          KM   Routing length updated using Signal Butte Floodway plans dated March 1983
 874          KM   CHANNEL GEOMETRY FOR SPOOK HILL FRS OBTAINED FROM AS-BUILTS PLANS.
 875          KM   CONTINUE TO ROUTE FLOW WITHIN CONCRETE CHANNEL TO SPOOK HILL FRS
 876          RS      1   FLOW     -1
 877          RC   .016   .016   .016   1500  .0146
 878          RX      0      1      2    2.1   16.1   16.2     17     18
 879          RY    7.5    7.5    7.5      0      0    7.5    7.5    7.5
              *
              * DDM   ***** Updated *****

 880          KK    320A
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     881          KM   SUB-BASIN 320A
     882          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
     883          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF   .998
     884          KM     L = 1.07  Kb = .049  Adj. Slope =   93.0
     885          BA    .270
     886          LG    .280    .250   4.300    .490  25.000
1                                          HEC-1 INPUT                                                  PAGE 24

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

     887          UC    .404    .301
     888          UA       0       5      16      30      65      77      84      90      94      97
     889          UA     100
                  *
                  * DDM    ***** Preserved *****

     890          KK   D320A
     891          KM         DIVERT FLOW INTO ONLINE  DETENTION BASIN
     892          KM   DETENTION/RETENTION BASINS LOCATED WITHIN THREE SUBDIVISIONS
     893          KM   GRANDVIEW ESTATES     BOULDER MOUNTAIN & 33% OF MESA HIGHLANDS
     894          KM         MAXIMUM VOLUME DIVERSION = 11.8 acre-feet
     895          DT  BS320A     11.8
     896          DI       0   10000
     897          DQ       0   10000
                  * DDM    ***** Preserved *****

     898          KK  RT320A
     899          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
     900          DR  BS320A
                  * DDM    ***** Preserved *****

     901          KK   S320A
     902          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
     903          KM    11.8 ACRE-FEETx43560/36x3600= 4.0cfs
     904          RS       1    STOR       0
     905          SV       0     .01    11.8      20
     906          SQ       0     1.0     4.0    40.0
                  * DDM    ***** Preserved *****

     907          KK    C320
     908          KM   HYDROGRAPH COMBINATION
     909          HC       3
                  *
                  * DDM    ***** Updated *****

     910          KK   340A1
     911          KM   SUB-BASIN 340A1
     912          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
     913          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF   .993
     914          KM     L = 1.80  Kb = .045  Adj. Slope =  117.0
     915          BA   1.089
     916          LG    .250    .250   4.150    .560  24.000
     917          UC    .500    .261
     918          UA       0       5      16      30      65      77      84      90      94      97
     919          UA     100
                  *
                  * DDM    ***** Preserved *****

     920          KK  D340A1
     921          KM         DIVERT FLOW INTO ONLINE  DETENTION BASIN
     922          KM   DETENTION/RETENTION BASINS LOCATED WITHIN THREE SUBDIVISIONS
     923          KM   GRANDVIEW ESTATES     BOULDER MOUNTAIN & 33% OF MESA HIGHLANDS
     924          KM         MAXIMUM VOLUME DIVERSION = 91.9 acre-feet
     925          DT  B340A1     91.9
     926          DI       0   10000
1                                          HEC-1 INPUT                                                  PAGE 25

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

     927          DQ       0   10000
                  * DDM    ***** Preserved *****

     928          KK  T340A1
     929          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
     930          DR  B340A1
                  * DDM    ***** Preserved *****

     931          KK  S340A1
     932          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
     933          KM    91.9 ACRE-FEETx43560/36x3600=30.9cfs
     934          RS       1    STOR       0
     935          SV       0     .01    91.9     120
     936          SQ       0     3.0    20.9     300
                  *
                  * DDM    ***** Preserved *****

     937          KK  C340A1
     938          KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
     939          HC       2
                  *
                  * DDM    ***** Preserved *****

     940          KK    C340
     941          KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
     942          HC       2
```

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                 *
                 * DDM    ***** Updated *****

     943         KK     360
     944         KM    SUB-BASIN 360
     945         KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
     946         KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF   .995
     947         KM      L = 2.10  Kb = .044  Adj. Slope =  124.0
     948         BA     .880
     949         LG     .260     .250    4.100     .570   23.000
     950         UC     .538     .362
     951         UA       0        5       16       30       65       77       84       90       94       97
     952         UA     100
                 * DDM    ***** Preserved *****

     953         KK    D360
     954         KM          DIVERT FLOW INTO ONLINE  DETENTION BASIN
     955         KM    DETENTION/RETENTION BASINS LOCATED WITHIN 33% OF MESA HIGHLANDS
     956         KM          MAXIMUM VOLUME DIVERSION = 49.5 acre-feet
     957         DT    BS360     49.5
     958         DI        0    10000
     959         DQ        0    10000
                 * DDM    ***** Preserved *****
1                                             HEC-1 INPUT                                         PAGE 26

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


     960         KK    RT360
     961         KM    RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
     962         DR    BS360
                 * DDM    ***** Preserved *****

     963         KK    S360
     964         KM    RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
     965         KM     49.5 ACRE-FEETx43560/36x3600=16.6 cfs
     966         RS        1    STOR        0
     967         SV        0      .01     49.5       70
     968         SQ        0      3.0     16.6      150
                 * DDM    ***** Preserved *****

     969         KK    C360
     970         KM    HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
     971         HC        3
                 *
                 * DDM    ***** Updated *****

     972         KK     380A
     973         KM    SUB-BASIN 380A
     974         KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
     975         KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF   .998
     976         KM      L =   .66  Kb = .076  Adj. Slope =   91.0
     977         BA     .261
     978         LG     .170     .250    4.100     .710   21.000
     979         UC     .425     .221
     980         UA       0        3        5        8       12       20       43       75       90       96
     981         UA     100
                 *
                 * DDM    ***** Preserved *****

     982         KK    C380A
     983         KM    HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
     984         HC        2
                 *
                 * DDM    ***** Updated *****

     985         KK     400A
     986         KM    SUB-BASIN 400A
     987         KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
     988         KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
     989         KM      L =   .28  Kb = .094  Adj. Slope =   71.0
     990         BA     .048
     991         LG     .250     .290    4.000     .640     .000
     992         UC     .317     .211
     993         UA       0        3        5        8       12       20       43       75       90       96
     994         UA     100
                 *
                 * DDM    ***** Preserved *****
1                                             HEC-1 INPUT                                         PAGE 27

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


     995         KK    C400A
     996         KM    HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
     997         HC        2
                 *

     998         KK     370
     999         KM    SUB-BASIN 370
    1000         KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
    1001         KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF   .996
    1002         KM      L = 1.90  Kb = .044  Adj. Slope =  203.5
    1003         BA     .672
    1004         LG     .340     .320    4.650     .330    8.000
```

```
UC    .404    .284
UA       0       3       5       8      12      20      43      75      90      96
UA     100
*

KK    S370
KM    Online Detention Basin at Madrid Subdivision
KM    Basin Bottom Elevation = 1822.9 ft
KM    Route through 24" pipe for 404 low flow and
KM    Route through 72" pipe to west along McDowell
KM    2-8'x3' RCBC as emergency spillway
RS       1    STOR       0
SV       0    1.37    3.61    5.97    8.46   11.07   13.81   16.69   19.72
SE     0.9     2.0     3.0     4.0     5.0     6.0     7.0     8.0     9.0
SQ     0.0      98     157     221     270     313     350     380     800
*

KK    D370
KM    Split the out flow to pipe along McDowell Road and to Madrid subdivision
DT    B370W
DI     0.0      98     157     221     270     313     350     380     800
DQ       0      89     141     199     243     282     315     340     380
*

KK    R370S
KM    CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
KM    ROUTING FLOW to SUB-BASINS 380B1
RS      12    FLOW      -1
RC    .045    .035    .045    8800    .023
RX       0       1      40      46      56      62     102     103
RY       3       2       2       0       0       2       2       3
*

KK    380B1
KM    SUB-BASIN 380B1
KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
KM      L = 1.61  Kb = .047  Adj. Slope =  124.0
BA    .369
LG    .300    .250   4.200    .520  16.000
UC    .471    .414
UA       0       5      16      30      65      77      84      90      94      97
```



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

UA     100
*

KK  D380B1
KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
KM    DETENTION/RETENTION BASINS LOCATED WITHIN MESA HIGHLANDS
KM        MAXIMUM VOLUME DIVERSION = 10.5 acre-feet
DT  B380B1    10.5
DI       0   10000
DQ       0   10000
*

KK  T380B1
KM    RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
DR  B380B1
*

KK  S380B1
KM    RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
KM     10.5 ACRE-FEETx43560/36x3600=3.5cfs
RS       1    STOR       0
SV       0     .01    10.5    20.0
SQ       0     1.0     3.5    50.0
*

KK  C380B1
KM    HYDROGRAPH COMBINATION
HC       3
*

KK  R380B1
KM    CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
KM    ROUTING OF FLOW FROM SUB-BASINS 380B1 TO SUB-BASIN 400B1.
RS       7    FLOW      -1
RC    .045    .035    .045    2600    .023
RX       0       1      40      46      56      62     102     103
RY       3       2       2       0       0       2       2       3
*
* DDM   ***** Updated *****

KK    400B1
KM    SUB-BASIN 400B1
KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
KM      L =  .93  Kb = .057  Adj. Slope =   91.0
BA    .385
LG    .280    .250   4.100    .590  12.000
UC    .433    .238
UA       0       5      16      30      65      77      84      90      94      97
```

```
1075          UA     100
              *
              * DDM    ***** Preserved *****
```



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

1076          KK  D400B1
1077          KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
1078          KM   DETENTION/RETENTION BASIN LOCATED WITHIN SAGUARO VISTA SUBDIVISION
1079          KM        MAXIMUM VOLUME DIVERSION = 5.6 ACRE-FEET
1080          DT  B400B1     5.6
1081          DI       0   10000
1082          DQ       0   10000
              * DDM    ***** Preserved *****

1083          KK  T400B1
1084          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
1085          DR  B400B1
              * DDM    ***** Preserved *****

1086          KK  S400B1
1087          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
1088          KM     5.6 ACRE-FEETx43560/36x3600 = 2 cfs
1089          RS       1    STOR       0
1090          SV       0     .01     5.6    10.0
1091          SQ       0       1       2    20.0
              * DDM    ***** Preserved *****

1092          KK  C400B1
1093          KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
1094          HC       2
              * DDM    ***** Preserved *****

1095          KK  CC400B
1096          KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
1097          HC       3
              *
              * DDM    ***** Updated *****

1098          KK    420A2
1099          KM    SUB-BASIN 420A2
1100          KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1101          KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
1102          KM      L =  .26  Kb = .064  Adj. Slope =    96.0
1103          BA     .022
1104          LG     .350    .350   4.150    .430    .000
1105          UC     .208    .194
1106          UA       0       5      16      30      65      77      84      90      94      97
1107          UA     100
              *
              * DDM    ***** Preserved *****

1108          KK  C400A2
1109          KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
1110          HC       2
              *
```



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

1111          KK      395
1112          KM    SUB-BASIN 395
1113          KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1114          KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
1115          KM      L = 1.30  Kb = .051  Adj. Slope =  219.2
1116          BA     .199
1117          LG     .310    .260   4.900    .340  18.000
1118          UC     .329    .334
1119          UA       0       5      16      30      65      77      84      90      94      97
1120          UA     100
              *

1121          KK     R395
1122          KM    CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
1123          KM    ROUTING OF FLOW TO SUB-BASIN 390.
1124          RS       3    FLOW      -1
1125          RC     .045    .035    .045    2600    .023
1126          RX       0       1      40      46      56      62     102     103
1127          RY       3       2       2       0       0       2       2       3
              *

1128          KK      385
1129          KM    SUB-BASIN 385
1130          KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1131          KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
1132          KM      L = 2.30  Kb = .045  Adj. Slope =  303.0
1133          BA     .527
1134          LG     .340    .360   5.600    .220  13.000
1135          UC     .383    .358
1136          UA       0       3       5       8      12      20      43      75      90      96
1137          UA     100
              *
```

```
                * DDM   ***** Updated *****

 1138           KK    415B
 1139           KM   SUB-BASIN 415B
 1140           KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 1141           KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
 1142           KM     L = 1.59  Kb = .048  Adj. Slope =  315.0
 1143           BA    .329
 1144           LG    .320    .310   5.300    .260  19.000
 1145           UC    .308    .274
 1146           UA       0       5      16      30      65      77      84      90      94      97
 1147           UA     100
                * DDM   ***** Preserved *****

 1148           KK   C415B
 1149           KM   HYDROGRAPH COMBINATION OF 415 DIVERSION.
 1150           HC       2
                *
1                                          HEC-1 INPUT                                         PAGE 31

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


 1151           KK   D415B
 1152           KM   DIVERT FLOW INTO OFFLINE DETENTION BASIN
 1153           KM   MAXIMUM STORAGE VOLUME FOR DIVERSION = 32 AC-FT @ 5' DEPTH.
 1154           DT  BS415B
 1155           DI       0     150    5000
 1156           DQ       0       0    4850
                *
                * DDM   ***** Preserved *****

 1157           KK  RT415B
 1158           KM   RETRIEVE FLOW FROM DIVERSION INTO OFFLINE BASIN
 1159           DR  BS415B
                *
                * DDM   ***** Preserved *****

 1160           KK   S415B
 1161           KM   RETRIEVE FLOW INTO OFFLINE BASIN AND BLEED OFF WITHIN 36 HOURS.
 1162           KM      32 ACRE-FEETx43560/36x3600 = 11cfs
 1163           RS       1    STOR       0
 1164           SV       0     .01      32      40
 1165           SQ       0       5      50      60
                * DDM   ***** Preserved *****

 1166           KK  CC415B
 1167           KM   HYDROGRAPH COMBINATION OF 415 DIVERSION.
 1168           HC       2
                * DDM   ***** Preserved *****

 1169           KK   R415B
 1170           KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
 1171           KM   ROUTING OF FLOW FROM 415C TO 415B
 1172           RS       3    FLOW      -1
 1173           RC    .045     .03    .045    2590    .024
 1174           RX       0       1      40      46      56      62     102     103
 1175           RY       3       2       2       0       0       2       2       3
                *

 1176           KK     390
 1177           KM   SUB-BASIN 390
 1178           KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 1179           KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
 1180           KM     L =  .70  Kb = .050  Adj. Slope =  299.4
 1181           BA    .248
 1182           LG    .300    .250   4.700    .380  18.000
 1183           UC    .204    .106
 1184           UA       0       5      16      30      65      77      84      90      94      97
 1185           UA     100
                *
1                                          HEC-1 INPUT                                         PAGE 32

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


 1186           KK    D390
 1187           KM         DIVERT FLOW INTO ONLINE  DETENTION BASIN
 1188           KM   DETENTION/RETENTION BASINS LOCATED WITHIN THUNDER MOUNTAIN ESTATES
 1189           KM        MAXIMUM VOLUME DIVERSION  = 3.5 acre-feet
 1190           DT   BS390     3.5
 1191           DI       0   10000
 1192           DQ       0   10000
                * DDM   ***** Preserved *****

 1193           KK   RT390
 1194           KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
 1195           DR   BS390
                * DDM   ***** Preserved *****

 1196           KK    S390
 1197           KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
 1198           KM     3.5 ACRE-FEETx43560/36x3600=1.2cfs
 1199           RS       1    STOR       0
 1200           SV       0     .01     3.5     6.0
```

```
1201          SQ      0     0.5     1.2    20.0
              *

1202          KK    C390
1203          KM   HYDROGRAPH COMBINATION at NEC of McDowell and Hawes
1204          HC      4
              *

1205          KK   D390S
1206          KM        DIVERT FLOW to West along McDowell
1207          DT   B390W
1208          DI      0     700    2000
1209          DQ      0     700     700
              *

1210          KK   T370W
1211          KM   RETRIEVE FLOW FROM DIVERSION of ONLINE BASIN
1212          DR   B370W
              *

1213          KK   R370W
1214          KM   ROUTING OF FLOW FROM SUB-BASINS 370W TO Hawes along McDowell.
1215          RS      5    FLOW      -1
1216          RC   .045    .035    .045    3200    .023
1217          RX      0       1      40      46      56      62     102     103
1218          RY      3       2       2       0       0       2       2       3
              *

1219          KK    C370
1220          KM   HYDROGRAPH COMBINATION
1221          HC      2
              *
```



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

1222          KK   R390S
1223          KM   Route Flow South to Subbasin 400B3.
1224          RS      2    FLOW      -1
1225          RC   .045    .045    .045    1000    .020
1226          RX      0       1      40      46      56      62     102     103
1227          RY      3       2       2       0       0       2       2       3
              *

1228          KK   400B3
1229          KM   SUB-BASIN 400B3
1230          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1231          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
1232          KM      L =  .26  Kb = .064  Adj. Slope =  135.0
1233          BA   .024
1234          LG   .300    .250   4.500    .430    .000
1235          UC   .183    .161
1236          UA      0       5      16      30      65      77      84      90      94      97
1237          UA    100
              *

1238          KK D400B3
1239          KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
1240          KM   DETENTION/RETENTION BASIN LOCATED WITHIN SAGUARO VISTA SUBDIVISION
1241          KM        MAXIMUM VOLUME DIVERSION = 1.6 ACRE-FEET
1242          DT B400B3     1.6
1243          DI      0   10000
1244          DQ      0   10000
              *

1245          KK T400B3
1246          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
1247          DR B400B3
              *

1248          KK S400B3
1249          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
1250          KM      1.6 ACRE-FEETx43560/36x3600 = 1 cfs
1251          RS      1    STOR       0
1252          SV      0     .01     1.6     5.0
1253          SQ      0       1       1    10.0
              *

1254          KK C400B3
1255          KM   HYDROGRAPH COMBINATION
1256          HC      2
              *

1257          KK   C390S
1258          KM   HYDROGRAPH COMBINATION of flow fron north of the Basin
1259          HC      2
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1260          KK   380B3
1261          KM   SUB-BASIN 380B3
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1262          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1263          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
1264          KM     L =   .69  Kb = .054  Adj. Slope =  138.0
1265          BA    .123
1266          LG    .300     .250   4.350    .480  16.000
1267          UC    .279     .220
1268          UA       0        5      16      30      65      77      84      90      94      97
1269          UA     100
              *

1270          KK   D380B3
1271          KM          DIVERT FLOW INTO ONLINE  DETENTION BASIN
1272          KM          MAXIMUM VOLUME DIVERSION = 4.0 acre-feet
1273          DT   B380B3     4.0
1274          DI       0   10000
1275          DQ       0   10000
              *

1276          KK   T380B3
1277          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
1278          DR   B380B3
              *

1279          KK   S380B3
1280          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
1281          KM     4.0 ACRE-FEETx43560/36x3600= 2.cfs
1282          RS       1    STOR       0
1283          SV       0     .01     4.0     6.0
1284          SQ       0     0.5     2.0    20.0
              *

1285          KK   C380B3
1286          KM   HYDROGRAPH COMBINATION
1287          HC       2
              *

1288          KK   D380B3
1289          KM   Subbasin 380B3 is Divided into 3 Smaller Areas
1290          KM   38% to 380B3a, 35% to 380B3b, and 27% to 380B3c
1291          DT   380B3c
1292          DI       0    1000
1293          DQ       0     270
              *

1294          KK   380B3b
1295          KM   Subbasin 380B3 is Divided into 3 Smaller Areas
1296          KM   38% to 380B3a, 35% to 380B3b, and 27% to 380B3c
1297          DT   380B3a
1298          DI       0    1000
1299          DQ       0     520
              *
```



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

1300          KK   C380BB
1301          KM   Total Basin Inflows from North and East Areas
1302          HC       2
              *

1303          KK    D380B
1304          KM   DIVERT FLOW INTO OFFLINE DETENTION BASIN LOCATED WITHIN SUB-BASINS
1305          KM   380B3b - Culver/Hawes basin
1306          DT   B38B3b
1307          DI       0      70    5000
1308          DQ       0       0    4930
              *

1309          KK   RT380B
1310          KM    RETRIEVE FLOW FROM DIVERSION
1311          DR   B38B3b
              *

1312          KK    S380B
1313          KM    RETRIEVE FLOW INTO OFFLINE BASIN AND BLEED OFF WITHIN 36 HOURS.
1314          RS       1    STOR       0
1315          SV       0     2.5     5.1    11.0    18.7    28.0    32.0
1316          SE       0     1.0     2.0     4.0     6.0     8.0     9.0
1317          SQ       0     6.2     8.8    15.3    20.0      25     250
              *

1318          KK   CC380B
1319          KM    HYDROGRAPH COMBINATION at outlet of Basin "S380B"
1320          HC       2
              *

1321          KK   R38B3b
1322          KM    ROUTING OF FLOW FROM BASIN TO SUB-BASIN 380B3c
1323          RS       3    FLOW      -1
1324          RC    .045    .035    .045    1300    .020
1325          RX       0       1      40      46      56      62     102     103
1326          RY       3       2       2       0       0       2       2       3
              *
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```
1327          KK  T38B3a
1328          KM   RETRIEVE FLOW FROM DIVERSION of 380B3a
1329          DR  380B3a
              *

1330          KK  R38B3a
1331          KM   ROUTING OF FLOW FROM SUB-BASINS 380B3a TO SUB-BASIN 380B3c.
1332          RS       3    FLOW      -1
1333          RC    .045    .035    .045    1800    .020
1334          RX       0       1      40      46      56      62     102     103
1335          RY       3       2       2       0       0       2       2       3
              *
```



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

1336          KK  T38B3c
1337          KM   RETRIEVE FLOW FROM DIVERSION of 380B3c
1338          DR  380B3c
              *

1339          KK  C38B3c
1340          KM   HYDROGRAPH COMBINATION of 380B3c, 380B3a and flow from the Basin
1341          HC       3
              *

1342          KK  R380B3
1343          KM   ROUTING OF FLOW FROM SUB-BASINS 380B3c TO SUB-BASIN 380B2.
1344          RS       4    FLOW      -1
1345          RC    .045    .035    .045    2500    .020
1346          RX       0       1      40      46      56      62     102     103
1347          RY       3       2       2       0       0       2       2       3
              *

1348          KK   380B2
1349          KM   SUB-BASIN 380B2
1350          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1351          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
1352          KM     L =  .55  Kb = .055  Adj. Slope =  136.0
1353          BA    .096
1354          LG    .300    .250   3.950    .580  15.000
1355          UC    .250    .187
1356          UA       0       5      16      30      65      77      84      90      94      97
1357          UA     100
              *

1358          KK  C380B2
1359          KM   HYDROGRAPH COMBINATION
1360          HC       2
              *

1361          KK  R380B2
1362          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
1363          KM   ROUTING OF FLOW FROM SUB-BASINS 380B2 TO SUB-BASIN 400B2.
1364          RS       9    FLOW      -1
1365          RC    .045    .035    .045    4000    .018
1366          RX       0       1      40      46      56      62     102     103
1367          RY       3       2       2       0       0       2       2       3
              *

1368          KK   400B2
1369          KM   SUB-BASIN 400B2
1370          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1371          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
1372          KM     L =  .93  Kb = .051  Adj. Slope =  118.0
1373          BA    .194
1374          LG    .300    .250   4.150    .530    .000
1375          UC    .363    .288
1376          UA       0       5      16      30      65      77      84      90      94      97
1377          UA     100
              *
```



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

1378          KK  C400B2
1379          KM   HYDROGRAPH COMBINATION
1380          HC       2
              *

1381          KK  R400B2
1382          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
1383          KM   ROUTING OF FLOW FROM SUB-BASINS 400B2 TO SUB-BASIN 420A1.
1384          RS       3    FLOW      -1
1385          RC    .045    .035    .045    1800    .018
1386          RX       0       1      40      46      56      62     102     103
1387          RY       3       2       2       0       0       2       2       3
              *

1388          KK   420A1
1389          KM   SUB-BASIN 420A1
1390          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1391          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
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1392          KM     L = 1.20  Kb = .044  Adj. Slope =  108.0
1393          BA    .566
1394          LG    .300     .270   4.250     .480  17.000
1395          UC    .387     .207
1396          UA       0        5      16       30      65      77      84      90      94      97
1397          UA     100
              *

1398          KK  D420A1
1399          KM         DIVERT FLOW INTO ONLINE  DETENTION BASIN
1400          KM    DETENTION/RETENTION BASINS LOCATED WITHIN GRAY FOX SUBDIVISION
1401          KM         MAXIMUM VOLUME DIVERSION = 11.2 acre-feet
1402          DT  B420A1     11.2
1403          DI       0    10000
1404          DQ       0    10000
              *

1405          KK  T420A1
1406          KM    RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
1407          DR  B420A1
              *

1408          KK  S420A1
1409          KM    RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
1410          KM     11.2 ACRE-FEETx43560/36x3600= 4cfs
1411          RS       1     STOR       0
1412          SV       0      .01    11.2      20
1413          SQ       0      1.0     4.0      40
              *

1414          KK    C420A
1415          KM    HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
1416          HC       4
              *
1                                        HEC-1 INPUT                                              PAGE 38

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

1417          KK    T390W
1418          KM    RETRIEVE FLOW FROM DIVERSION of C390 to west
1419          DR    B390W
              *

1420          KK    R390W
1421          KM    Route Flow west to Subbasin 420B.
1422          RS       6     FLOW      -1
1423          RC    .045     .045    .045    5200    .020
1424          RX       0        1      40      46      56      62     102     103
1425          RY       3        2       2       0       0       2       2       3
              *

1426          KK     420B
1427          KM    SUB-BASIN 420B
1428          KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1429          KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
1430          KM     L = 1.00  Kb = .049  Adj. Slope =  150.0
1431          BA    .279
1432          LG    .300     .250   3.910     .590  15.000
1433          UC    .333     .226
1434          UA       0        5      16      30      65      77      84      90      94      97
1435          UA     100
              *

1436          KK    C420B
1437          KM    HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
1438          HC       2
              *

1439          KK     440
1440          KM    SUB-BASIN 440
1441          KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1442          KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
1443          KM     L =  .40  Kb = .039  Adj. Slope =  315.0
1444          BA    .080
1445          LG    .190     .380   6.400     .140  13.000
1446          UC    .129     .077
1447          UA      .0        3       5       8      12      20      43      75      90      96
1448          UA     100
              * DDM    ***** Preserved *****

1449          KK     R70
1450          KM    ROUTE FLOW FROM SUB-BASIN 440 TO C108
1451          RS       2     FLOW      -1
1452          RC     .05     .035     .05    2250     .08
1453          RX    1000     1025    1050    1070    1075    1095    1120    1145
1454          RY      30     22.9    15.7      10      10    15.7    22.9      30
              * DDM    ***** Updated *****
1                                        HEC-1 INPUT                                              PAGE 39

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

1455          KK     441
1456          KM    SUB-BASIN 441
```

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1457            KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1458            KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
1459            KM      L =   .28  Kb =  .069  Adj. Slope =  315.0
1460            BA     .010
1461            LG     .300     .250   5.600    .220    5.000
1462            UC     .150     .225
1463            UA       0        5      16      30       65       77       84       90       94       97
1464            UA     100
                * DDM    ***** Preserved *****

1465            KK     C108
1466            KM    COMBINE HYDROGRAPHS FROM SUB-BASINS 440 & 441
1467            HC       2
                * DDM    ***** Preserved *****

1468            KK       D4
1469            KM          SPLIT FLOW WITH TWO 42 INCH PIPES TO WEST AND SOUTH
1470            DT    SPLIT
1471            DI       0       14      40      82      120      154      180
1472            DQ       0        7      20      41       60       77       90
                * DDM    ***** Preserved *****

1473            KK     R108
1474            KM          ROUTE FLOW FROM SUB-BASIN C108 TO C67
1475            RS       2     FLOW      -1
1476            RC     .05     .035     .05    3200       .1
1477            RX    1000     1025    1050    1070     1075     1095     1120     1145
1478            RY      30     22.9    15.7      10       10     15.7     22.9       30
                * DDM    ***** Updated *****

1479            KK     442
1480            KM    SUB-BASIN 442
1481            KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1482            KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
1483            KM      L =   .83  Kb = .055  Adj. Slope =  274.2
1484            BA     .100
1485            LG     .300     .270   3.290    .770    5.000
1486            UC     .258     .264
1487            UA       0        5      16      30       65       77       84       90       94       97
1488            UA     100
                * DDM    ***** Preserved *****

1489            KK     C67
1490            KM    COMBINE FLOW FROM SUB-BASIN 442 & DIV4
1491            HC       2
                * DDM    ***** Preserved *****
1                                          HEC-1 INPUT                                                  PAGE 40

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


1492            KK       D6
1493            KM          OFFLINE BASIN WITH 25 FOOT WEIR SET AT 2.5 FEET ABOVE BOTTOM OF CHANNEL
1494            KM          FLOW CONTINUES BEYOND BASIN THROUGH 2-30" PIPES
1495            DT   BASIN4     3.3
1496            DI       0       10      32      44     79.9    132.5      198    272.9    356.8
1497            DQ       0        0       0       0     23.9     67.5      124    190.9    266.8
                * DDM    ***** Preserved *****

1498            KK     RTD6
1499            KM    RETRIEVE FLOW FROM DIVERSION INTO OFFLINE BASIN
1500            DR   BASIN4
                * DDM    ***** Preserved *****

1501            KK     SD6
1502            KM    RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
1503            KM      3.3 ACRE-FEETx43560/36x3600=1.1cfs
1504            RS       1     STOR       0
1505            SV       0      .01     3.3
1506            SQ       0      0.2     1.1
                * DDM    ***** Preserved *****

1507            KK     CD6
1508            KM    HYDROGRAPH COMBINATION FOR OFFLINE BASIN BLEEDOFF
1509            HC       2
                * DDM    ***** Updated *****

1510            KK     443
1511            KM    SUB-BASIN 443
1512            KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1513            KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
1514            KM      L =   .71  Kb = .050  Adj. Slope =  315.0
1515            BA     .080
1516            LG     .250     .190   8.000    .080   10.000
1517            UC     .196     .194
1518            UA       0        5      16      30       65       77       84       90       94       97
1519            UA     100
                * DDM    ***** Preserved *****

1520            KK     D66
1521            KM          DIVERT FLOW INTO 3 NATURAL WASHES WITH ONE 24" PIPE IN EACH WASH.
1522            KM          EACH PIPE CAPACITY BASED ON 4 FEET OF HEAD
1523            DT    WSH66
1524            DI       0       78     100     200
1525            DQ       0       78      78      78
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                  * DDM    ***** Preserved *****

1526              KK    R113
1527              KM         ROUTE FLOW FROM C113 TO C114
1528              RS       1    FLOW      -1
1529              RC    .019    .019    .019    1300    .029
1530              RX    1000    1004    1008    1012    1018    1022    1026    1030
1531              RY      17   15.33   12.67      10      10   12.67   15.33      17
                  * DDM    ***** Preserved *****
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LINE              ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1532              KK    C114
1533              KM         COMBINE HYDROGRAPHS FROM SUB-BASIN 67 AND C113
1534              HC       2
                  * DDM    ***** Updated *****

1535              KK     444
1536              KM    SUB-BASIN 444
1537              KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1538              KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
1539              KM      L =  .33  Kb = .034  Adj. Slope =  315.0
1540              BA    .040
1541              LG    .130    .350   4.450    .320   1.000
1542              UC    .112    .084
1543              UA       0       3       5       8      12      20      43      75      90      96
1544              UA     100
                  * DDM    ***** Preserved *****

1545              KK     R58
1546              KM    ROUTE FLOW FROM SUB-BASIN 444 TO C107
1547              RS       2    FLOW      -1
1548              RC     .05    .035     .05    2370   .0516
1549              RX    1000    1010    1020    1050    1055    1085    1095    1105
1550              RY      19      18      17      10      10      17      18      19
                  * DDM    ***** Updated *****

1551              KK     445
1552              KM    SUB-BASIN 445
1553              KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1554              KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
1555              KM      L =  .82  Kb = .036  Adj. Slope =  315.0
1556              BA    .190
1557              LG    .170    .320   3.470    .590   3.000
1558              UC    .192    .130
1559              UA       0       5      16      30      65      77      84      90      94      97
1560              UA     100
                  * DDM    ***** Preserved *****

1561              KK    C107
1562              KM    COMBINE HYDROGRAPHS FROM SUB-BASINS 444 & 445
1563              HC       2
                  * DDM    ***** Preserved *****

1564              KK    R107
1565              KM         ROUTE FLOW FROM C107 TO C109
1566              RS       2    FLOW      -1
1567              RC     .05    .035     .05     700   .0516
1568              RX    1000    1010    1020    1050    1055    1085    1095    1105
1569              RY      19      18      17      10      10      17      18      19
                  * DDM    ***** Preserved *****
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LINE              ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1570              KK    RTB2
1571              KM         RETRIEVE DIVERTED FLOW FROM BASIN 1
1572              DR    SPLIT
                  * DDM    ***** Preserved *****

1573              KK  RSPLIT
1574              KM         ROUTE FLOW FROM SPLIT TO C109
1575              RS       1    FLOW      -1
1576              RC     .05    .035     .05     800     .05
1577              RX    1000    1025    1050    1070    1075    1095    1120    1145
1578              RY      30    22.9    15.7      10      10    15.7    22.9      30
                  * DDM    ***** Updated *****

1579              KK     446
1580              KM    SUB-BASIN 446
1581              KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1582              KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
1583              KM      L =  .46  Kb = .061  Adj. Slope =  303.9
1584              BA    .040
1585              LG    .270    .250   4.500    .400  19.000
1586              UC    .183    .189
1587              UA       0       5      16      30      65      77      84      90      94      97
1588              UA     100
                  * DDM    ***** Preserved *****

1589              KK    C109
1590              KM         COMBINE HYDROGRAPHS FROM COMBINES C107 AND C108
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1591          HC      3
              * DDM   ***** Preserved *****

1592          KK     D5
1593          KM          DIVERT FLOW INTO WASHES TOWARDS WEST
1594          KM          DIVERSION THROUGH 36" PIPE WITH 3 FEET OF HEAD
1595          DT  WSH404
1596          DI      0    40.7    71.2   121.6     190     276   379.4   500.6
1597          DQ      0      35      35      35      35      35      35      35
              * DDM   ***** Preserved *****

1598          KK   R109
1599          KM          ROUTE FLOW FROM C109 TO C110
1600          RS      1    FLOW      -1
1601          RC   .019    .019    .019    3080     .05
1602          RX   1000    1005    1010    1015    1025    1030    1035    1040
1603          RY  13.75    12.5   11.25      10      10   11.25    12.5   13.75
              * DDM   ***** Updated *****

1604          KK    447
1605          KM  SUB-BASIN 447
1606          KM  24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1607          KM  THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
1608          KM    L =  .49  Kb = .056  Adj. Slope =  221.0
1609          BA   .090
1610          LG   .250    .270   3.350    .870  30.000
1611          UC   .208    .145
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1612          UA      0       5      16      30      65      77      84      90      94      97
1613          UA    100
              * DDM   ***** Preserved *****

1614          KK  RT404
1615          KM          RETRIEVE DIVERTED FLOW FOR WASH 109
1616          DR  WSH404
              * DDM   ***** Preserved *****

1617          KK   R404
1618          KM          ROUTE FLOW FROM C110 TO C110
1619          RS      6    FLOW      -1
1620          RC   .019    .019    .019    3540     .03
1621          RX   1000    1012    1016    1020    1025    1029    1033    1045
1622          RY     15      12      11      10      10      11      12      15
              * DDM   ***** Preserved *****

1623          KK   C110
1624          KM  COMBINE HYDROGRAPHS FROM SUB-BASIN 447 AND R404
1625          HC      3
              * DDM   ***** Preserved *****

1626          KK   R110
1627          KM          ROUTE FLOW FROM C110 TO C115
1628          RS      1    FLOW      -1
1629          RC   .019    .019    .019     580   .0291
1630          RX   1000    1012    1016    1020    1035    1039    1043    1055
1631          RY     15      12      11      10      10      11      12      15
              * DDM   ***** Preserved *****

1632          KK   C115
1633          KM          COMBINE HYDROGRAPHS FROM C114 AND C110
1634          HC      2
              * DDM   ***** Preserved *****

1635          KK   R115
1636          KM          ROUTE FLOW FROM C115 TO Sub 453
1637          RS      1    FLOW      -1
1638          RC   .019    .019    .019    2125    .029
1639          RX   1000    1012    1016    1020    1035    1039    1043    1055
1640          RY     15      12      11      10      10      11      12      15
              * DDM   ***** Updated *****

1641          KK    448
1642          KM  SUB-BASIN 448
1643          KM  24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1644          KM  THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
1645          KM    L =  .36  Kb = .042  Adj. Slope =  315.0
1646          BA   .045
1647          LG   .170    .310   4.200    .390  11,000
1648          UC   .133    .102
1649          UA      0       5      16      30      65      77      84      90      94      97
1650          UA    100
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1651          KK    449
1652          KM  SUB-BASIN 449
1653          KM  24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1654          KM  THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
1655          KM    L =  .40  Kb = .054  Adj. Slope =  315.0
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1656          BA    .050
1657          LG    .260     .280   3.500     .640   6.000
1658          UC    .167     .134
1659          UA       0        5      16       30      65      77      84      90      94      97
1660          UA     100
              * DDM   ***** Preserved *****

1661          KK    C6364
1662          KM    COMBINE HYDROGRAPHS FROM SUB-BASINS 448 & 449
1663          HC       2
              * DDM   ***** Preserved *****

1664          KK    R6364
1665          KM    ROUTE FLOW FROM C116 AND SUB-BASINS 448 AND 449
1666          RS       5    FLOW      -1
1667          RC     .05     .035     .05     4375   .0333
1668          RX    1000     1027    1053     1080    1090    1117    1143    1170
1669          RY      15    13.33   11.67       10      10   11.67   13.33      15
              * DDM   ***** Updated *****

1670          KK     450
1671          KM    SUB-BASIN 450
1672          KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1673          KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
1674          KM      L =  .85  Kb = .057  Adj. Slope =  210.5
1675          BA    .070
1676          LG    .340     .350   3.630     .570   4.000
1677          UC    .296     .383
1678          UA       0        3       5        8      12      20      43      75      90      96
1679          UA     100
              * DDM   ***** Updated *****

1680          KK     451
1681          KM    SUB-BASIN 451
1682          KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1683          KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
1684          KM      L =  .57  Kb = .063  Adj. Slope =  175.0
1685          BA    .025
1686          LG    .340     .340   3.290     .750   3.000
1687          UC    .271     .453
1688          UA       0        3       5        8      12      20      43      75      90      96
1689          UA     100
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


1690          KK    C451
1691          KM    COMBINE HYDROGRAPHS FROM SUB-BASINS 450 & 451
1692          HC       2
              * DDM   ***** Preserved *****

1693          KK    RT66
1694          KM         RETRIEVE DIVERTED FLOW FROM SUB-BASIN 66
1695          DR    WSH66
              * DDM   ***** Updated *****

1696          KK     452
1697          KM    SUB-BASIN 452
1698          KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1699          KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
1700          KM      L =  .43  Kb = .055  Adj. Slope =  315.0
1701          BA    .040
1702          LG    .260     .280   3.700     .550   9.000
1703          UC    .171     .166
1704          UA       0        5      16       30      65      77      84      90      94      97
1705          UA     100
              * DDM   ***** Preserved *****

1706          KK    C6465
1707          KM    COMBINE HYDROGRAPHS FROM SUB-BASINS 443 AND 452
1708          HC       2
              * DDM   ***** Preserved *****

1709          KK    R6566
1710          KM         ROUTE FLOW FROM DIVERSIONS 65 AND 66 TO C116
1711          RS       3    FLOW      -1
1712          RC     .05     .035     .05     2435   .0282
1713          RX    1000     1045    1090     1150    1160    1220    1265    1310
1714          RY      25       23      20       10      10      20      23      25
              * DDM   ***** Preserved *****

1715          KK    C116
1716          KM    COMBINE HYDROGRAPHS FROM SUB-BASINS 450 & 451 AND R6364 & R6465
1717          HC       3
              * DDM   ***** Preserved *****

1718          KK  BASIN5
1719          KM         RESERVOIR WITHIN PARCEL 31        2-48 INCH PIPES AT OUTFALL
1720          KM         BASIN 5 FEET DEEP
1721          RS       1    ELEV       0
1722          SV       0     4.5     9.9
1723          SQ       0      69     190
1724          SE       0     2.5       5
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* DDM   ***** Preserved *****
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1725        KK    R116
1726        KM   ROUTE FLOW FROM C116 TO C117
1727        RS      2    FLOW      -1
1728        RC    .05    .035     .05    1300   .0333
1729        RX   1000    1100    1200    1300    1320    1420    1520    1620
1730        RY     13      12      11      10      10      11      12      13
            * DDM   ***** Updated *****

1731        KK    453
1732        KM   SUB-BASIN 453
1733        KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1734        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
1735        KM      L =   .58  Kb = .058  Adj. Slope =  138.0
1736        BA    .060
1737        LG    .290    .300   3.290    .820  18.000
1738        UC    .275    .284
1739        UA      0       5      16      30      65      77      84      90      94      97
1740        UA    100
            * DDM   ***** Preserved *****

1741        KK    C117
1742        KM   COMBINE HYDROGRAPHS FROM SUB-BASIN 453 AND R116
1743        HC      2
            * DDM   ***** Preserved *****

1744        KK    C118
1745        KM   COMBINE HYDROGRAPHS FROM R115 AND C117
1746        HC      2
            * DDM   ***** Preserved *****

1747        KK    R118
1748        KM         ROUTE FLOW FROM C118 TO  DIV7
1749        RS      1    FLOW      -1
1750        RC   .019    .019    .019    1500    .024
1751        RX   1000    1012    1016    1020    1035    1039    1043    1055
1752        RY     15      12      11      10      10      11      12      15
            * DDM   ***** Preserved *****

1753        KK     D7
1754        KM         OFFLINE BASIN AT NORTH MOUNTAIN RIDGE   FLOWS ENTER BASIN OVER
1755        KM         30' WEIR SET AT 5.3' ABOVE THE CHANNEL BOTTOM, Vol = 3.6 A-F
1756        DT  BASIN6    3.6
1757        DI      0     363     487     563     645     900
1758        DQ      0       2      10      15      25     260
            * DDM   ***** Preserved *****

1759        KK    RTD7
1760        KM   RETRIEVE FLOW FROM DIVERSION INTO OFFLINE BASIN
1761        DR  BASIN6
            * DDM   ***** Preserved *****
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1762        KK     SD7
1763        KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
1764        KM     3.6 ACRE-FEETx43560/36x3600=1.2cfs
1765        RS      1    STOR       0
1766        SV      0     .01     3.6     4.0
1767        SQ      0     0.2     1.2     1.5
            * DDM   ***** Preserved *****

1768        KK     CD7
1769        KM   HYDROGRAPH COMBINATION FOR OFFLINE BASIN BLEEDOFF
1770        HC      2
            * DDM   ***** Updated *****

1771        KK     454
1772        KM   SUB-BASIN 454
1773        KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1774        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF   .999
1775        KM     L = 1.23  Kb = .051  Adj. Slope =  163.0
1776        BA    .180
1777        LG    .300    .310   3.780    .560  14.000
1778        UC    .379    .395
1779        UA      0       5      16      30      65      77      84      90      94      97
1780        UA    100
            *
            * DDM   ***** Preserved *****

1781        KK    C454
1782        KM         COMBINE HYDROGRAPHS FROM SUB-BASIN 454 AND CDIV7
1783        HC      2
            * DDM   ***** Preserved *****

1784        KK    R454
1785        KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
1786        KM   ROUTE FLOW FROM C454 TO 415C
```

```
RS      3   FLOW     -1
RC    .045   .035   .045   2200   .009
RX      0     .5      1     33     42      67    67.5     68
RY      5      4      4      0      0       6      6       6
*
* DDM   ***** Updated *****

KK    415A
KM    SUB-BASIN 415A
KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
KM      L = 1.21  Kb = .049  Adj. Slope =  140.0
BA    .280
LG    .300   .260   3.630    .710  15.000
UC    .400   .322
UA      0      5     16     30     65      77     84      90      94      97
UA    100
* DDM   ***** Preserved *****
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KK   C415A
KM         COMBINE HYDROGRAPHS FROM R454 AND 415A
HC       2
*
* DDM   ***** Preserved *****

KK  CC415A
KM         COMBINE HYDROGRAPHS FROM CC420B AND 415A
HC       2
*

KK   D420B
KM    DIVERT FLOW INTO OFFLINE DETENTION BASIN
KM    MAXIMUM STORAGE VOLUME FOR DIVERSION = 8.0 AC-FT @ 5' DEPTH.
DT  BS420B
DI       0    1500    5000
DQ       0       0    3500
*
* DDM   ***** Preserved *****

KK  RT420B
KM    RETRIEVE FLOW FROM DIVERSION INTO OFFLINE BASIN
DR  BS420B
* DDM   ***** Preserved *****

KK   S420B
KM    RETRIEVE FLOW INTO OFFLINE BASIN AND BLEED OFF WITHIN 36 HOURS.
KM      8.0 ACRE-FEETx43560/36x3600 = 2.7 cfs
RS       1    STOR      0
SV       0     0.1    8.0     20
SQ       0       1     30     55
*
* DDM   ***** Preserved *****

KK  CC420B
KM    HYDROGRAPH COMBINATION at D/S of the Basin "H"
HC       2
*
* DDM   ***** Preserved *****

KK   R415A
KM    CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
KM    ROUTING OF FLOW FROM C415A TO 455C
RS       2   FLOW     -1
RC    .045    .03   .045   4100   .024
RX       0     .5      1      8     16      23    23.5     24
RY       8      8      8      0      0       8      8       8
*
* DDM   ***** Updated *****
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```
KK     455
KM    SUB-BASIN 455
KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .993
KM      L = 1.70  Kb = .041  Adj. Slope =  146.0
BA   1.111
LG    .270   .280   3.700    .640  24.000
UC    .421   .204
UA       0      5     16     30     65      77     84      90      94      97
UA     100
* DDM   ***** Preserved *****

KK    D455
KM         DIVERT FLOW INTO ONLINE  DETENTION BASIN
KM    DETENTION/RETENTION BASINS LOCATED WITHIN LAS SENDAS ADDENDUM III
KM    FOR BASIN #: 30       34       43       47&58
KM         MAXIMUM VOLUME DIVERSION = 74.1 acre-feet
DT    BS455    74.1
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DI       0   10000
DQ       0   10000
* DDM    ***** Preserved *****

KK    RT455
KM    RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
DR    BS455
* DDM    ***** Preserved *****

KK     S455
KM    RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
KM     74.1 ACRE-FEETx43560/36x3600=25cfs
RS       1     STOR       0
SV       0      .01     74.1    100.0
SQ       0      3.0       25    250.0
* DDM    ***** Preserved *****

KK     C455
KM    HYDROGRAPH COMBINATION FOR SUB-BASIN 455 AND DIVERTED BASIN STORAGE OF 455
HC       2
* DDM    ***** Preserved *****

KK    CC455
KM   HYDROGRAPH COMBINATION OF 420C, R415 AND C455
HC       3
* DDM    ***** Preserved *****

KK     S440
KM    SPOOK HILL FRS PLANS DATED 6/15/77
KM    OUTLET PIPE=7'x7.5'RCBC; L=70 INLET INV.=1566; OUTLET INV.=1566
KM    EMERGENCY SPILLWAY ELEV.=1582; PRINCIPLE SPILLWAY ELEV.=1577.5
KM    STORAGE VOLUME BELOW PRINCIPLE SPILLWAY FOR SEDIMENT = 271 ACRE-FEET
RS       1     STOR       0
SV     0.0       81    211.0  265.72  692.96  896.16  1120.0 1630.34  2230.9 3311.68
SQ     0.0      1.0      3.0     8.0  515.00  780.00  825.00  3184.7  7426.0 16007.3
SE   577.0   578.00   579.00  579.36  581.86  582.86  583.86  585.86  587.86  590.86
* DDM    ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK     R455
KM    ROUTE FLOW FROM SPOOK HILL FRS TO SUB-BASIN 480
RS      15     FLOW      -1
RC    .035     .025     .035    7000   .0002
RX       0        1        2      28      58      84      85      86
RY    13.5     13.5     13.5       0       0    13.5    13.5    13.5
* DDM    ***** Updated *****

KK      480
KM    SUB-BASIN 480
KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
KM      L = 1.21  Kb = .042  Adj. Slope =  165.0
BA    .731
LG    .270     .270    3.580    .730  27.000
UC    .325     .148
UA       0        5       16      30      65      77      84      90      94      97
UA     100
* DDM    ***** Preserved *****

KK    D480
KM          DIVERT FLOW INTO ONLINE  DETENTION BASIN
KM    DETENTION/RETENTION BASINS LOCATED WITHIN LAS SENDAS ADDENDUM III
KM    FOR BASIN #: 18 & 26
KM          MAXIMUM VOLUME DIVERSION = 16.5 acre-feet
DT    BS480     16.5
DI       0   10000
DQ       0   10000
* DDM    ***** Preserved *****

KK    RT480
KM    RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
DR    BS480
* DDM    ***** Preserved *****

KK     S480
KM    RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
KM     16.5 ACRE-FEETx43560/36x3600=5.5cfs
RS       1     STOR       0
SV       0      .01     16.5    30.0
SQ       0      3.0      5.6    50.0
* DDM    ***** Preserved *****

KK     C480
KM    HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
HC       2
* DDM    ***** Preserved *****

KK    CC480
KM    HYDROGRAPH COMBINATION AT SUBBASIN 480
HC       2   0.731
* DDM    ***** Preserved *****
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LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

                KK    R480
                KM    ROUTE FLOW FROM SUB-BASIN 480 TO SUBBASIN 462
                RS       7    FLOW      -1
                RC    .035    .025    .035    2800   .0002
                RX       0       1       2      28      58      84      85      86
                RY    13.5    13.5    13.5       0       0    13.5    13.5    13.5
                * DDM   ***** Updated *****

                KK     456
                KM    SUB-BASIN 456
                KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
                KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
                KM      L =  .94  Kb = .045  Adj. Slope =  315.0
                BA    .260
                LG    .300    .380   5.600    .200  12.000
                UC    .217    .139
                UA       0       5      16      30      65      77      84      90      94      97
                UA     100
                * DDM   ***** Preserved *****

                KK      D1
                KM          DIVERT FLOW INTO OFFLINE DETENTION BASIN
                KM          WEIR FOR BASIN SET AT 4 FEET ABOVE CHANNEL BOTTOM
                DT  BASIN1     4.0
                DI       0    11.1   127.9   234.4   577.7   789.9  1025.5  1280.9  1555.7
                DQ       0       0       0    47.7     248   381.8   533.6   701.5     884
                * DDM   ***** Preserved *****

                KK     CD2
                KM          SPLIT OUT FLOW FOR WASHES THAT FLOW TO THE SOUTH FROM
                KM          WASHES THAT DRAIN TO THE WES, SOUTHERN WASHES FED BY 30" & 24" PIPE
                DT     WA30
                DI       0    11.1   127.9   189.6   329.7     408   491.9   579.4   671.7
                DQ       0    11.1    38.4    48.2      63    69.5      76      81      86
                * DDM   ***** Preserved *****

                KK    R456
                KM          ROUTE FLOW FROM SUB-BASIN 51 TO C101
                RS       2    FLOW      -1
                RC     .05    .035     .05    3800    .044
                RX    1000    1010    1020    1036    1041    1057    1067    1077
                RY   14.88   14.44      14      10      10      14   14.44   14.88
                * DDM   ***** Updated *****

                KK     457
                KM    SUB-BASIN 457
                KM    24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
                KM    THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
                KM      L = 1.01  Kb = .045  Adj. Slope =  308.8
                BA    .190
                LG    .270    .330   3.950    .460   6.000
                UC    .237    .195
                UA       0       5      16      30      65      77      84      90      94      97
                UA     100
                * DDM   ***** Preserved *****
1                                         HEC-1 INPUT                                           PAGE 52

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

                KK    C101
                KM          COMBINE HYDROGRAPHS FROM SUB-BASINS 50 AND 51
                HC       2
                * DDM   ***** Preserved *****

                KK      D3
                KM          RESERVOIR AT THE EDGE OF THE PROPERTY   FLOW FROM CHANNEL
                KM          DIVERTED  INTO OFFLINE BASIN A 25' WEIR SET AT ELEVATION 1808 FT
                DT  BASIN2     5.0
                DI       0      36      70     110     180   313.5     402   500.9
                DQ       0       0       0       0       0    67.5     124   190.9
                * DDM   ***** Preserved *****

                KK    RTD3
                KM    RETRIEVE FLOW FROM DIVERSION INTO OFFLINE BASIN
                DR  BASIN2
                * DDM   ***** Preserved *****

                KK     SD3
                KM    RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
                KM      5.0 ACRE-FEETx43560/36x3600=1.7cfs
                RS       1    STOR       0
                SV       0     .01       5
                SQ       0     0.7     1.7
                * DDM   ***** Preserved *****

                KK     CD3
                KM    HYDROGRAPH COMBINATION FOR OFFLINE BASIN BLEEDOFF
                HC       2
                * DDM   ***** Preserved *****
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1978        KK    R101
1979        KM       ROUTE FLOW FROM SUBBASIN C101 TO C103
1980        RS       1    FLOW      -1
1981        RC     .05    .035     .05    1450     .05
1982        RX    1000    1010    1020    1036    1041    1057    1067    1077
1983        RY      15    14.5      14      10      10      14    14.5      15
            * DDM   ***** Updated *****

1984        KK    458
1985        KM   SUB-BASIN 458
1986        KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1987        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
1988        KM     L =  .76  Kb = .048  Adj. Slope =  299.0
1989        BA    .190
1990        LG    .290    .330   5.800    .190   6.000
1991        UC    .204    .131
1992        UA       0       5      16      30      65      77      84      90      94      97
1993        UA     100
            * DDM   ***** Preserved *****
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1994        KK    C103
1995        KM       COMBINE HYDROGRAPHS FROM SUB-BASIN 55 AND C101
1996        HC       2
            * DDM   ***** Preserved *****

1997        KK    R103
1998        KM       ROUTE FLOW FROM SUBBASIN C103 TO C106
1999        RS       1    FLOW      -1
2000        RC     .05    .035     .05     900     .03
2001        RX    1000    1010    1020    1030    1050    1060    1070    1080
2002        RY   13.16   12.83    12.5      10      10    12.5   12.83   13.16
            * DDM   ***** Preserved *****

2003        KK    RT30
2004        KM       RETRIEVE DIVERTED FLOW FOR WASH BELOW 30 INCH PIPE
2005        DR    WA30
            * DDM   ***** Preserved *****

2006        KK     R30
2007        KM       ROUTE FLOW FROM WASH DIVERSION TO COMBINE C52
2008        RS       1    FLOW      -1
2009        RC     .05    .035     .05    1630     .05
2010        RX    1000    1010    1020    1036    1041    1057    1067    1077
2011        RY      15    14.5      14      10      10      14    14.5      15
            * DDM   ***** Preserved *****

2012        KK    RTB1
2013        KM       RETRIEVE DIVERTED FLOW FROM BASIN 1
2014        DR  BASIN1
            * DDM   ***** Preserved *****

2015        KK      B1
2016        KM       ROUTE FLOW THROUGH OFFLINE DETENTION BASIN
2017        KM       FLOW OUTLETS THROUGH A 30 INCH OUTLET PIPE
2018        RS       1    ELEV       0
2019        SV              .7     1.4     2.3     2.7     4.0
2020        SQ       0       5      16      28    32.5      37
2021        SE       0       1       2       3     3.5       4
            * DDM   ***** Preserved *****

2022        KK     RB1
2023        KM       ROUTE FLOW FROM BASIN DIVERSION TO COMBINE C52
2024        RS       3    FLOW      -1
2025        RC     .05    .035     .05    1720     .05
2026        RX    1000    1010    1020    1036    1041    1057    1067    1077
2027        RY      15    14.5      14      10      10      14    14.5      15
            * DDM   ***** Preserved *****

2028        KK    CDIV
2029        KM       COMBINE FLOWS FROM WA30 AND BASIN 1
2030        HC       2     .12
            * DDM   ***** Updated *****
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2031        KK     459
2032        KM   SUB-BASIN 459
2033        KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
2034        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
2035        KM     L =  .35  Kb = .052  Adj. Slope =  251.6
2036        BA    .030
2037        LG    .220    .300   3.330    .710   8.000
2038        UC    .162    .157
2039        UA       0       5      16      30      65      77      84      90      94      97
2040        UA     100
            * DDM   ***** Preserved *****

2041        KK     C52
2042        KM       COMBINE FLOWS FROM SUB-BASIN 52 WA30 AND BASIN 1
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                .
117             .          60
                .           .
                .           .
130             .           .------->    BS60
127             .          D60
                .           .
                .           .
135             .           .              .<-------    BS60
133             .           .            RT60
                .           .              V
                .           .              V
136             .           .            SB60
                .           .              .
                .           .              .
142           C60.......................
                V
                V
145           S60
                V
                V
154           R60
                V
                V
160          RR60
                .
                .
166             .          80
                .           .
                .           .
179             .           .------->    BS80
176             .          D80
                .           .
                .           .
184             .           .              .<-------    BS80
182             .           .            RT80
                .           .              V
                .           .              V
185             .           .             S80
                .           .              .
                .           .              .
191             .          C80............
                .           .
                .           .
194          CC80............
                V
                V
197           R80
                .
                .
203             .         100
                .           .
                .           .
216             .           .------->    BS100
213             .         D100
                .           .
                .           .
221             .           .              .<-------    BS100
219             .           .           RT100
                .           .              V
                .           .              V
222             .           .            S100
                .           .              .
                .           .              .
228          C100........................
                V
                V
231          R100
                .
                .
237             .         120
                .           .
                .           .
250             .           .------->    BS120
247             .         D120
                .           .
                .           .
255             .           .              .<-------    BS120
253             .           .           RT120
                .           .              V
                .           .              V
256             .           .            S120
                .           .              .
                .           .              .
262          C120........................
                V
                V
265          R120
                .
                .
271             .         140
                .           .
                .           .
284             .           .------->    BS140
281             .         D140
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              .           .
              .           .
289           .           .          .<-------   BS140
287           .           .      RT140
              .           .          V
              .           .          V
290           .           .       S140
              .           .          .
              .           .          .
296        C140.......................
              .
299           .         150
              .           V
              .           V
309           .        R150
              .           V
              .           V
315           .        R152
              .           .
              .           .
321           .           .        160
              .           .          .
              .           .          .
334           .           .          .------->   BS160
331           .           .       D160
              .           .          .
              .           .          .
339           .           .          .           .<-------   BS160
337           .           .          .       RT160
              .           .          .           V
              .           .          .           V
340           .           .          .        S160
              .           .          .           .
              .           .          .           .
346           .        C160.......................
              .           .
              .           .
349           .           .        180
              .           .          .
              .           .          .
359        C180.......................
              .
362           .         210
              .           V
              .           V
372           .        R210
              .           .
              .           .
378           .           .        240
              .           .          .
              .           .          .
388           .        C240...........
              .           V
              .           V
391           .        S240
              .           V
              .           V
398           .        R240
              .           .
              .           .
405           .           .        220
              .           .          .
              .           .          .
415           .        C220...........
              .           V
              .           V
418           .       SW220
              .           V
              .           V
425           .        R220
              .           .
              .           .
432           .           .        190
              .           .          V
              .           .          V
442           .           .       R190
              .           .          V
              .           .          V
448           .           .       R192
              .           .          .
              .           .          .
454           .           .          .         200
              .           .          .           .
              .           .          .           .
464           .        C200.......................
              .           V
              .           V
467           .       SW200
              .           V
              .           V
474           .        R200
              .           V
              .           V
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                .         .         .         .
706             .         .         .         .-------> B320B2
701             .         .         .    D320B2
                .         .         .         .
                .         .         .         .
711             .         .         .         .         .<------- B320B2
709             .         .         .         .    T320B2
                .         .         .         .         V
                .         .         .         .         V
712             .         .         .         .    S320B2
                .         .         .         .         .
                .         .         .         .         .
718             .    C320B2..............................
                .         V
                .         V
721             .    R320B2
                .         .
                .         .
728             .         .       340B
                .         .         .
                .         .         .
743             .         .         .-------> BS340B
738             .         .      D340B
                .         .         .
                .         .         .
748             .         .         .         .<------- BS340B
746             .         .         .    RT340B
                .         .         .         V
                .         .         .         V
749             .         .         .     S340B
                .         .         .         .
                .         .         .         .
755             .     C340B.....................
                .         .
                .         .
760             .         .-------> BS340
758             .    DD340B
                .         .
                .         .
765             .         .         .<------- BS340
763             .         .      RT340
                .         .         V
                .         .         V
766             .         .     SS340B
                .         .         .
                .         .         .
772             .    CD340B..........
                .         .
                .         .
777             .         .         .<------- SF350
775             .         .      RT350
                .         .         V
                .         .         V
778             .         .      RR350
                .         .         .
                .         .         .
785             .         .         .        355
                .         .         .         .
                .         .         .         .
795             .         .       C355..........
                .         .         .
                .         .         .
801             .         .         .-------> BS355
798             .         .       D355
                .         .         .
                .         .         .
806             .         .         .         .<------- BS355
804             .         .         .     RT355
                .         .         .         V
                .         .         .         V
807             .         .         .      S355
                .         .         .         .
                .         .         .         .
813             .         .      CC355..........
                .         .         V
                .         .         V
816             .         .       R355
                .         .         .
                .         .         .
823             .    CC340B..........
                .         V
                .         V
826             .     R340B
                .         .
                .         .
833             .         .      340A2
                .         .         .
                .         .         .
846             .         .         .-------> B340A2
843             .         .     D340A2
                .         .         .
                .         .         .
851             .         .         .         .<------- B340A2
849             .         .         .    T340A2
                .         .         .         V
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                .           .           .           V
852             .           .           .      S340A2
                .           .           .           .
                .           .           .           .
858             .      C340A2........................
                .           V
                .           V
861             .      R340A2
                .           .
                .           .
868        CC320B............
                V
                V
871         R320B
                .
                .
880             .        320A
                .           .
                .           .
895             .           .------->  BS320A
890             .       D320A
                .           .
                .           .
900             .           .           .<-------  BS320A
898             .           .      RT320A
                .           .           V
                .           .           V
901             .           .       S320A
                .           .           .
                .           .           .
907          C320........................
                .
                .
910             .       340A1
                .           .
                .           .
925             .           .------->  B340A1
920             .      D340A1
                .           .
                .           .
930             .           .           .<-------  B340A1
928             .           .      T340A1
                .           .           V
                .           .           V
931             .           .      S340A1
                .           .           .
                .           .           .
937             .      C340A1............
                .           .
                .           .
940          C340............
                .
                .
943             .         360
                .           .
                .           .
957             .           .------->   BS360
953             .        D360
                .           .
                .           .
962             .           .           .<-------   BS360
960             .           .       RT360
                .           .           V
                .           .           V
963             .           .        S360
                .           .           .
                .           .           .
969          C360........................
                .
                .
972             .        380A
                .           .
                .           .
982         C380A............
                .
                .
985             .        400A
                .           .
                .           .
995         C400A............
                .
                .
998             .         370
                .           V
                .           V
1008            .        S370
                .           .
                .           .
1020            .           .------->   B370W
1018            .        D370
                .           V
                .           V
1023            .       R370S
                .           .
                .           .
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480           .       SS200
              .           V
              .           V
487           .       RR200
              .           .
              .           .
493       CC180............
              V
              V
496        S180
              V
              V
505        R180
              .
              .
514           .         260
              .           .
              .           .
524        C260............
              V
              V
527        R260
              .
              .
536           .         280
              .           .
              .           .
546        C280............
              V
              V
549        R280
              .
              .
558           .         300
              .           .
              .           .
568        C300............
              V
              V
571        R300
              .
              .
580           .        305A
              .           .
              .           .
590        C305............
              V
              V
593        R305
              .
              .
601           .       320B1
              .           .
              .           .
616           .           .------->  B320B1
611           .      D320B1
              .           .
              .           .
621           .           .           .<-------   B320B1
619           .           .      T320B1
              .           .           V
              .           .           V
622           .           .      S320B1
              .           .           .
              .           .           .
628      C320B1........................
              .
              .
631           .         350
              .           .
              .           .
644           .           .------->  SF350
641           .        D350
              .           V
              .           V
647           .        R350
              .           .
              .           .
654           .           .         310
              .           .           .
              .           .           .
664           .        C310............
              .           V
              .           V
667           .        R310
              .           .
              .           .
674           .           .        305B
              .           .           V
              .           .           V
684           .           .       R305B
              .           .           .
              .           .           .
691           .           .           .       320B2
              .           .           .           .
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1030            .           .       380B1
                .           .           .
                .           .           .
1044            .           .           .-------> B380B1
1040            .           .      D380B1
                .           .           .
                .           .           .
1049            .           .           .           .<------- B380B1
1047            .           .           .      T380B1
                .           .           .           V
                .           .           .           V
1050            .           .           .      S380B1
                .           .           .           .
                .           .           .           .
1056            .      C380B1........................
                .           V
                .           V
1059            .      R380B1
                .           .
                .           .
1066            .           .       400B1
                .           .           .
                .           .           .
1080            .           .           .-------> B400B1
1076            .           .      D400B1
                .           .           .
                .           .           .
1085            .           .           .           .<------- B400B1
1083            .           .           .      T400B1
                .           .           .           V
                .           .           .           V
1086            .           .           .      S400B1
                .           .           .           .
                .           .           .           .
1092            .           .      C400B1............
                .           .           .
                .           .           .
1095       CC400B........................
                .
                .
1098            .       420A2
                .           .
                .           .
1108       C400A2............
                .
                .
1111            .         395
                .           V
                .           V
1121            .        R395
                .           .
                .           .
1128            .           .         385
                .           .           .
                .           .           .
1138            .           .           .        415B
                .           .           .           .
                .           .           .           .
1148            .           .       C415B............
                .           .           .
                .           .           .
1154            .           .           .-------> BS415B
1151            .           .       D415B
                .           .           .
                .           .           .
1159            .           .           .           .<------- BS415B
1157            .           .           .      RT415B
                .           .           .           V
                .           .           .           V
1160            .           .           .       S415B
                .           .           .           .
                .           .           .           .
1166            .           .      CC415B............
                .           .           V
                .           .           V
1169            .           .       R415B
                .           .           .
                .           .           .
1176            .           .           .         390
                .           .           .           .
                .           .           .           .
1190            .           .           .           .-------> BS390
1186            .           .           .        D390
                .           .           .           .
                .           .           .           .
1195            .           .           .           .           .<------- BS390
1193            .           .           .           .       RT390
                .           .           .           .           V
                .           .           .           .           V
1196            .           .           .           .        S390
                .           .           .           .           .
                .           .           .           .           .
1202            .        C390....................................
                .           .
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1207           .           .------->   B390W
1205           .       D390S
               .           .
               .           .
1212           .           .           .<-------   B370W
1210           .           .       T370W
               .           .           V
               .           .           V
1213           .           .       R370W
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1219           .        C370............
               .           V
               .           V
1222           .       R390S
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1228           .           .       400B3
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1242           .           .           .------->  B400B3
1238           .           .      D400B3
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1247           .           .           .           .<-------   B400B3
1245           .           .           .      T400B3
               .           .           .           V
               .           .           .           V
1248           .           .           .      S400B3
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1254           .           .      C400B3............
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1257           .       C390S............
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1260           .           .       380B3
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1273           .           .           .------->  B380B3
1270           .           .      D380B3
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1278           .           .           .           .<-------   B380B3
1276           .           .           .      T380B3
               .           .           .           V
               .           .           .           V
1279           .           .           .      S380B3
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1285           .           .      C380B3............
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1291           .           .           .------->  380B3c
1288           .           .      D380B3
               .           .           .
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1297           .           .           .------->  380B3a
1294           .           .      380B3b
               .           .           .
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1300           .      C380BB............
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               .           .
1306           .           .------->  B38B3b
1303           .       D380B
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1311           .           .           .<-------  B38B3b
1309           .           .      RT380B
               .           .           V
               .           .           V
1312           .           .        S380B
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1318           .      CC380B............
               .           V
               .           V
1321           .      R38B3b
               .           .
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1329           .           .           .<-------  380B3a
1327           .           .      T38B3a
               .           .           V
               .           .           V
1330           .           .      R38B3a
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1338           .           .           .           .<-------  380B3c
1336           .           .           .      T38B3c
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1339           .      C38B3c........................
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1342                .      R380B3
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1348                .          .         380B2
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1358                .      C380B2.............
                    .          V
                    .          V
1361                .      R380B2
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1368                .          .         400B2
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1378                .      C400B2.............
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                    .          V
1381                .      R400B2
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1388                .          .         420A1
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1402                .          .             .------->  B420A1
1398                .          .        D420A1
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1407                .          .             .               .<-------  B420A1
1405                .          .             .          T420A1
                    .          .             .               V
                    .          .             .               V
1408                .          .             .          S420A1
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1414           C420A.........................................
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1419                .          .<-------  B390W
1417                .       T390W
                    .          V
                    .          V
1420                .       R390W
                    .          .
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1426                .          .          420B
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1436                .       C420B.............
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1439                .          .           440
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1449                .          .           R70
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1455                .          .             .          441
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1465                .          .          C108.............
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1470                .          .             .------->  SPLIT
1468                .          .            D4
                    .          .             V
                    .          .             V
1473                .          .          R108
                    .          .             .
                    .          .             .
1479                .          .             .          442
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1489                .          .           C67.............
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1495                .          .             .------->  BASIN4
1492                .          .            D6
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                    .          .             .
1500                .          .             .             .<-------  BASIN4
1498                .          .             .          RTD6
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                    .          .             .             V
1501                .          .             .           SD6
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1507                .          .           CD6.............
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1510                .          .             .          443
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1523                .          .             .             .------->  WSH66
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2031          .          .          .          459
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2041          .          .         C52............
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2044          .          .         R52
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2050          .          .          .          460
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2060          .          .        C102............
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2063          .          .      BASIN3
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2070          .          .          R3
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2076          .          .          .          461
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2086          .          .        C104............
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2089          .       C106............
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              .          V
2092          .       R106
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2098          .          .         462
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2108          .        C56............
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2111       C462............
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2114       R462
              V
              V
2120      RR462
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2126          .         500
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2136       C500............
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(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *             JUN   1998               *
 *           VERSION 4.1                *
 *                                      *
 * RUN DATE   17AUG05  TIME  15:47:26   *
 *                                      *
 ****************************************
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****************************************
*                                      *
*   U.S. ARMY CORPS OF ENGINEERS       *
*   HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET            *
*      DAVIS, CALIFORNIA 95616         *
*          (916) 756-1104              *
*                                      *
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                    Spook Hill ADMP Update
                    Future Condition Preferred Model with Spook Hill FRS Storage Routing
                    Return Period = 100 Years, Rainfall Duration = 24 Hours
                    Original File Name: REC_EC24.DAT, Wood/Patel, April 2002, SZ
                    Hermosa Vista Hawes Road Basin Alternative Analysis
                    Final Option Model Name: FINAL.DAT, Wood/Patel, April 2005, SZ
                    METHODOLOGY
                    THE US CORPS OF ENGINEERS FLOW HYDROGRAPH PACKAGE HEC-1 DATED JUNE 1998 V4.1
                    SCS TYPE II RAINFALL DISTRIBUTION
                    CLARK UNIT HYDROGRAPH
                    GREEN AND AMPT INFILTRATION EQUATION USED FOR CALCULATING LOSSES
                    NORMAL DEPTH STORAGE CHANNEL ROUTING

  14 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        2000  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      3    0  ENDING DATE
                      NDTIME        1838  ENDING TIME
                       ICENT          19  CENTURY MARK
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              NDTIME       1838  ENDING TIME
              ICENT          19  CENTURY MARK

           COMPUTATION INTERVAL    .03 HOURS
                TOTAL TIME BASE  66.63 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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17 JD        INDEX STORM NO. 1
                STRM        3.81  PRECIPITATION DEPTH
                TRDA         .01  TRANSPOSITION DRAINAGE AREA
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18 PI PRECIPITATION PATTERN

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28 JD        INDEX STORM NO. 2
                STRM        3.79  PRECIPITATION DEPTH
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TRDA 1.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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29 JD INDEX STORM NO. 3

STRM 3.68 PRECIPITATION DEPTH

TRDA 5.80 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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29 JD INDEX STORM NO. 4

STRM 3.57 PRECIPITATION DEPTH

TRDA 10.66 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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30 JD INDEX STORM NO. 5

STRM 3.54 PRECIPITATION DEPTH

TRDA 13.70 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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31 JD INDEX STORM NO. 6

STRM 3.47 PRECIPITATION DEPTH

TRDA 20.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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32 JD INDEX STORM NO. 7

STRM 3.32 PRECIPITATION DEPTH

TRDA 50.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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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									

+		10	972.	12.27	119.	33.	12.	.69
+	ROUTED TO	R10	903.	12.40	119.	33.	12.	.69
+	ROUTED TO	R12	845.	12.60	118.	33.	12.	.69
+	HYDROGRAPH AT	20	1103.	12.23	165.	45.	16.	1.17
+	DIVERSION TO	BS20	1103.	12.23	92.	24.	9.	1.17
+	HYDROGRAPH AT	D20	839.	12.50	79.	21.	8.	1.17
+	HYDROGRAPH AT	RT20	1103.	12.23	92.	24.	9.	1.17
+	ROUTED TO	S20	16.	12.50	15.	12.	7.	1.17
+	3 COMBINED AT	C20	1554.	12.57	207.	63.	26.	1.86
+	ROUTED TO	R20	1554.	12.57	207.	63.	26.	1.86
+	HYDROGRAPH AT	40	2753.	12.30	286.	79.	28.	2.23
+	DIVERSION TO	BS40	1789.	12.13	72.	20.	7.	2.23
+	HYDROGRAPH AT	D40	2753.	12.30	227.	59.	21.	2.23
+	HYDROGRAPH AT	RT40	1789.	12.13	72.	20.	7.	2.23
+	ROUTED TO	S40	13.	12.20	12.	10.	6.	2.23
+	3 COMBINED AT	C40	3088.	12.33	437.	129.	52.	4.08
+	HYDROGRAPH AT	60	1654.	12.40	244.	66.	24.	1.75
+	DIVERSION TO	BS60	11.	9.17	7.	2.	1.	1.75
+	HYDROGRAPH AT	D60	1654.	12.40	244.	64.	23.	1.75
+	HYDROGRAPH AT	RT60	11.	9.17	7.	2.	1.	1.75
+	ROUTED TO	SB60	2.	9.33	2.	1.	1.	1.75
+	3 COMBINED AT	C60	4599.	12.33	665.	190.	75.	5.84
+	ROUTED TO	S60	101.	14.73	101.	98.	54.	5.84
+	ROUTED TO	R60	101.	14.83	101.	98.	54.	5.84
+	ROUTED TO	RR60	101.	14.87	101.	98.	54.	5.84
+	HYDROGRAPH AT	80	1951.	12.13	199.	53.	19.	1.49
+	DIVERSION TO	BS80	945.	11.93	35.	10.	3.	1.49
+	HYDROGRAPH AT	D80	1951.	12.13	170.	43.	16.	1.49
+	HYDROGRAPH AT	RT80	945.	11.93	35.	10.	3.	1.49
+	ROUTED TO	S80	7.	12.00	6.	5.	3.	1.49
+	2 COMBINED AT	C80	1958.	12.13	176.	48.	19.	1.49
+	2 COMBINED AT	CC80	1958.	12.13	264.	144.	75.	1.49

+	ROUTED TO	R80	1950.	12.17	264.	144.	75.	1.49
+	HYDROGRAPH AT	100	453.	12.20	66.	18.	6.	.49
+	DIVERSION TO	BS100	422.	12.13	19.	5.	2.	.49
+	HYDROGRAPH AT	D100	453.	12.20	50.	13.	5.	.49
+	HYDROGRAPH AT	RT100	422.	12.13	19.	5.	2.	.49
+	ROUTED TO	S100	4.	12.20	3.	3.	2.	.49
+	3 COMBINED AT	C100	2352.	12.20	314.	158.	81.	1.98
+	ROUTED TO	R100	2303.	12.23	313.	158.	81.	1.98
+	HYDROGRAPH AT	120	3345.	12.27	342.	93.	34.	2.20
+	DIVERSION TO	BS120	13.	7.50	10.	3.	1.	2.20
+	HYDROGRAPH AT	D120	3345.	12.27	342.	90.	33.	2.20
+	HYDROGRAPH AT	RT120	13.	7.50	10.	3.	1.	2.20
+	ROUTED TO	S120	2.	8.00	2.	2.	1.	2.20
+	3 COMBINED AT	C120	5561.	12.23	633.	242.	112.	4.18
+	ROUTED TO	R120	5512.	12.27	633.	242.	112.	4.18
+	HYDROGRAPH AT	140	665.	12.13	67.	18.	6.	.60
+	DIVERSION TO	BS140	369.	11.97	11.	3.	1.	.60
+	HYDROGRAPH AT	D140	665.	12.13	58.	15.	5.	.60
+	HYDROGRAPH AT	RT140	369.	11.97	11.	3.	1.	.60
+	ROUTED TO	S140	2.	12.03	2.	2.	1.	.60
+	3 COMBINED AT	C140	6028.	12.27	687.	257.	118.	4.78
+	HYDROGRAPH AT	150	593.	12.17	51.	14.	5.	.41
+	ROUTED TO	R150	567.	12.23	51.	14.	5.	.41
+	ROUTED TO	R152	513.	12.33	51.	14.	5.	.41
+	HYDROGRAPH AT	160	224.	12.40	36.	9.	3.	.37
+	DIVERSION TO	BS160	82.	12.13	2.	1.	0.	.37
+	HYDROGRAPH AT	D160	224.	12.40	34.	9.	3.	.37
+	HYDROGRAPH AT	RT160	82.	12.13	2.	1.	0.	.37
+	ROUTED TO	S160	1.	12.20	1.	1.	0.	.37
+	3 COMBINED AT	C160	732.	12.37	86.	23.	8.	.77
+	HYDROGRAPH AT	180	851.	12.37	98.	25.	9.	1.01
+	3 COMBINED AT	C180	7186.	12.27	850.	298.	132.	6.56

+	HYDROGRAPH AT	210	1322.	12.17	111.	29.	10.	.79
+	ROUTED TO	R210	1246.	12.23	111.	29.	10.	.79
+	HYDROGRAPH AT	240	1513.	12.30	167.	42.	15.	1.41
+	2 COMBINED AT	C240	2684.	12.27	273.	70.	25.	2.20
+	ROUTED TO	S240	799.	12.70	226.	59.	21.	2.20
+	ROUTED TO	R240	795.	12.77	225.	59.	21.	2.20
+	HYDROGRAPH AT	220	676.	12.20	68.	18.	6.	.47
+	2 COMBINED AT	C220	955.	12.60	288.	75.	27.	2.67
+	ROUTED TO	SW220	895.	12.80	280.	73.	26.	2.67
+	ROUTED TO	R220	893.	12.87	280.	73.	26.	2.67
+	HYDROGRAPH AT	190	1471.	12.17	123.	33.	12.	.92
+	ROUTED TO	R190	1415.	12.23	123.	33.	12.	.92
+	ROUTED TO	R192	1359.	12.30	123.	33.	12.	.92
+	HYDROGRAPH AT	200	831.	12.17	72.	20.	7.	.53
+	3 COMBINED AT	C200	2264.	12.30	459.	122.	44.	4.12
+	ROUTED TO	SW200	2144.	12.37	454.	119.	43.	4.12
+	ROUTED TO	R200	2135.	12.37	454.	119.	43.	4.12
+	ROUTED TO	SS200	1364.	12.73	333.	88.	32.	4.12
+	ROUTED TO	RR200	1343.	12.83	331.	88.	32.	4.12
+	2 COMBINED AT	CC180	7186.	12.27	1160.	382.	162.	10.68
+	ROUTED TO	S180	124.	24.37	124.	123.	89.	10.68
+	ROUTED TO	R180	124.	24.40	124.	123.	89.	10.68
+	HYDROGRAPH AT	260	427.	12.10	42.	11.	4.	.26
+	2 COMBINED AT	C260	428.	12.10	140.	130.	102.	.26
+	ROUTED TO	R260	411.	12.20	140.	130.	102.	.26
+	HYDROGRAPH AT	280	527.	12.10	46.	13.	5.	.32
+	2 COMBINED AT	C280	893.	12.13	181.	141.	107.	.58
+	ROUTED TO	R280	870.	12.20	180.	141.	106.	.58
+	HYDROGRAPH AT	300	428.	12.10	37.	11.	4.	.29
+	2 COMBINED AT	C300	1235.	12.17	214.	149.	110.	.87
+	ROUTED TO	R300	1189.	12.23	213.	149.	110.	.87
	HYDROGRAPH AT							

+		305A	394.	12.13	41.	11.	4.	.32
+	2 COMBINED AT	C305	1534.	12.20	250.	159.	113.	1.19
+	ROUTED TO	R305	1520.	12.23	250.	158.	113.	1.19
+	HYDROGRAPH AT	320B1	659.	12.13	66.	19.	7.	.45
+	DIVERSION TO	B320B1	364.	11.93	16.	5.	2.	.45
+	HYDROGRAPH AT	D320B1	659.	12.13	54.	14.	5.	.45
+	HYDROGRAPH AT	T320B1	364.	11.93	16.	5.	2.	.45
+	ROUTED TO	S320B1	4.	12.00	3.	3.	2.	.45
+	3 COMBINED AT	C320B1	2042.	12.20	304.	174.	119.	1.64
+	HYDROGRAPH AT	350	1315.	12.20	112.	29.	11.	1.00
+	DIVERSION TO	SF350	658.	12.20	56.	15.	5.	1.00
+	HYDROGRAPH AT	D350	658.	12.20	56.	15.	5.	1.00
+	ROUTED TO	R350	593.	12.40	56.	15.	5.	1.00
+	HYDROGRAPH AT	310	381.	12.33	50.	13.	5.	.54
+	2 COMBINED AT	C310	950.	12.37	106.	27.	10.	1.04
+	ROUTED TO	R310	865.	12.67	106.	27.	10.	1.04
+	HYDROGRAPH AT	305B	333.	12.33	40.	10.	4.	.39
+	ROUTED TO	R305B	317.	12.43	40.	10.	4.	.39
+	HYDROGRAPH AT	320B2	251.	12.13	27.	7.	3.	.22
+	DIVERSION TO	B320B2	177.	12.00	6.	2.	1.	.22
+	HYDROGRAPH AT	D320B2	251.	12.13	22.	6.	2.	.22
+	HYDROGRAPH AT	T320B2	177.	12.00	6.	2.	1.	.22
+	ROUTED TO	S320B2	1.	12.03	1.	1.	1.	.22
+	4 COMBINED AT	C320B2	1150.	12.63	167.	43.	16.	1.65
+	ROUTED TO	R320B2	1144.	12.67	167.	43.	16.	1.65
+	HYDROGRAPH AT	340B	497.	12.07	41.	12.	4.	.29
+	DIVERSION TO	BS340B	497.	12.07	29.	8.	3.	.29
+	HYDROGRAPH AT	D340B	286.	12.20	15.	4.	2.	.29
+	HYDROGRAPH AT	RT340B	497.	12.07	29.	8.	3.	.29
+	ROUTED TO	S340B	5.	12.20	5.	4.	3.	.29
+	3 COMBINED AT	C340B	1166.	12.67	185.	50.	20.	1.94
+	DIVERSION TO	BS340	966.	12.67	113.	28.	10.	1.94

+	HYDROGRAPH AT	DD340B	200.	12.10	71.	22.	10.	1.94
+	HYDROGRAPH AT	RT340	966.	12.67	113.	28.	10.	1.94
+	ROUTED TO	SS340B	48.	13.40	41.	24.	10.	1.94
+	2 COMBINED AT	CD340B	248.	13.40	109.	46.	20.	1.94
+	HYDROGRAPH AT	RT350	658.	12.20	56.	15.	5.	1.00
+	ROUTED TO	RR350	570.	12.43	56.	15.	5.	1.00
+	HYDROGRAPH AT	355	546.	12.33	75.	19.	7.	.68
+	2 COMBINED AT	C355	1061.	12.40	130.	34.	12.	1.17
+	DIVERSION TO	BS355	611.	12.40	40.	10.	4.	1.17
+	HYDROGRAPH AT	D355	450.	12.13	90.	24.	9.	1.17
+	HYDROGRAPH AT	RT355	611.	12.40	40.	10.	4.	1.17
+	ROUTED TO	S355	40.	12.77	26.	10.	4.	1.17
+	2 COMBINED AT	CC355	490.	12.77	115.	34.	12.	1.17
+	ROUTED TO	R355	478.	12.77	115.	34.	12.	1.17
+	2 COMBINED AT	CC340B	707.	12.77	220.	78.	31.	3.11
+	ROUTED TO	R340B	703.	12.80	219.	78.	31.	3.11
+	HYDROGRAPH AT	340A2	72.	12.03	8.	3.	1.	.04
+	DIVERSION TO	B340A2	64.	11.97	4.	1.	0.	.04
+	HYDROGRAPH AT	D340A2	72.	12.03	5.	1.	1.	.04
+	HYDROGRAPH AT	T340A2	64.	11.97	4.	1.	0.	.04
+	ROUTED TO	S340A2	1.	12.03	1.	1.	0.	.04
+	3 COMBINED AT	C340A2	710.	12.80	225.	80.	32.	3.15
+	ROUTED TO	R340A2	703.	12.93	225.	80.	32.	3.15
+	2 COMBINED AT	CC320B	2211.	12.23	517.	251.	148.	4.79
+	ROUTED TO	R320B	2204.	12.23	517.	251.	148.	4.79
+	HYDROGRAPH AT	320A	315.	12.13	40.	12.	4.	.27
+	DIVERSION TO	BS320A	315.	12.13	22.	6.	2.	.27
+	HYDROGRAPH AT	D320A	267.	12.27	22.	6.	2.	.27
+	HYDROGRAPH AT	RT320A	315.	12.13	22.	6.	2.	.27
+	ROUTED TO	S320A	4.	12.27	3.	3.	2.	.27
+	3 COMBINED AT	C320	2378.	12.30	539.	259.	151.	5.06
+	HYDROGRAPH AT	340A1	1254.	12.17	154.	46.	17.	1.09

+	DIVERSION TO	B340A1	1254.	12.17	154.	46.	17.	1.09
+	HYDROGRAPH AT	D340A1	0.	.00	0.	0.	0.	1.09
+	HYDROGRAPH AT	T340A1	1254.	12.17	154.	46.	17.	1.09
+	ROUTED TO	S340A1	18.	15.30	18.	16.	12.	1.09
+	2 COMBINED AT	C340A1	18.	15.30	18.	16.	12.	1.09
+	2 COMBINED AT	C340	2378.	12.30	553.	273.	162.	6.15
+	HYDROGRAPH AT	360	840.	12.20	122.	36.	13.	.88
+	DIVERSION TO	BS360	840.	12.20	93.	25.	9.	.88
+	HYDROGRAPH AT	D360	366.	12.67	40.	12.	4.	.88
+	HYDROGRAPH AT	RT360	840.	12.20	93.	25.	9.	.88
+	ROUTED TO	S360	15.	12.67	15.	12.	8.	.88
+	3 COMBINED AT	C360	2378.	12.30	597.	294.	172.	7.03
+	HYDROGRAPH AT	380A	322.	12.27	33.	10.	4.	.26
+	2 COMBINED AT	C380A	2639.	12.30	619.	300.	174.	7.29
+	HYDROGRAPH AT	400A	56.	12.20	4.	1.	0.	.05
+	2 COMBINED AT	C400A	2676.	12.30	622.	300.	174.	7.34
+	HYDROGRAPH AT	370	817.	12.23	83.	22.	8.	.67
+	ROUTED TO	S370	374.	12.53	83.	22.	8.	.67
+	DIVERSION TO	B370W	335.	12.53	74.	20.	7.	.67
+	HYDROGRAPH AT	D370	39.	12.53	8.	2.	1.	.67
+	ROUTED TO	R370S	38.	12.90	8.	2.	1.	.67
+	HYDROGRAPH AT	380B1	329.	12.20	47.	14.	5.	.37
+	DIVERSION TO	B380B1	329.	12.20	19.	5.	2.	.37
+	HYDROGRAPH AT	D380B1	312.	12.27	31.	8.	3.	.37
+	HYDROGRAPH AT	T380B1	329.	12.20	19.	5.	2.	.37
+	ROUTED TO	S380B1	3.	12.27	3.	3.	2.	.37
+	3 COMBINED AT	C380B1	315.	12.27	42.	13.	6.	1.04
+	ROUTED TO	R380B1	287.	12.43	42.	13.	6.	1.04
+	HYDROGRAPH AT	400B1	440.	12.13	45.	13.	5.	.38
+	DIVERSION TO	B400B1	239.	11.97	10.	3.	1.	.38
+	HYDROGRAPH AT	D400B1	440.	12.13	37.	10.	3.	.38
	HYDROGRAPH AT							

+		T400B1	239.	11.97	10.	3.	1.	.38
	ROUTED TO							
+		S400B1	2.	12.03	2.	2.	1.	.38
	2 COMBINED AT							
+		C400B1	442.	12.13	39.	11.	5.	.38
	3 COMBINED AT							
+		CC400B	2957.	12.30	685.	319.	181.	8.76
	HYDROGRAPH AT							
+		420A2	31.	12.07	2.	1.	0.	.02
	2 COMBINED AT							
+		C400A2	2967.	12.30	687.	320.	181.	8.78
	HYDROGRAPH AT							
+		395	236.	12.13	29.	8.	3.	.20
	ROUTED TO							
+		R395	230.	12.20	29.	8.	3.	.20
	HYDROGRAPH AT							
+		385	613.	12.23	74.	20.	7.	.53
	HYDROGRAPH AT							
+		415B	449.	12.10	49.	14.	5.	.33
	2 COMBINED AT							
+		C415B	979.	12.20	123.	35.	12.	.86
	DIVERSION TO							
+		BS415B	829.	12.20	72.	18.	7.	.86
	HYDROGRAPH AT							
+		D415B	150.	11.80	50.	16.	6.	.86
	HYDROGRAPH AT							
+		RT415B	829.	12.20	72.	18.	7.	.86
	ROUTED TO							
+		S415B	51.	12.83	39.	18.	7.	.86
	2 COMBINED AT							
+		CC415B	201.	12.83	85.	33.	12.	.86
	ROUTED TO							
+		R415B	201.	12.90	84.	33.	12.	.86
	HYDROGRAPH AT							
+		390	486.	12.03	35.	10.	4.	.25
	DIVERSION TO							
+		BS390	103.	11.73	6.	2.	1.	.25
	HYDROGRAPH AT							
+		D390	486.	12.03	32.	8.	3.	.25
	HYDROGRAPH AT							
+		RT390	103.	11.73	6.	2.	1.	.25
	ROUTED TO							
+		S390	1.	11.80	1.	1.	1.	.25
	4 COMBINED AT							
+		C390	801.	12.07	144.	50.	19.	1.30
	DIVERSION TO							
+		B390W	700.	12.00	142.	49.	19.	1.30
	HYDROGRAPH AT							
+		D390S	101.	12.07	2.	0.	0.	1.30
	HYDROGRAPH AT							
+		T370W	335.	12.53	74.	20.	7.	.67
	ROUTED TO							
+		R370W	331.	12.73	74.	20.	7.	.67
	2 COMBINED AT							
+		C370	330.	12.73	75.	20.	7.	1.30
	ROUTED TO							
+		R390S	329.	12.80	75.	20.	7.	1.30
	HYDROGRAPH AT							
+		400B3	39.	12.03	3.	1.	0.	.02
	DIVERSION TO							
+		B400B3	39.	12.03	3.	1.	0.	.02
	HYDROGRAPH AT							
+		D400B3	0.	.00	0.	0.	0.	.02

+	HYDROGRAPH AT	T400B3	39.	12.03	3.	1.	0.	.02
+	ROUTED TO	S400B3	1.	11.67	1.	1.	0.	.02
+	2 COMBINED AT	C400B3	1.	11.67	1.	1.	0.	.02
+	2 COMBINED AT	C390S	330.	12.80	76.	21.	8.	1.33
+	HYDROGRAPH AT	380B3	171.	12.10	16.	5.	2.	.12
+	DIVERSION TO	B380B3	170.	12.07	7.	2.	1.	.12
+	HYDROGRAPH AT	D380B3	162.	12.13	10.	3.	1.	.12
+	HYDROGRAPH AT	T380B3	170.	12.07	7.	2.	1.	.12
+	ROUTED TO	S380B3	2.	12.13	2.	1.	1.	.12
+	2 COMBINED AT	C380B3	164.	12.13	11.	4.	2.	.12
+	DIVERSION TO	380B3c	44.	12.13	3.	1.	0.	.12
+	HYDROGRAPH AT	D380B3	120.	12.13	8.	3.	1.	.12
+	DIVERSION TO	380B3a	62.	12.13	4.	1.	1.	.12
+	HYDROGRAPH AT	380B3b	57.	12.13	4.	1.	1.	.12
+	2 COMBINED AT	C380BB	335.	12.77	80.	22.	8.	1.45
+	DIVERSION TO	B38B3b	265.	12.77	51.	13.	5.	1.45
+	HYDROGRAPH AT	D380B	70.	12.07	29.	9.	3.	1.45
+	HYDROGRAPH AT	RT380B	265.	12.77	51.	13.	5.	1.45
+	ROUTED TO	S380B	22.	13.80	20.	12.	5.	1.45
+	2 COMBINED AT	CC380B	92.	13.80	47.	21.	8.	1.45
+	ROUTED TO	R38B3b	92.	13.83	47.	21.	8.	1.45
+	HYDROGRAPH AT	T38B3a	62.	12.13	4.	1.	1.	.12
+	ROUTED TO	R38B3a	50.	12.23	4.	1.	1.	.12
+	HYDROGRAPH AT	T38B3c	44.	12.13	3.	1.	0.	.12
+	3 COMBINED AT	C38B3c	154.	12.23	54.	23.	9.	1.45
+	ROUTED TO	R380B3	149.	12.33	54.	23.	9.	1.45
+	HYDROGRAPH AT	380B2	140.	12.07	12.	3.	1.	.10
+	2 COMBINED AT	C380B2	205.	12.27	64.	26.	10.	1.55
+	ROUTED TO	R380B2	202.	12.40	64.	26.	10.	1.55
+	HYDROGRAPH AT	400B2	205.	12.13	19.	5.	2.	.19
+	2 COMBINED AT	C400B2	336.	12.17	82.	31.	12.	1.74
+	ROUTED TO	R400B2	323.	12.33	82.	31.	12.	1.74

	HYDROGRAPH AT								
+		420A1	759.	12.13	74.	21.	8.	.57	
	DIVERSION TO								
+		B420A1	477.	11.97	20.	6.	2.	.57	
	HYDROGRAPH AT								
+		D420A1	759.	12.13	60.	16.	6.	.57	
	HYDROGRAPH AT								
+		T420A1	477.	11.97	20.	6.	2.	.57	
	ROUTED TO								
+		S420A1	4.	12.03	3.	3.	2.	.57	
	4 COMBINED AT								
+		C420A	3670.	12.23	806.	360.	196.	11.09	
	HYDROGRAPH AT								
+		T390W	700.	12.00	142.	49.	19.	1.30	
	ROUTED TO								
+		R390W	672.	12.27	142.	49.	19.	1.30	
	HYDROGRAPH AT								
+		420B	356.	12.10	34.	10.	4.	.28	
	2 COMBINED AT								
+		C420B	940.	12.20	176.	59.	22.	.28	
	HYDROGRAPH AT								
+		440	184.	12.03	12.	3.	1.	.08	
	ROUTED TO								
+		R70	181.	12.07	12.	3.	1.	.08	
	HYDROGRAPH AT								
+		441	16.	12.03	1.	0.	0.	.01	
	2 COMBINED AT								
+		C108	197.	12.07	14.	4.	1.	.09	
	DIVERSION TO								
+		SPLIT	98.	12.07	7.	2.	1.	.09	
	HYDROGRAPH AT								
+		D4	98.	12.07	7.	2.	1.	.09	
	ROUTED TO								
+		R108	92.	12.13	7.	2.	1.	.09	
	HYDROGRAPH AT								
+		442	105.	12.10	9.	2.	1.	.10	
	2 COMBINED AT								
+		C67	195.	12.10	16.	4.	2.	.19	
	DIVERSION TO								
+		BASIN4	121.	12.10	6.	2.	1.	.19	
	HYDROGRAPH AT								
+		D6	74.	12.10	10.	3.	1.	.19	
	HYDROGRAPH AT								
+		RTD6	121.	12.10	6.	2.	1.	.19	
	ROUTED TO								
+		SD6	1.	12.47	1.	1.	0.	.19	
	2 COMBINED AT								
+		CD6	74.	12.10	10.	3.	1.	.19	
	HYDROGRAPH AT								
+		443	151.	12.07	15.	4.	1.	.08	
	DIVERSION TO								
+		WSH66	78.	11.87	12.	3.	1.	.08	
	HYDROGRAPH AT								
+		D66	73.	12.07	3.	1.	0.	.08	
	ROUTED TO								
+		R113	71.	12.07	3.	1.	0.	.08	
	2 COMBINED AT								
+		C114	144.	12.07	13.	4.	2.	.27	
	HYDROGRAPH AT								
+		444	83.	12.03	5.	1.	0.	.04	
	ROUTED TO								
+		R58	79.	12.07	5.	1.	0.	.04	
	HYDROGRAPH AT								

+		445	307.	12.03	19.	5.	2.	.19
+	2 COMBINED AT	C107	382.	12.03	23.	6.	2.	.23
+	ROUTED TO	R107	382.	12.07	23.	6.	2.	.23
+	HYDROGRAPH AT	RTB2	98.	12.07	7.	2.	1.	.09
+	ROUTED TO	RSPLIT	98.	12.07	7.	2.	1.	.09
+	HYDROGRAPH AT	446	66.	12.03	6.	2.	1.	.04
+	3 COMBINED AT	C109	545.	12.07	36.	10.	3.	.27
+	DIVERSION TO	WSH404	35.	11.70	8.	2.	1.	.27
+	HYDROGRAPH AT	D5	510.	12.07	28.	7.	3.	.27
+	ROUTED TO	R109	493.	12.10	28.	7.	3.	.27
+	HYDROGRAPH AT	447	141.	12.07	12.	4.	1.	.09
+	HYDROGRAPH AT	RT404	35.	11.70	8.	2.	1.	.27
+	ROUTED TO	R404	35.	11.83	8.	2.	1.	.27
+	3 COMBINED AT	C110	666.	12.07	48.	13.	5.	.36
+	ROUTED TO	R110	663.	12.10	48.	13.	5.	.36
+	2 COMBINED AT	C115	805.	12.07	61.	17.	7.	.63
+	ROUTED TO	R115	799.	12.10	61.	17.	7.	.63
+	HYDROGRAPH AT	448	89.	12.03	6.	2.	1.	.05
+	HYDROGRAPH AT	449	81.	12.03	5.	1.	0.	.05
+	2 COMBINED AT	C6364	170.	12.03	11.	3.	1.	.09
+	ROUTED TO	R6364	145.	12.17	11.	3.	1.	.09
+	HYDROGRAPH AT	450	63.	12.20	7.	2.	1.	.07
+	HYDROGRAPH AT	451	18.	12.17	2.	1.	0.	.03
+	2 COMBINED AT	C451	80.	12.20	9.	2.	1.	.09
+	HYDROGRAPH AT	RT66	78.	11.87	12.	3.	1.	.08
+	HYDROGRAPH AT	452	63.	12.03	5.	1.	0.	.04
+	2 COMBINED AT	C6465	141.	12.03	17.	4.	2.	.04
+	ROUTED TO	R6566	137.	12.10	17.	4.	2.	.04
+	3 COMBINED AT	C116	357.	12.17	36.	10.	3.	.23
+	ROUTED TO	BASIN5	159.	12.47	36.	10.	3.	.23
+	ROUTED TO	R116	157.	12.53	36.	10.	3.	.23
+	HYDROGRAPH AT	453	63.	12.10	7.	2.	1.	.06

+	2 COMBINED AT	C117	177.	12.47	43.	12.	4.	.29
+	2 COMBINED AT	C118	892.	12.10	104.	29.	11.	.92
+	ROUTED TO	R118	887.	12.13	104.	29.	11.	.92
+	DIVERSION TO	BASIN6	248.	12.13	7.	2.	1.	.92
+	HYDROGRAPH AT	D7	639.	12.13	97.	27.	10.	.92
+	HYDROGRAPH AT	RTD7	248.	12.13	7.	2.	1.	.92
+	ROUTED TO	SD7	1.	12.67	1.	1.	1.	.92
+	2 COMBINED AT	CD7	640.	12.13	97.	28.	11.	.92
+	HYDROGRAPH AT	454	162.	12.13	21.	6.	2.	.18
+	2 COMBINED AT	C454	801.	12.13	118.	34.	13.	1.10
+	ROUTED TO	R454	793.	12.23	118.	34.	13.	1.10
+	HYDROGRAPH AT	415A	267.	12.17	32.	9.	3.	.28
+	2 COMBINED AT	C415A	1046.	12.20	149.	43.	16.	1.38
+	2 COMBINED AT	CC415A	1975.	12.20	321.	100.	38.	1.66
+	DIVERSION TO	BS420B	475.	12.20	17.	4.	2.	1.66
+	HYDROGRAPH AT	D420B	1500.	12.10	304.	96.	37.	1.66
+	HYDROGRAPH AT	RT420B	475.	12.20	17.	4.	2.	1.66
+	ROUTED TO	S420B	29.	12.40	14.	4.	2.	1.66
+	2 COMBINED AT	CC420B	1529.	12.37	318.	100.	38.	1.66
+	ROUTED TO	R415A	1527.	12.40	318.	100.	38.	1.66
+	HYDROGRAPH AT	455	1418.	12.13	150.	45.	16.	1.11
+	DIVERSION TO	BS455	1418.	12.13	139.	37.	13.	1.11
+	HYDROGRAPH AT	D455	145.	12.80	24.	8.	3.	1.11
+	HYDROGRAPH AT	RT455	1418.	12.13	139.	37.	13.	1.11
+	ROUTED TO	S455	23.	12.80	22.	18.	11.	1.11
+	2 COMBINED AT	C455	169.	12.80	46.	26.	14.	1.11
+	3 COMBINED AT	CC455	5133.	12.23	1112.	465.	240.	13.86
+	ROUTED TO	S440	300.	22.00	299.	271.	175.	13.86
+	ROUTED TO	R455	300.	22.77	299.	271.	172.	13.86
+	HYDROGRAPH AT	480	1102.	12.10	100.	31.	11.	.73
+	DIVERSION TO	BS480	487.	11.90	27.	8.	3.	.73
+	HYDROGRAPH AT	D480	1102.	12.10	83.	23.	8.	.73

+	HYDROGRAPH AT	RT480	487.	11.90	27.	8.	3.	.73
+	ROUTED TO	S480	5.	11.97	5.	4.	3.	.73
+	2 COMBINED AT	C480	1107.	12.10	88.	27.	11.	.73
+	2 COMBINED AT	CC480	1107.	12.10	359.	318.	207.	.73
+	ROUTED TO	R480	907.	12.33	359.	318.	205.	.73
+	HYDROGRAPH AT	456	483.	12.07	37.	10.	4.	.26
+	DIVERSION TO	BASIN1	193.	12.07	8.	2.	1.	.26
+	HYDROGRAPH AT	D1	290.	12.07	29.	8.	3.	.26
+	DIVERSION TO	WA30	59.	12.07	10.	3.	1.	.26
+	HYDROGRAPH AT	CD2	231.	12.07	19.	5.	2.	.26
+	ROUTED TO	R456	218.	12.13	19.	5.	2.	.26
+	HYDROGRAPH AT	457	273.	12.07	21.	6.	2.	.19
+	2 COMBINED AT	C101	480.	12.10	40.	10.	4.	.45
+	DIVERSION TO	BASIN2	177.	12.10	8.	2.	1.	.45
+	HYDROGRAPH AT	D3	303.	12.10	32.	8.	3.	.45
+	HYDROGRAPH AT	RTD3	177.	12.10	8.	2.	1.	.45
+	ROUTED TO	SD3	1.	12.40	1.	1.	1.	.45
+	2 COMBINED AT	CD3	304.	12.10	33.	9.	4.	.45
+	ROUTED TO	R101	302.	12.10	33.	9.	4.	.45
+	HYDROGRAPH AT	458	366.	12.03	26.	7.	2.	.19
+	2 COMBINED AT	C103	655.	12.07	59.	16.	6.	.64
+	ROUTED TO	R103	651.	12.07	59.	16.	6.	.64
+	HYDROGRAPH AT	RT30	59.	12.07	10.	3.	1.	.26
+	ROUTED TO	R30	58.	12.10	10.	3.	1.	.26
+	HYDROGRAPH AT	RTB1	193.	12.07	8.	2.	1.	.26
+	ROUTED TO	B1	35.	12.20	8.	2.	1.	.26
+	ROUTED TO	RB1	35.	12.27	8.	2.	1.	.26
+	2 COMBINED AT	CDIV	87.	12.20	18.	5.	2.	.12
+	HYDROGRAPH AT	459	45.	12.03	3.	1.	0.	.03
+	2 COMBINED AT	C52	117.	12.10	21.	6.	2.	.15
+	ROUTED TO	R52	116.	12.17	21.	6.	2.	.15
	HYDROGRAPH AT							

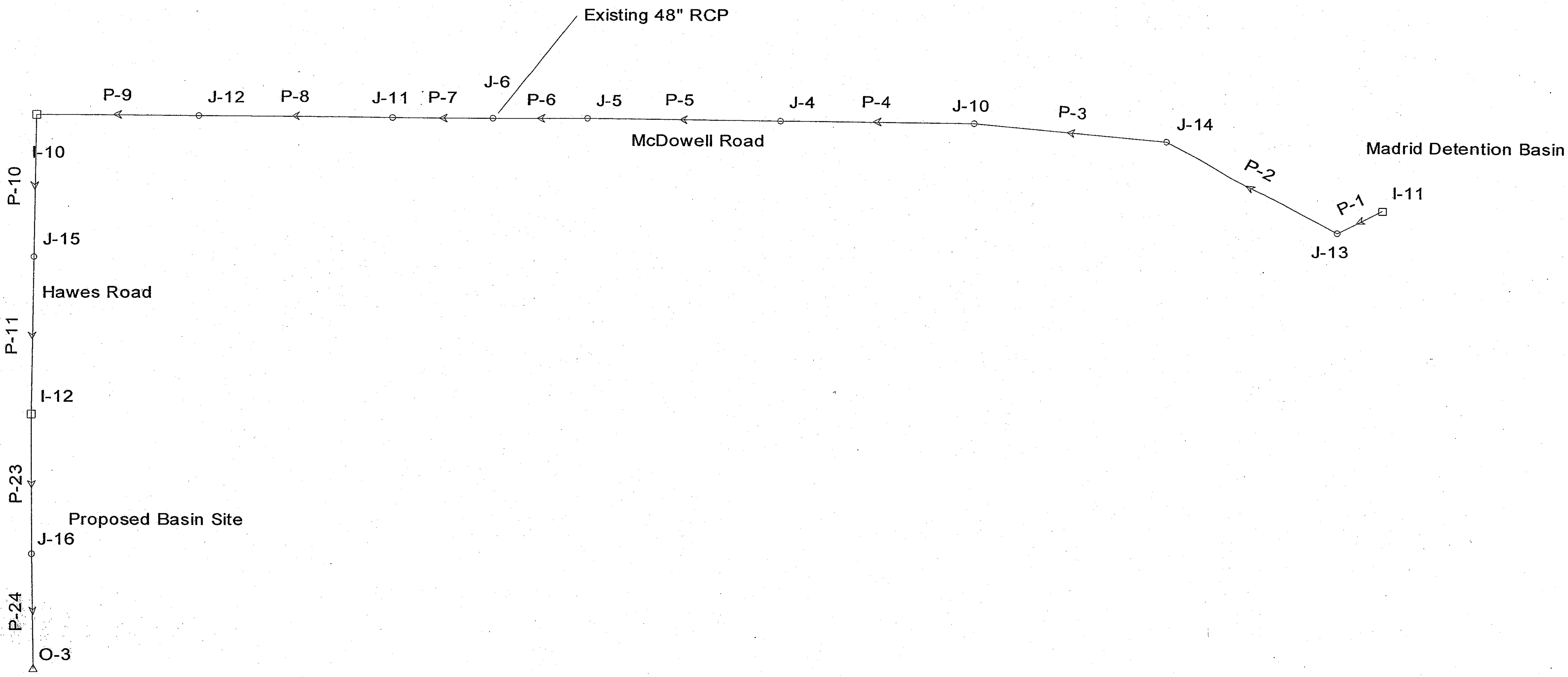
+		460	221.	12.07	20.	6.	2.	.14
	2 COMBINED AT							
+		C102	323.	12.07	40.	12.	4.	.29
	ROUTED TO							
+		BASIN3	71.	12.63	40.	12.	4.	.29
	ROUTED TO							
+		R3	71.	12.77	40.	12.	4.	.29
	HYDROGRAPH AT							
+		461	165.	12.10	17.	5.	2.	.12
	2 COMBINED AT							
+		C104	220.	12.10	57.	17.	6.	.41
	2 COMBINED AT							
+		C106	866.	12.07	115.	33.	12.	1.05
	ROUTED TO							
+		R106	828.	12.13	115.	33.	12.	1.05
	HYDROGRAPH AT							
+		462	557.	12.07	42.	12.	4.	.30
	2 COMBINED AT							
+		C56	1306.	12.10	156.	44.	16.	1.35
	2 COMBINED AT							
+		C462	1633.	12.30	398.	341.	217.	2.09
	ROUTED TO							
+		R462	1600.	12.33	397.	341.	217.	2.09
	ROUTED TO							
+		RR462	1563.	12.40	396.	340.	217.	2.09
	HYDROGRAPH AT							
+		500	1126.	12.27	128.	35.	12.	.93
	2 COMBINED AT							
+		C500	2472.	12.33	507.	367.	226.	3.02

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

APPENDIX C

Hydraulic Analysis for Preferred Alternative

Scenario: Base



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Wood Patel & Associates Inc

Project Engineer: WPA
StormCAD v5.5 [5.5003]

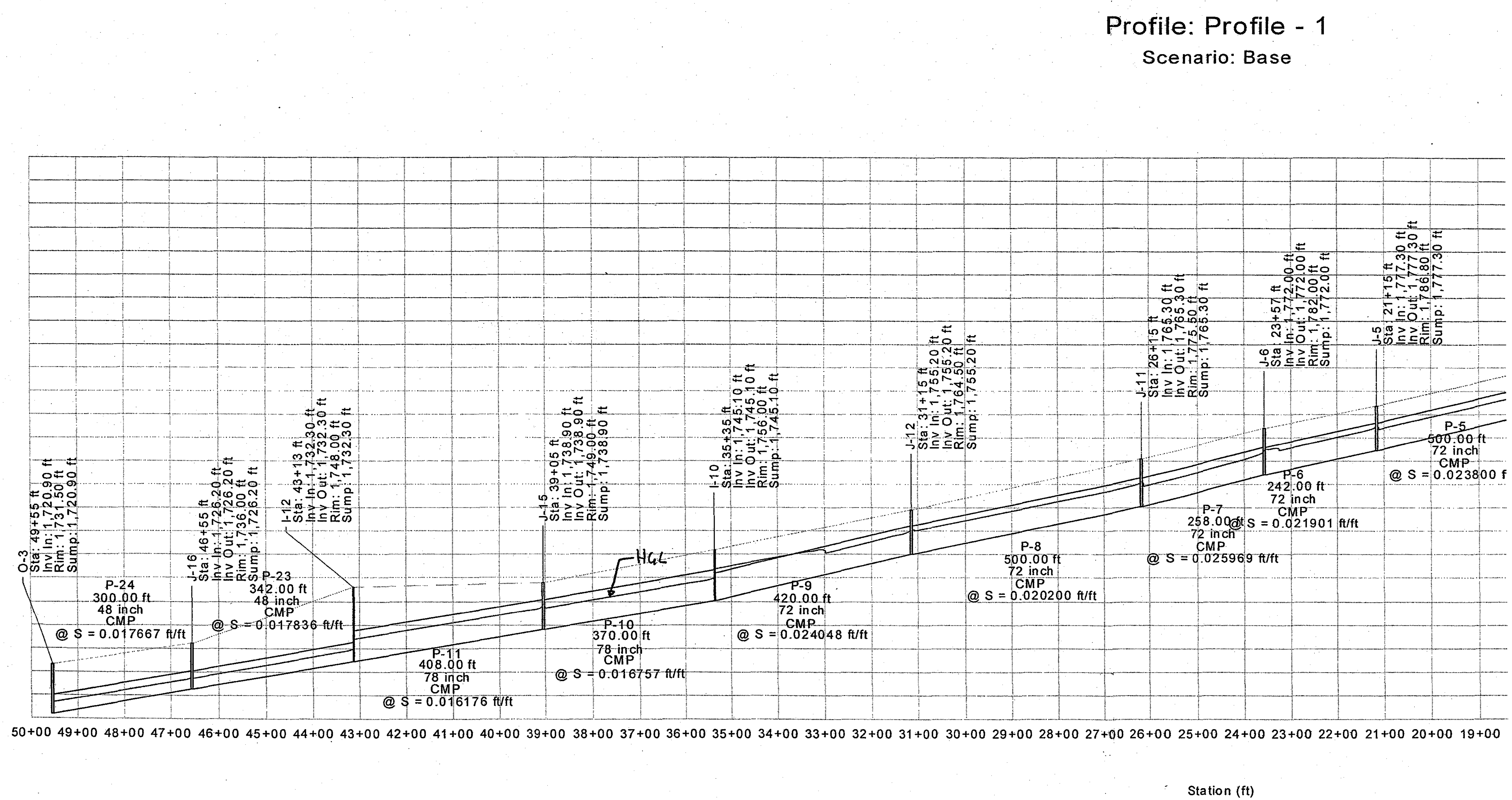
Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Average Velocity (ft/s)
P-1	I-11	J-13	335.00	115.00	0.033043	72 inch	0.023	1,822.90	1,819.10	1,833.00	1,828.00	4.10	2.90	1,828.22	1,826.31	12.25
P-2	J-13	J-14	335.00	500.00	0.016200	72 inch	0.023	1,819.10	1,811.00	1,828.00	1,824.00	2.90	7.00	1,825.66	1,816.37	12.20
P-3	J-14	J-10	335.00	500.00	0.018400	72 inch	0.023	1,811.00	1,801.80	1,824.00	1,811.50	7.00	3.70	1,816.11	1,806.91	13.05
P-4	J-10	J-4	335.00	500.00	0.025200	72 inch	0.023	1,801.80	1,789.20	1,811.50	1,798.50	3.70	3.30	1,806.78	1,794.31	13.21
P-5	J-4	J-5	335.00	500.00	0.023800	72 inch	0.023	1,789.20	1,777.30	1,798.50	1,786.80	3.30	3.50	1,794.18	1,782.41	13.21
P-6	J-5	J-6	335.00	242.00	0.021901	72 inch	0.023	1,777.30	1,772.00	1,786.80	1,782.00	3.50	4.00	1,782.28	1,777.53	12.83
P-7	J-6	J-11	335.00	258.00	0.025969	72 inch	0.023	1,772.00	1,765.30	1,782.00	1,775.50	4.00	4.20	1,776.98	1,770.41	13.21
P-8	J-11	J-12	335.00	500.00	0.020200	72 inch	0.023	1,765.30	1,755.20	1,775.50	1,764.50	4.20	3.30	1,770.28	1,760.31	13.21
P-9	J-12	I-10	335.00	420.00	0.024048	72 inch	0.023	1,755.20	1,745.10	1,764.50	1,756.00	3.30	4.90	1,760.18	1,751.85	12.61
P-10	I-10	J-15	328.00	370.00	0.016757	78 inch	0.023	1,745.10	1,738.90	1,756.00	1,749.00	4.40	3.60	1,749.96	1,743.88	12.17
P-11	J-15	I-12	328.00	408.00	0.016176	78 inch	0.023	1,738.90	1,732.30	1,749.00	1,748.00	3.60	9.20	1,743.76	1,736.99	12.56
P-23	I-12	J-16	70.00	342.00	0.017836	48 inch	0.023	1,732.30	1,726.20	1,748.00	1,736.00	11.70	5.80	1,734.83	1,728.54	8.76
P-24	J-16	O-3	70.00	300.00	0.017667	48 inch	0.023	1,726.20	1,720.90	1,736.00	1,731.50	5.80	6.60	1,728.73	1,723.25	8.75

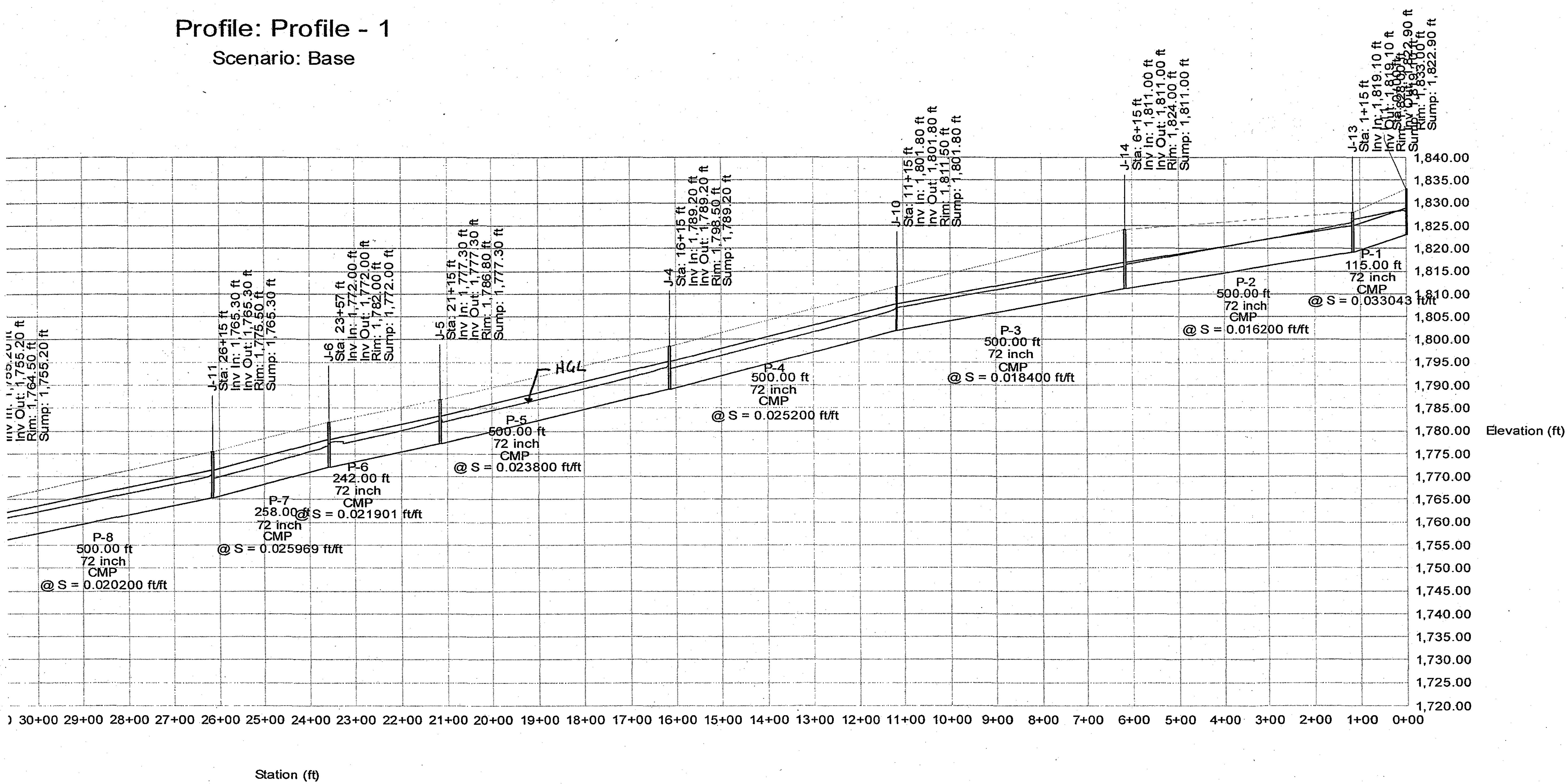
Profile

Scenario: Base



Profile: Profile - 1

Scenario: Base



88th Street Drainage

Option 1

WOOD/PATEL & ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors
Construction Managers
(602) 335-8500

88th Street Drainage

Option 2

WOOD/PATEL & ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors
Construction Managers
(602) 335-8500

88th Street Drainage

Option 3

WOOD/PATEL & ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors
Construction Managers
(602) 335-8500

V:\2004\042284\dwg\ 88th-street.dwg - Oct 12,2005

APPENDIX D

Supporting Cost Estimation Sheets

<u>*Hermosa Vista/Hawes Road Storm Drain and Basin Drainage Improvements*</u>
Flood Control District of Maricopa County
FCD 2004 C045

October 19, 2005
W/P # 042284.01

Preliminary Opinion of Probable Cost for Alternative 1

MAJOR SYSTEM ELEMENTS

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	72" CMP Pipe "A"	$190	LF	3,300	$627,000
2	78" CMP Pipe "B"	$210	LF	1,400	$294,000
3	Basin "D" Excavation	$6	CY	56,000	$336,000
4	Basin "E" Outlet Modification	$50,000	EA	1	$50,000
5	Manholes	$6,000	EA	15	$90,000
6	Diversion Structure	$150,000	EA	1	$150,000
7	Landscaping	$0.50	SF	413,820	$206,910
		SUBTOTAL MAJOR SYSTEM ELEMENTS			$1,753,910
		CONTINGENCIES:			
		Construction		30%	$526,173
		Engineering		7%	$159,606
		Construction Admin.		6%	$136,805
		TOTAL MAJOR SYSTEM ELEMENTS			**$2,576,494**

1. Construction Contingencies @ 30% of the Total Construction Cost
2. Engineering Costs @ 7% of the sum of Total Construction Cost and Construction Contingencies
3. Construction Admin. @ 6% of the sum of Total Construction Cost and Construction Contingencies

LAND ACQUISITION:

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Basin Land Acquisition[1]	$915,000	LS	9.5	$915,000
		TOTAL LAND ACQUISITION			**$915,000**
				TOTAL	**$3,491,494**

1. Land Acquisition cost supplied by FCDMC

Preliminary Opinion of Probable Cost for Alternative 2

MAJOR SYSTEM ELEMENTS

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	54" CMP Pipe "B"	$140	LF	1,400	$196,000
2	2-66" CMP Pipe "C"	$170	LF	5,000	$850,000
3	Basin "D" Excavation	$6	CY	61,000	$366,000
4	Manholes	$6,000	EA	8	$48,000
5	Diversion Structure	$150,000	EA	1	$150,000
6	Landscaping	$0.50	SF	413,820	$206,910
		SUBTOTAL MAJOR SYSTEM ELEMENTS			$1,816,910
		CONTINGENCIES:			
		Construction		30%	$545,073
		Engineering		7%	$165,339
		Construction Admin.		6%	$141,719
		TOTAL MAJOR SYSTEM ELEMENTS			**$2,669,041**

1. Construction Contingencies @ 30% of the Total Construction Cost
2. Engineering Costs @ 7% of the sum of Total Construction Cost and Construction Contingencies
3. Construction Admin. @ 6% of the sum of Total Construction Cost and Construction Contingencies

LAND ACQUISITION:

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Basin Land Acquisition[1]	$915,000	LS	9.5	$915,000
		TOTAL LAND ACQUISITION			**$915,000**
		TOTAL			**$3,584,041**

1. Land Acquisition cost supplied by FCDMC

Preliminary Opinion of Probable Cost for Alternative 3

MAJOR SYSTEM ELEMENTS

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	66" CMP Pipe "A"	$170	LF	3,300	$561,000
2	72" CMP Pipe "B"	$190	LF	1,400	$266,000
3	Basin "D" Excavation	$6	CY	56,000	$336,000
4	Basin "E" Outlet Modification	$50,000	EA	1	$50,000
5	Manholes	$6,000	EA	15	$90,000
6	Diversion Structure	$150,000	EA	1	$150,000
7	Landscaping	$0.50	SF	413,820	$206,910
		SUBTOTAL MAJOR SYSTEM ELEMENTS			$1,659,910
		CONTINGENCIES:			
		Construction		30%	$497,973
		Engineering		7%	$151,052
		Construction Admin.		6%	$129,473
		TOTAL MAJOR SYSTEM ELEMENTS			**$2,438,408**

1. Construction Contingencies @ 30% of the Total Construction Cost
2. Engineering Costs @ 7% of the sum of Total Construction Cost and Construction Contingencies
3. Construction Admin. @ 6% of the sum of Total Construction Cost and Construction Contingencies

LAND ACQUISITION:

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Basin Land Acquisition[1]	$915,000	LS	9.5	$915,000
		TOTAL LAND ACQUISITION			**$915,000**
		TOTAL			**$3,353,408**

1. Land Acquisition cost supplied by FCDMC

Preliminary Opinion of Probable Cost for Alternative 4

MAJOR SYSTEM ELEMENTS

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	78" CMP Pipe "A"	$210	LF	3,300	$693,000
2	84" CMP Pipe "B"	$240	LF	1,400	$336,000
3	Basin "D" Excavation	$6	CY	56,000	$336,000
4	Basin "E" Outlet Modification	$50,000	EA	1	$50,000
5	Manholes	$6,000	EA	15	$90,000
6	Diversion Structure	$150,000	EA	1	$150,000
7	Landscaping	$0.50	SF	413,820	$206,910
		SUBTOTAL MAJOR SYSTEM ELEMENTS			$1,861,910
		CONTINGENCIES:			
		Construction		30%	$558,573
		Engineering		7%	$169,434
		Construction Admin.		6%	$145,229
		TOTAL MAJOR SYSTEM ELEMENTS			**$2,735,146**

1. Construction Contingencies @ 30% of the Total Construction Cost
2. Engineering Costs @ 7% of the sum of Total Construction Cost and Construction Contingencies
3. Construction Admin. @ 6% of the sum of Total Construction Cost and Construction Contingencies

LAND ACQUISITION:

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Basin Land Acquisition[1]	$915,000	LS	9.5	$915,000
		TOTAL LAND ACQUISITION			**$915,000**
		TOTAL			**$3,650,146**

1. Land Acquisition cost supplied by FCDMC

Hermosa Vista/Hawes Road Storm Drain and Basin Drainage Improvements
Flood Control District of Maricopa County
FCD 2004 C045

October 19, 2005
W/P # 042284.01

Preliminary Opinion of Probable Cost for Alternative 5

MAJOR SYSTEM ELEMENTS

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	2-78" CMP Pipe "A"	$210	LF	6,600	$1,386,000
2	2-84" CMP Pipe "B"	$240	LF	2,800	$672,000
3	Basin "D" Excavation	$6	CY	73,000	$438,000
4	Basin "E" Outlet Modification	$50,000	EA	1	$50,000
5	Manholes	$6,000	EA	15	$90,000
6	Diversion Structure	$150,000	EA	1	$150,000
7	Landscaping	$0.50	SF	413,820	$206,910

SUBTOTAL MAJOR SYSTEM ELEMENTS		$2,992,910
CONTINGENCIES:		
Construction	30%	$897,873
Engineering	7%	$272,355
Construction Admin.	6%	$233,447
TOTAL MAJOR SYSTEM ELEMENTS		**$4,396,585**

1. Construction Contingencies @ 30% of the Total Construction Cost
2. Engineering Costs @ 7% of the sum of Total Construction Cost and Construction Contingencies
3. Construction Admin. @ 6% of the sum of Total Construction Cost and Construction Contingencies

LAND ACQUISITION:

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Basin Land Acquisition[1]	$915,000	LS	9.5	$915,000

TOTAL LAND ACQUISITION	**$915,000**
TOTAL	**$5,311,585**

1. Land Acquisition cost supplied by FCDMC

Hermosa Vista/Hawes Road Storm Drain and Basin Drainage Improvements October 19, 2005
Flood Control District of Maricopa County W/P # 042284.01
FCD 2004 C045

Preliminary Opinion of Probable Cost for Alternative 6

MAJOR SYSTEM ELEMENTS

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	72" CMP Pipe "A"	$190	LF	3,300	$627,000
2	78" CMP Pipe "B"	$210	LF	1,400	$294,000
3	Basin "D" Excavation	$6	CY	77,000	$462,000
4	Basin "E" Outlet Modification	$50,000	EA	1	$50,000
5	Manholes	$6,000	EA	15	$90,000
6	Diversion Structure	$150,000	EA	1	$150,000
7	Landscaping	$0.50	SF	413,820	$206,910
		SUBTOTAL MAJOR SYSTEM ELEMENTS			$1,879,910
		CONTINGENCIES:			
		Construction		30%	$563,973
		Engineering		7%	$171,072
		Construction Admin.		6%	$146,633
		TOTAL MAJOR SYSTEM ELEMENTS			**$2,761,588**

1. Construction Contingencies @ 30% of the Total Construction Cost
2. Engineering Costs @ 7% of the sum of Total Construction Cost and Construction Contingencies
3. Construction Admin. @ 6% of the sum of Total Construction Cost and Construction Contingencies

LAND ACQUISITION:

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Basin Land Acquisition[1]	$915,000	LS	9.5	$915,000
		TOTAL LAND ACQUISITION			**$915,000**
				TOTAL	**$3,676,588**

1. Land Acquisition cost supplied by FCDMC

<u>*Hermosa Vista/Hawes Road Storm Drain and Basin Drainage Improvements*</u>
Flood Control District of Maricopa County
FCD 2004 C045

October 19, 2005
W/P # 042284.01

88th Street Option 1

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Pavement Replacement & Misc.	$60	SY	580	$24,800
2	Rip Rap Spillway	$65	CY	45	$2,925
3	Regrading Channel / Landscaping	$8,000	LS	1	$8,000
		SUBTOTAL MAJOR SYSTEM ELEMENTS			$35,725
		CONTINGENCIES:			
		Construction		30%	$10,718
		Engineering		7%	$3,251
		Construction Admin.		6%	$2,787
		TOTAL MAJOR SYSTEM ELEMENTS			**$52,480**

1. Construction Contingencies @ 30% of the Total Construction Cost
2. Engineering Costs @ 7% of the sum of Total Construction Cost and Construction Contingencies
3. Construction Admin. @ 6% of the sum of Total Construction Cost and Construction Contingencies

<u>Hermosa Vista/Hawes Road Storm Drain and Basin Drainage Improvements</u>
Flood Control District of Maricopa County
FCD 2004 C045

October 19, 2005
W/P # 042284.01

88th Street Option 2

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Pavement Replacement & Misc.	$60	SY	580	$34,800
2	Grate Inlet	$30,000	EA	1	$30,000
3	Regrading Channel / Landscaping	$8,000	LS	1	$8,000
	SUBTOTAL MAJOR SYSTEM ELEMENTS				$72,800
	<u>CONTINGENCIES:</u>				
	Construction			30%	$21,840
	Engineering			7%	$6,625
	Construction Admin.			6%	$5,678
	TOTAL MAJOR SYSTEM ELEMENTS				**$106,943**

1. Construction Contingencies @ 30% of the Total Construction Cost
2. Engineering Costs @ 7% of the sum of Total Construction Cost and Construction Contingencies
3. Construction Admin. @ 6% of the sum of Total Construction Cost and Construction Contingencies

Hermosa Vista/Hawes Road Storm Drain and Basin Drainage Improvements
Flood Control District of Maricopa County
FCD 2004 C045

October 19, 2005
W/P # 042284.01

88th Street Option 3

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Gunite Inlet Channel	$50	SY	1,000	$50,000
2	Inlet Headwall	$400	CY	6	$2,400
3	2-8' x 3' CBC	$400	CY	59	$23,600
4	Outlet Headwall	$400	CY	9	$3,600
5	Channel Crossings (existing homes)	$5,000	EA	2	$10,000
6	Channel Inlets	$15,000	LS	1	$15,000
7	Regrading Channel / Landscaping	$8,000	LS	1	$8,000
8	Guardrail	$40	LF	260	$10,400

SUBTOTAL MAJOR SYSTEM ELEMENTS		$123,000
CONTINGENCIES:		
Construction	30%	$36,900
Engineering	7%	$11,193
Construction Admin.	6%	$9,594
TOTAL MAJOR SYSTEM ELEMENTS		**$180,687**

LAND ACQUISITION:

ITEM	DESCRIPTION	UNIT PRICE	UNIT	QUANTITY	AMOUNT
1	Collection Channel Land Acquisition	$95,300	AC	0.20	$19,060

SUBTOTAL LAND ACQUISITION		$19,060
CONTINGENCIES :	10%	$1,906
TOTAL LAND ACQUISITION		**$20,966**
TOTAL		**$201,653**

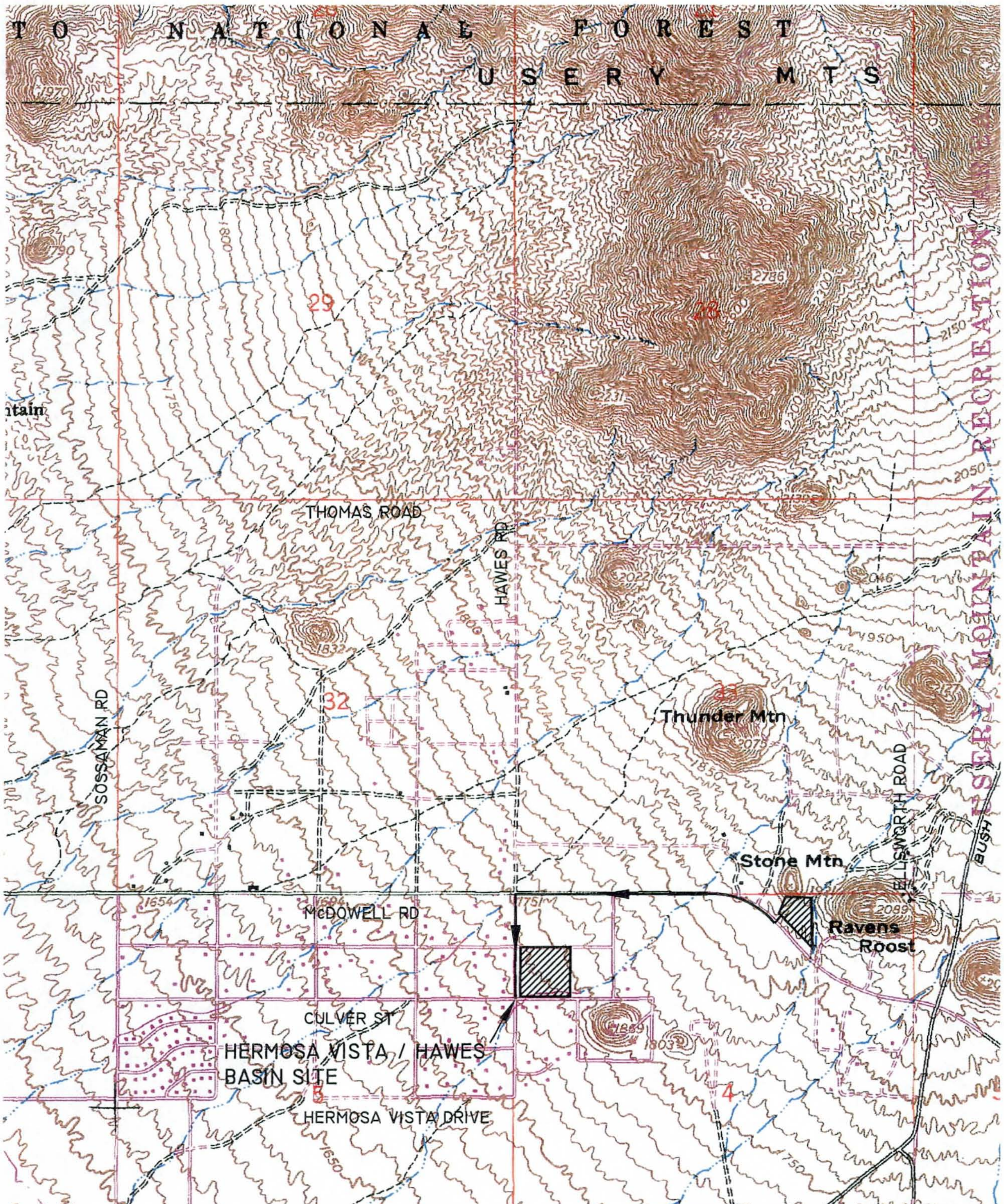
1. Construction Contingencies @ 30% of the Total Construction Cost
2. Engineering Costs @ 7% of the sum of Total Construction Cost and Construction Contingencies
3. Construction Admin. @ 6% of the sum of Total Construction Cost and Construction Contingencies

APPENDIX E

CD with Backup Files

PLATE 1

Vicinity Map



NO.	REVISION	BY	DATE
3	.	.	.
2	.	.	.
1	.	.	.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION

VICINITY MAP

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

	BY	DATE
DESIGNED	J. McCARTY	04/05
DRAWN	J. McCARTY	04/05
CHECKED	A. PATEL	04/05

WOOD PATEL & ASSOCIATES, INC.
2051 W. NORTHERN AVE., SUITE 100
PHOENIX, ARIZONA (602) 335-8500

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

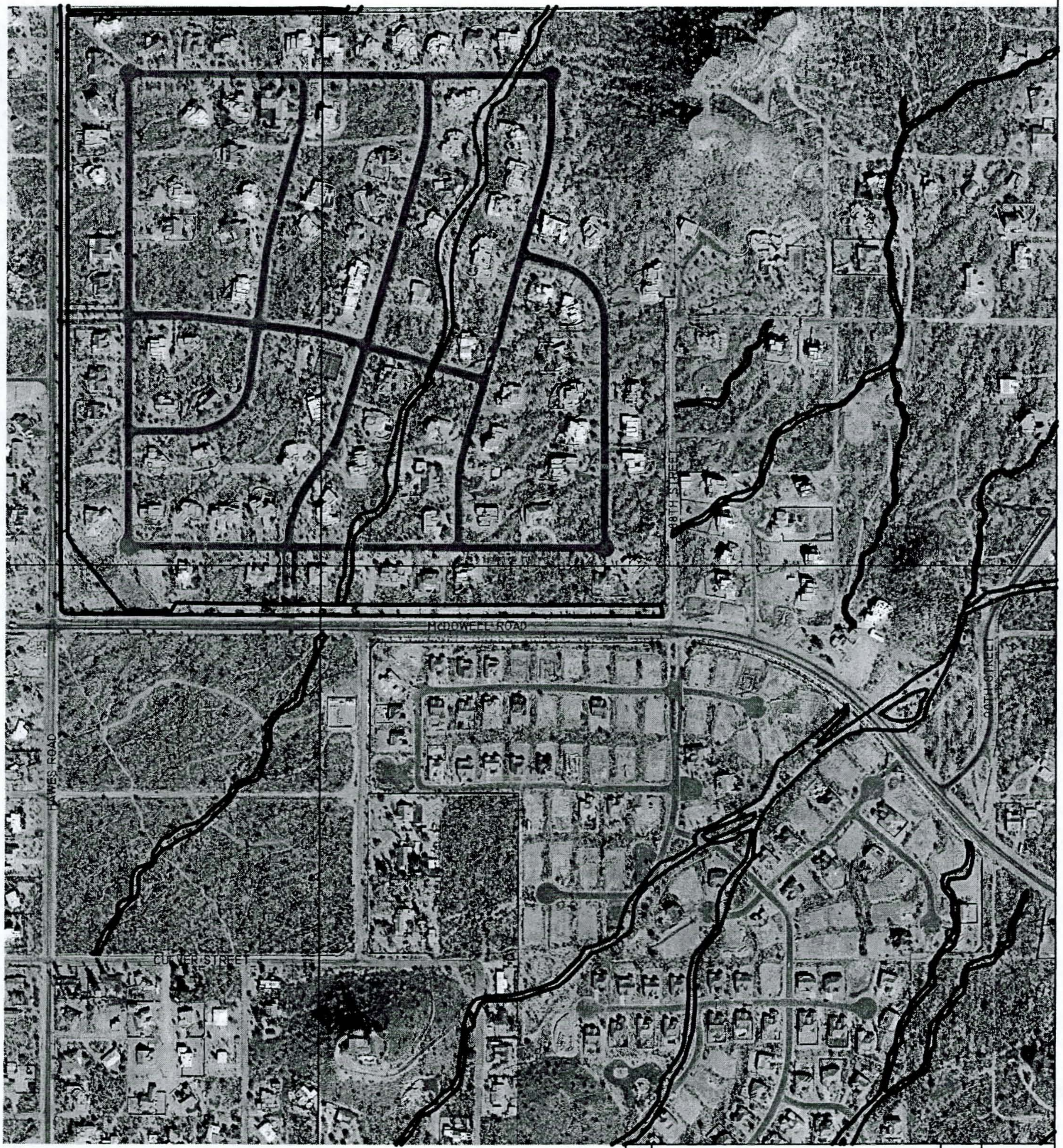
DRAWING NO. vicinity-map.dwg

PLATE 1

SHEET 1 OF 1

PLATE 2

Jurisdictional Delineation



LEGEND

WATERS OF THE U.S. LIMITS

N

1" = 600'

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

NO.	REVISION	BY	DATE
3	.	.	.
2	.	.	.
1	.	.	.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION

HERMOSA VISTA - HAWES ROAD PROJECT

JURISDICTIONAL DELINEATION

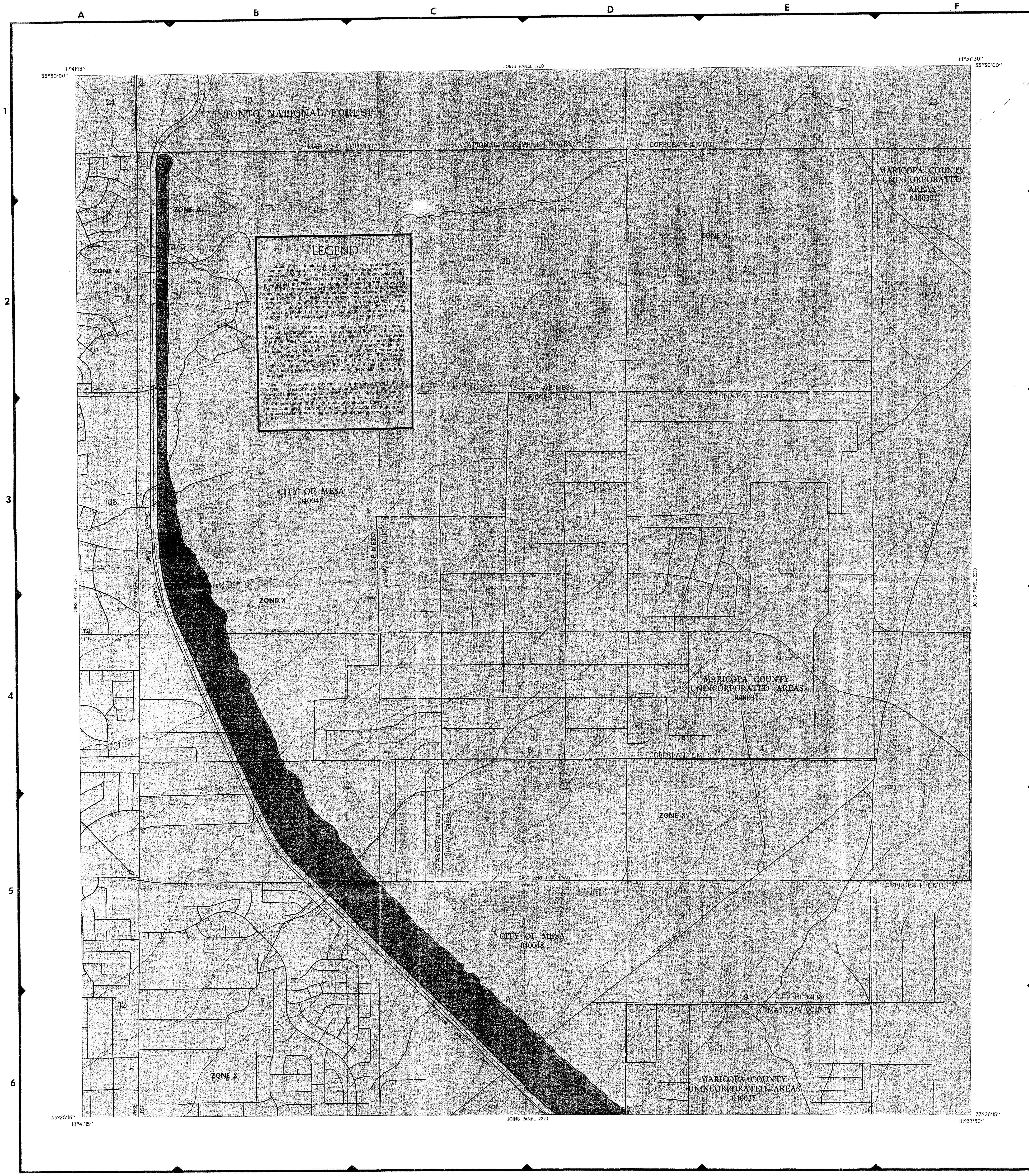
PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING		BY	DATE
	DESIGNED	J. McCARTY	08/05
	DRAWN	J. McCARTY	08/05
	CHECKED	A. PATEL	08/05

WOOD PATEL & ASSOCIATES, INC.
2051 W. NORTHERN AVE., SUITE 100
PHOENIX, ARIZONA (602) 335-8500

DRAWING NO.	PLATE 2	SHEET 1 OF 1

PLATE 3

FEMA FIRM Panel



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A No base flood elevations determined.

ZONE AE Base flood elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE A99 To be protected from 100-year flood by Federal flood protection system under construction ; no base flood elevations determined.

ZONE V Coastal flood with velocity hazard (wave action); no base flood elevations determined.

ZONE VE Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X Areas determined to be outside 500-year floodplain.

ZONE D Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

Identified 1983 | Identified 1990 | Otherwise Protected Areas

Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

~~~~513~~~~ Base Flood Elevation Line; Elevation in Feet. See Map Index for Elevation Datum.

(D)——(D) Cross Section Line

(EL 987) Base Flood Elevation in Feet Where Uniform Within Zone. See Map Index for Elevation Datum.

RM7 × Elevation Reference Mark

● M2 River Mile

97°07'30'', 32°22'30'' Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection.

NOTES

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas. The community map repository should be consulted for more detailed data on BFE's, and for any information on floodway delineations, prior to use of this map for property purchase or construction purposes.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, A1-A30, AH, AO, A99, V, VE and V1-V30.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Refer to Floodway Data Table where floodway width is shown at 1/20 inch.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

This map may incorporate approximate boundaries of Coastal Barrier Resource System Units and/or Otherwise Protected Areas established under the Coastal Barrier Improvement Act of 1990 (PL 101-591).

For community map revision history prior to countywide mapping, see Section 6.0 of the Flood Insurance Study Report.

For adjoining map panels and base map source see separately printed Map Index.

MAP REPOSITORY

Refer to Repository Listing on Map Index

EFFECTIVE DATE OF
COUNTYWIDE FLOOD INSURANCE RATE MAP:
APRIL 15, 1988

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL:

Map revised July 19, 2001 to update corporate limits, to change base flood elevations, to add base flood elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to change zone designations, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

MARICOPA COUNTY,
ARIZONA AND
INCORPORATED AREAS

PANEL 2210 OF 4350

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY, UNINCORPORATED AREAS	040037	2210	E
MESA, CITY OF	040048	2210	E

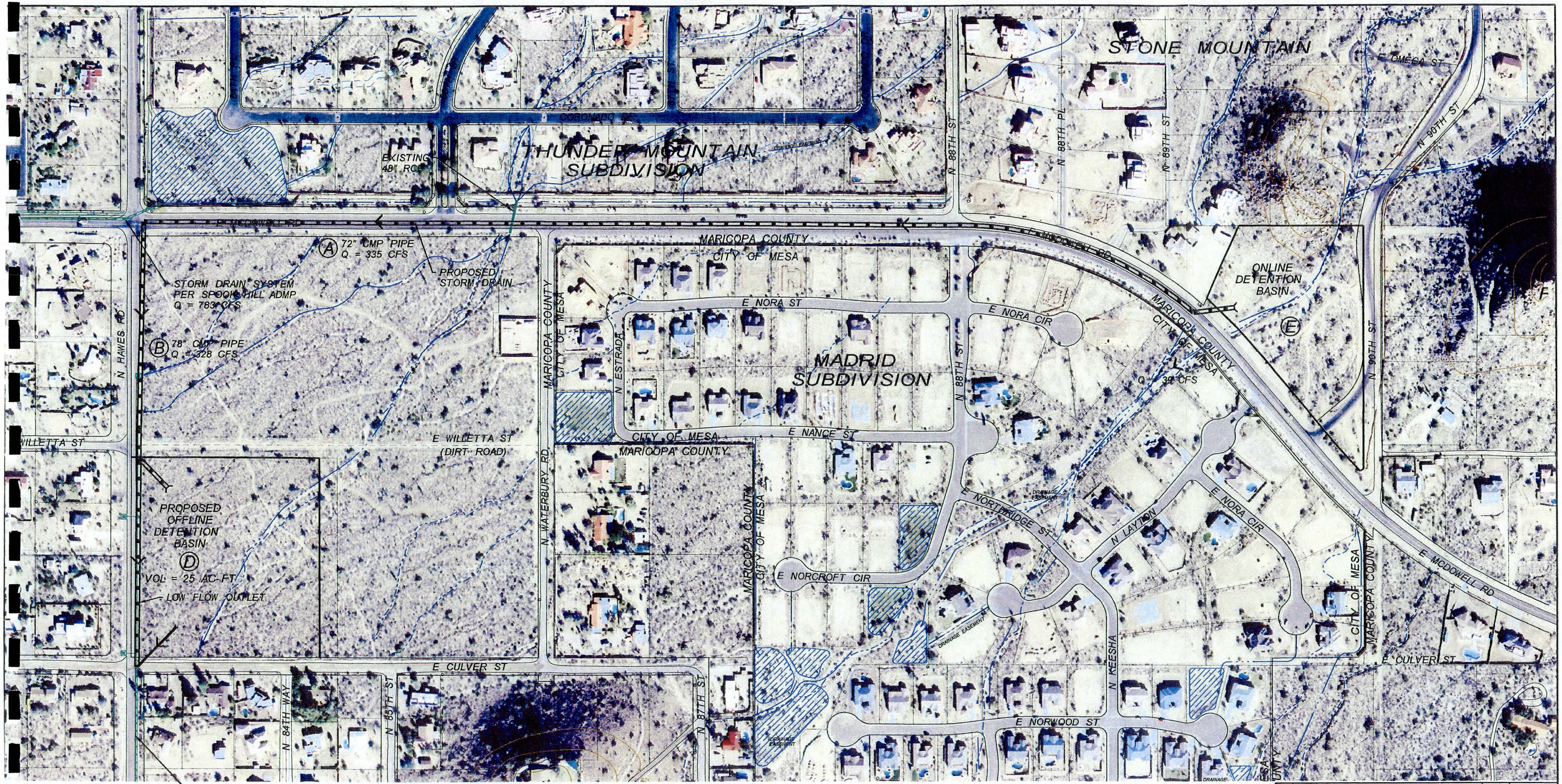
MAP NUMBER
04013C2210 E

MAP REVISED:
JULY 19, 2001

Federal Emergency Management Agency
~~~~

PLATE 4

Alternative 1



STORM DRAIN SYSTEM
PER SPOOK HILL ADMP
Q = 165 CFS

N

150 0 150 300

Scale in Feet

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

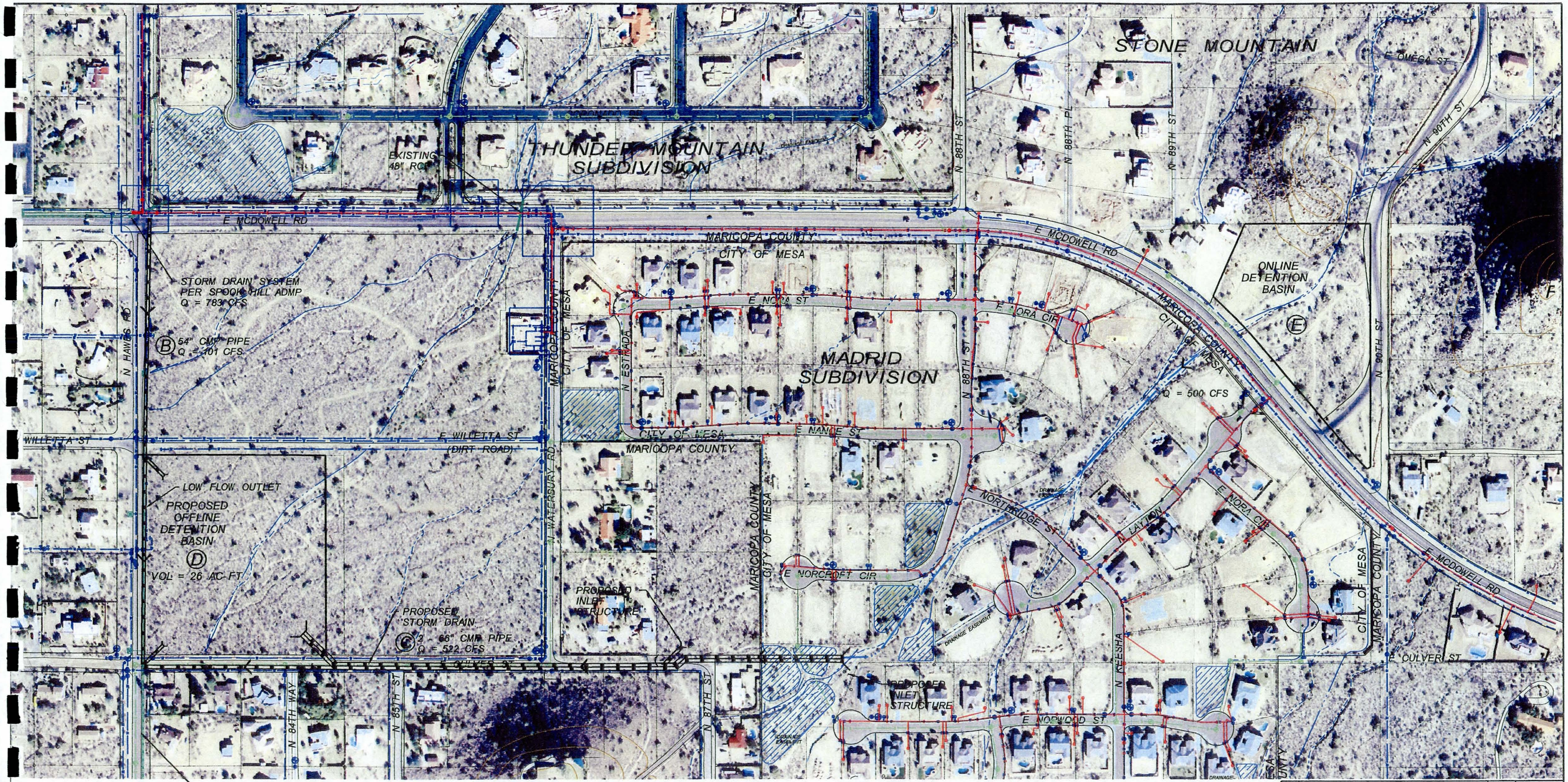
HERMOSA VISTA - HAWES ROAD STORM DRAIN AND BASIN
SPOOK HILL ADMP UPDATE
FCD CONTRACT NO. 2004 C045

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING		BY	DATE
	DESIGNED	J. McCARTY	02/05
	DRAWN	C. FOWLER	02/05
	CHECKED	A. PATEL	02/05
	WOOD PATEL & ASSOCIATES, INC. 2051 W. NORTHERN AVE., SUITE 100 PHOENIX, ARIZONA (602) 335-8500		

DRAWING NO.	ALTERNATIVE 1	PLATE 4

PLATE 5

Alternative 2



STORM DRAIN SYSTEM
PER SPOOK HILL ADMP
Q = 165 CFS

150 0 150 300
Scale in Feet

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

HERMOSA VISTA - HAWES ROAD STORM DRAIN AND BASIN
SPOOK HILL ADMP UPDATE
FCD CONTRACT NO. 2004 C045

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WOOD PATEL & ASSOCIATES, INC.
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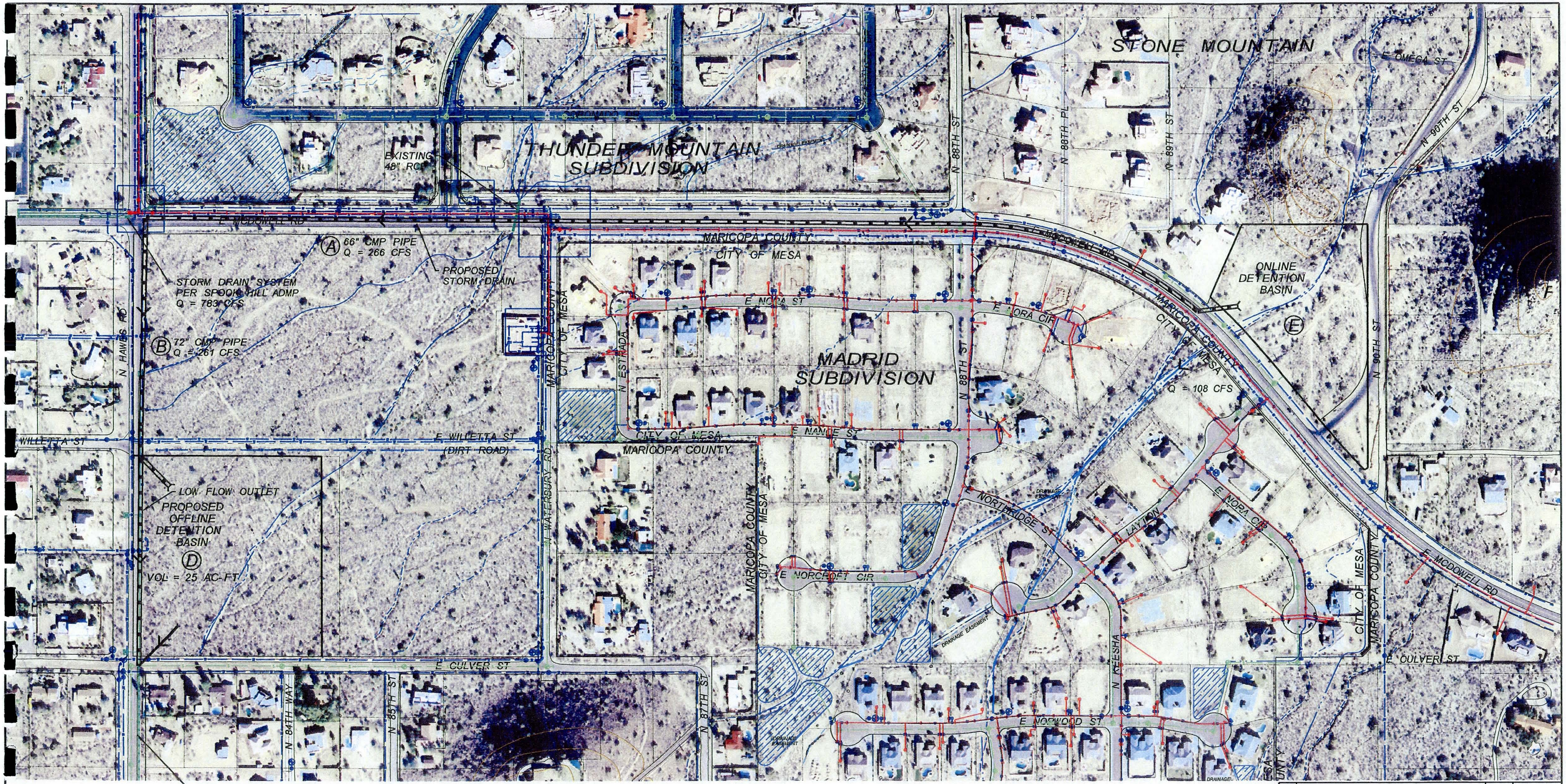
PHOENIX, ARIZONA (602) 335-8500

DRAWING NO. | ALTERNATIVE 2 | PLATE 5

Y:\2004\042284\DRAWING\042284OPT2.DGN

PLATE 6

Alternative 3



STORM DRAIN SYSTEM
PER SPOOK HILL ADMP
Q = 165 CFS

N

150 0 150 300
Scale in Feet

CALL TWO WORKING DAYS BEFORE YOU DIG
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1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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DRAWING NO.	ALTERNATIVE 3	PLATE 6

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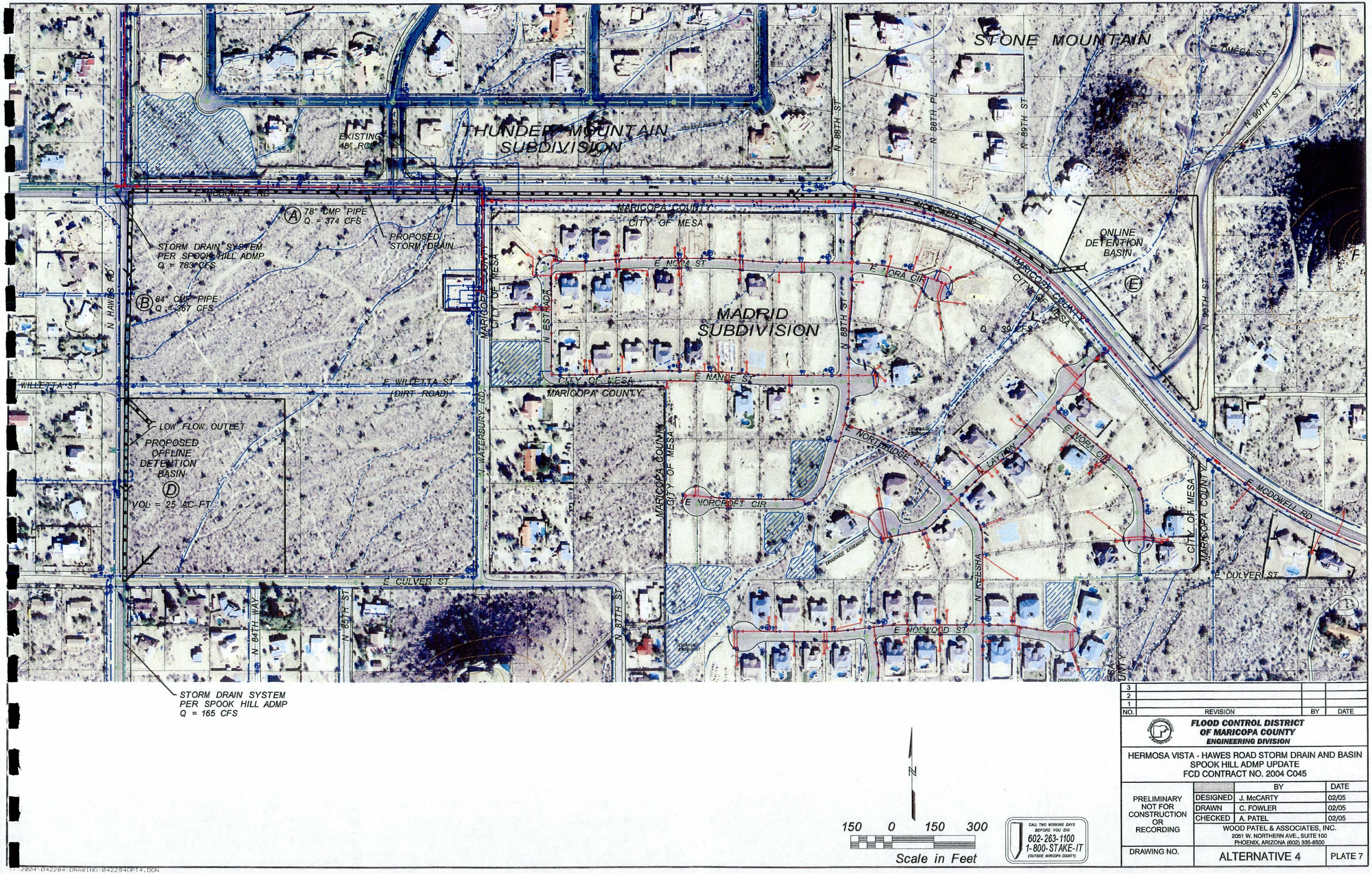
PLATE 7

Alternative 4



CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

NO.	REVISION	BY	DATE
3			
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1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

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DRAWING NO.	ALTERNATIVE 4	PLATE 7

2004-042284-DRAWING-042284OPT4.DGN

PLATE 8

Alternative 5

STORM DRAIN SYSTEM
PER SPOOK HILL ADMP
Q = 165 CFS

N

150 0 150 300

Scale in Feet

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

HERMOSA VISTA - HAWES ROAD STORM DRAIN AND BASIN
SPOOK HILL ADMP UPDATE
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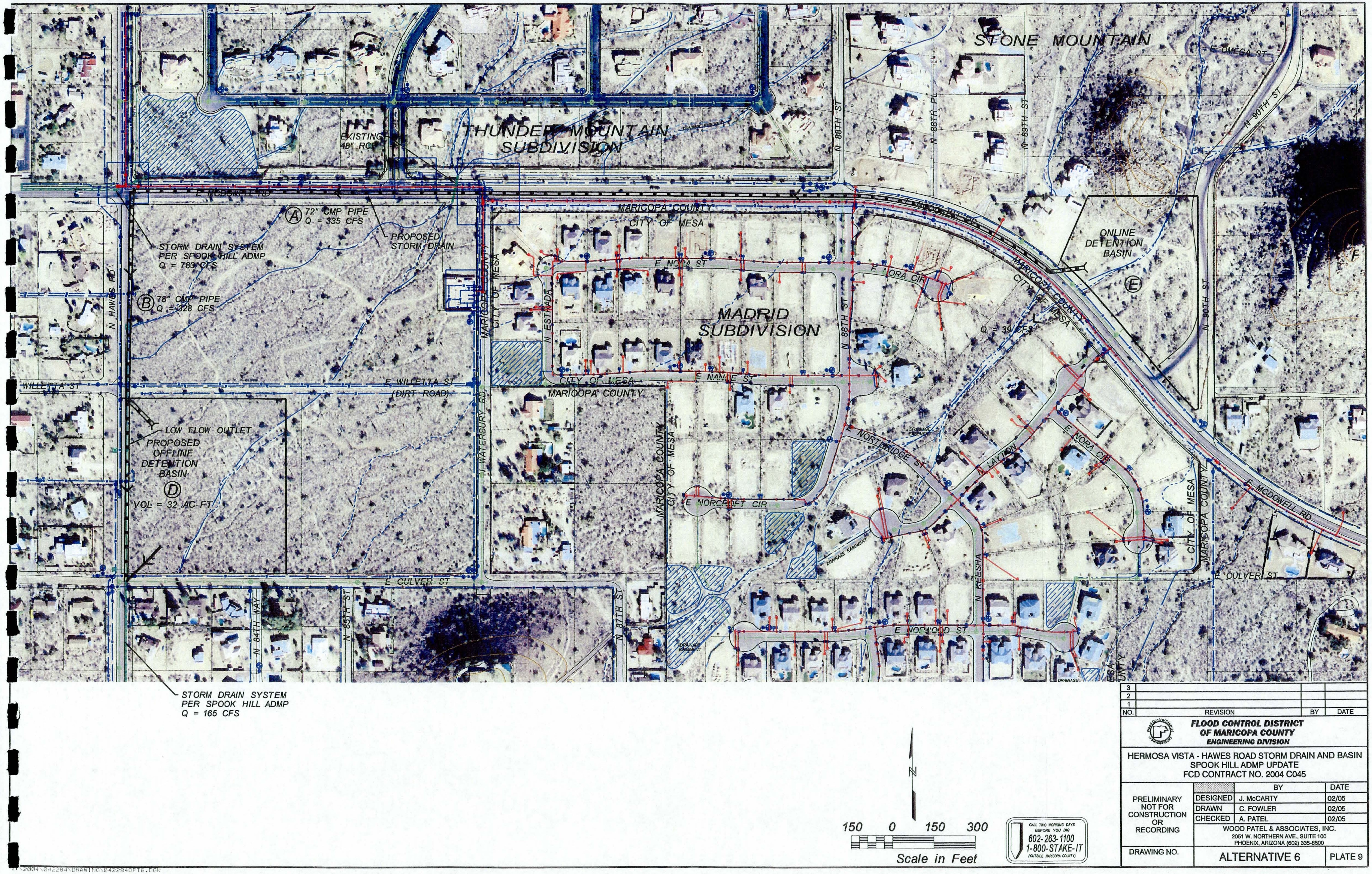
DRAWING NO.	ALTERNATIVE 5	PLATE 8

PLATE 9

Alternative 6



CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

HERMOSA VISTA - HAWES ROAD STORM DRAIN AND BASIN
SPOOK HILL ADMP UPDATE
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2051 W. NORTHERN AVE., SUITE 100
PHOENIX, ARIZONA (602) 335-8500

DRAWING NO.	ALTERNATIVE 6	PLATE 9

PLATE 10

Preferred Alternative

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

HERMOSA VISTA - HAWES ROAD STORM DRAIN AND BASIN
SPOOK HILL ADMP UPDATE
FCD CONTRACT NO. 2004 C045

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	DRAWN	C. FOWLER	02/05
	CHECKED	A. PATEL	02/05

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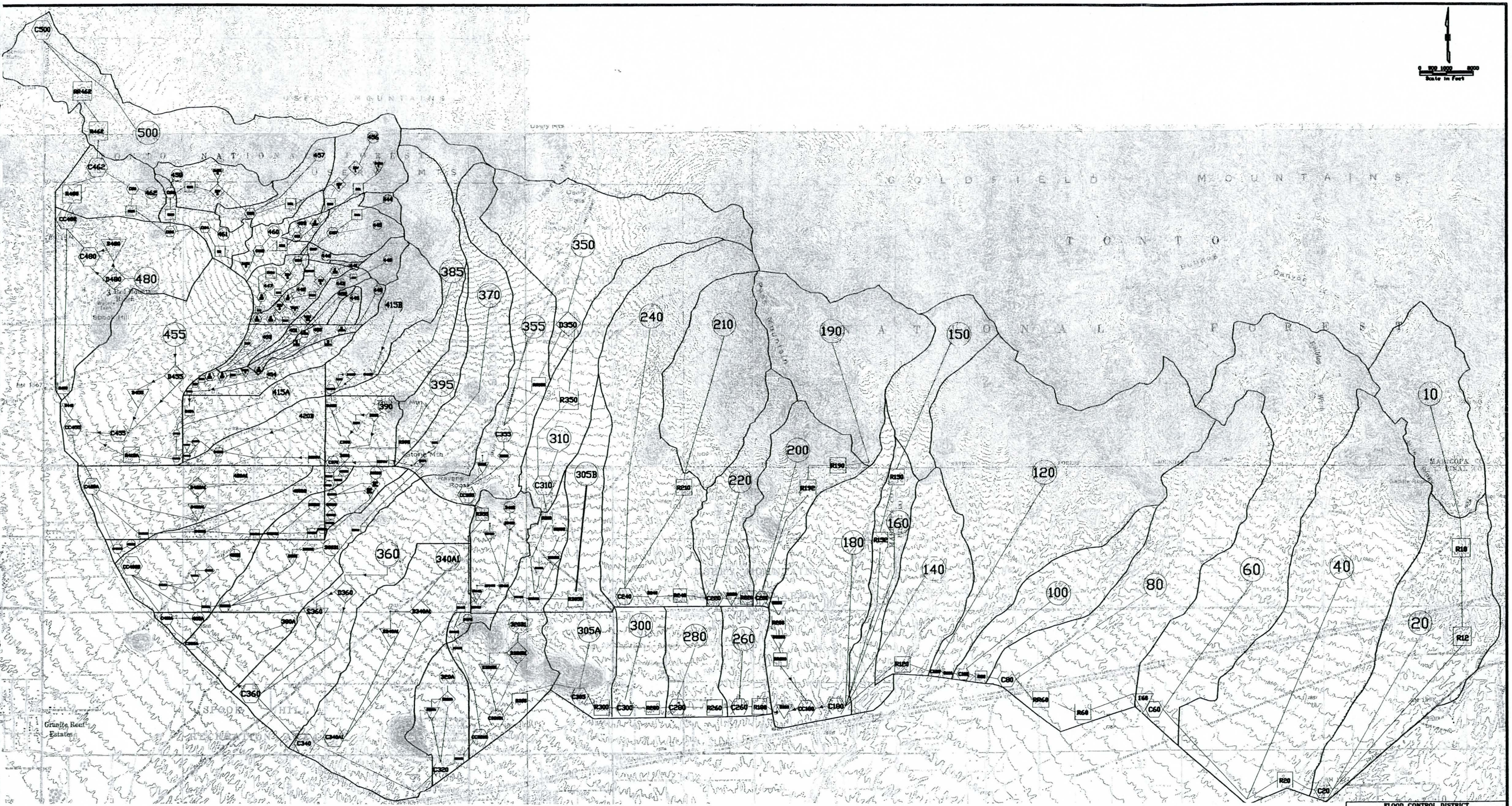
DRAWING NO. FIGURE 2	PREFERRED ALTERNATIVE	PLATE 10

Y:\2004\042284\DRAWING\042284PREFERRED.DGN

PLATE 11

HEC-1 Schematic for Preferred Alternative



SOSSAMAN ROAD

HAWES ROAD

ELLSWORTH ROAD

CRISMON ROAD

SIGNAL BUTTE RD

MERIDIAN ROAD

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

RECOMENDED ALTERNATIVE

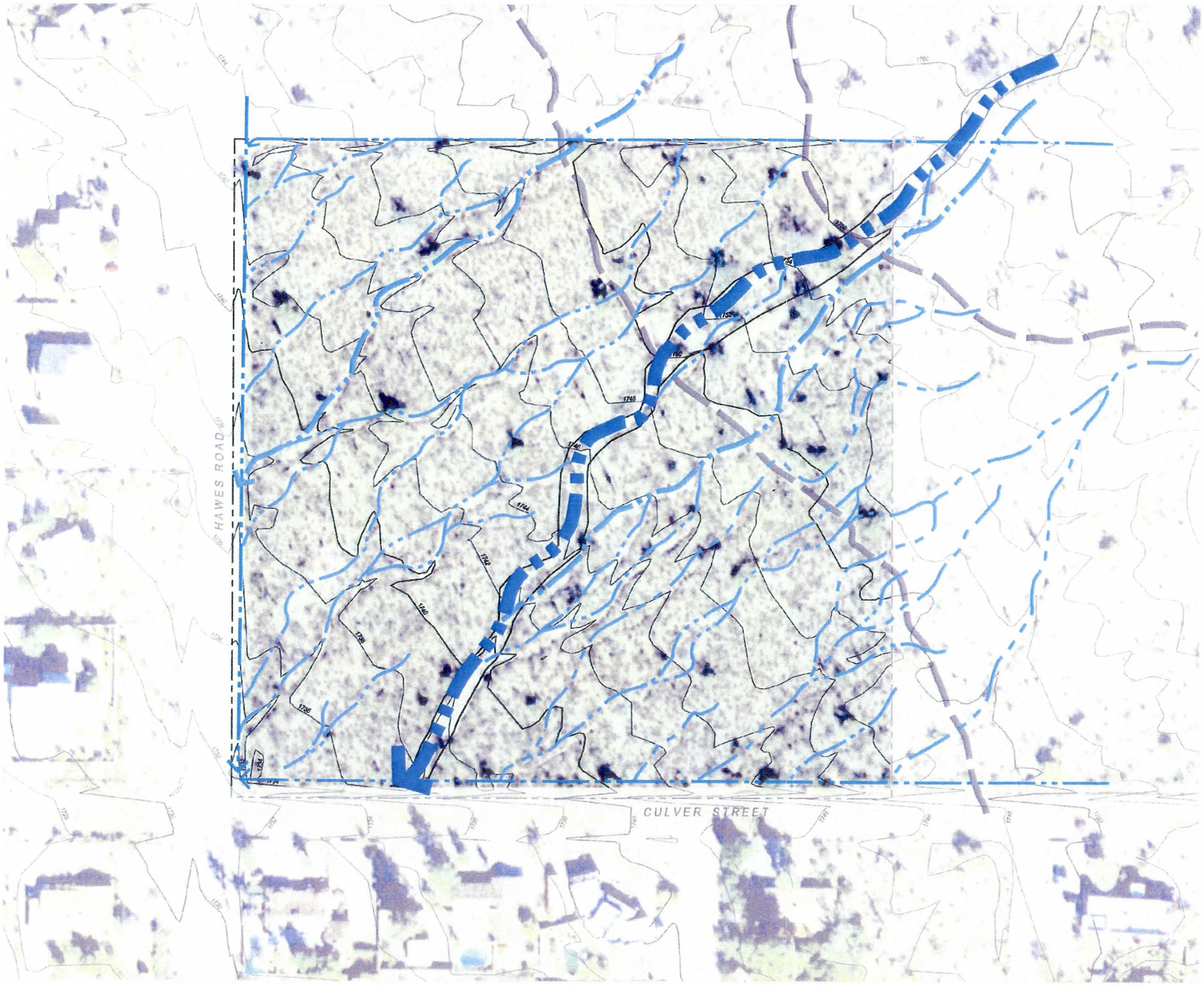
[illegible]	BY	DATE
DESIGNED	J. McCARTY	06/05
DRAWN	J. McCARTY	06/05
CHECKED	A. PATEL	06/05

WOOD, PATEL & ASSOCIATES, INC.
2051 WEST NORTHERN, SUITE 100
PHOENIX, ARIZONA (602) 335-8500

DRAWING NO. REC_FC24.DWG

Culver Hawes Basin

Site Analysis - Hydrology



Site Area

The Culver-Hawes Basin site drains from the northeast to the southwest. The 404 wash divides the site while smaller drainages are braided throughout, adding diversity to the topography. The 404 wash and small drainages south of the 404 wash primarily flow into the existing drainage channel along Culver Street. Small washes north of the 404 wash enter the existing channel parallel to Hawes Road along the western edge of the site.

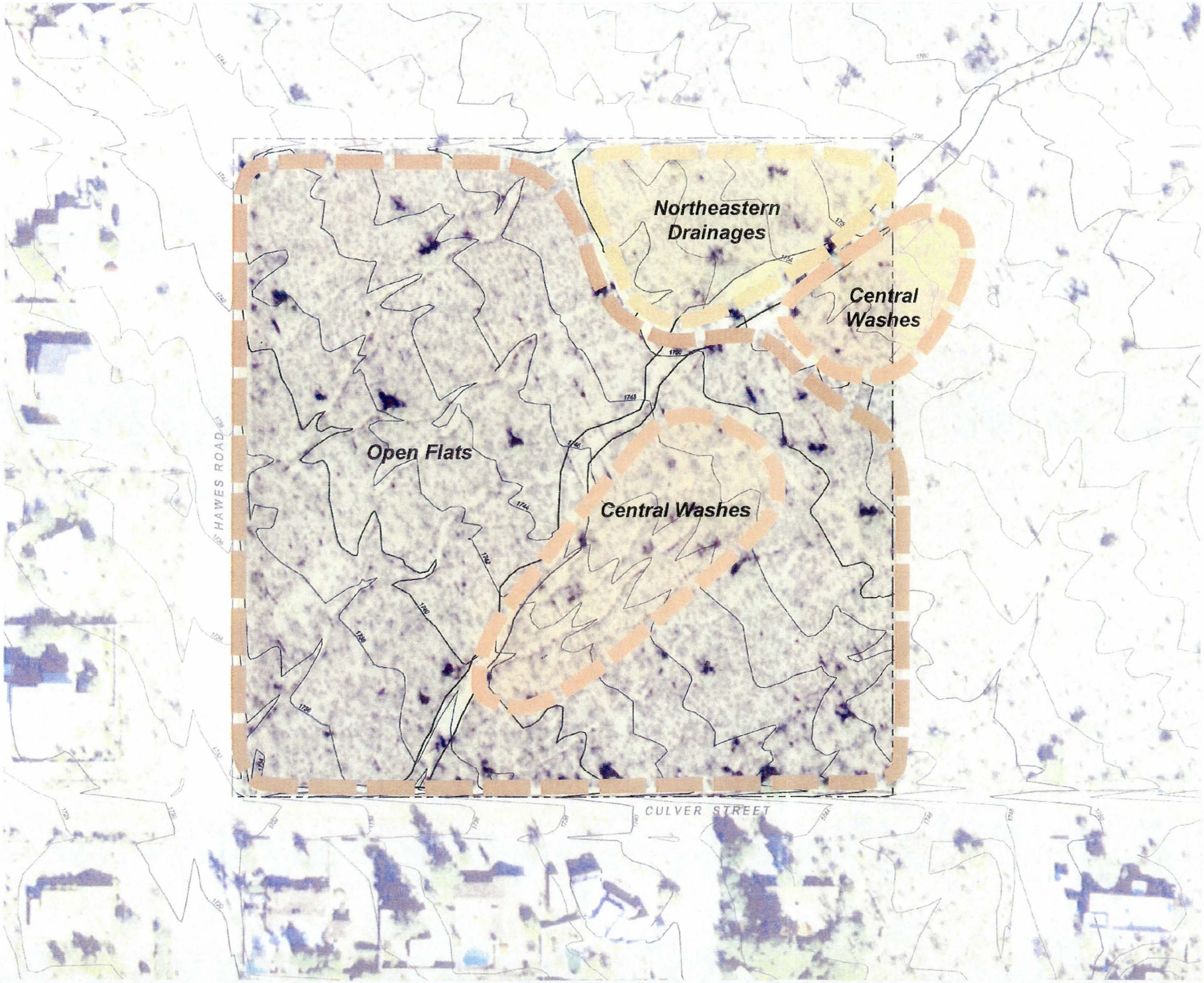
Water (Washes and Drainages)

March 2005

PLATE 12

PLATE 13

Landform



Site Area

Culver Hawes Basin

Site Analysis - Landform


Open Flats

Open flat topography with both clearly defined disected washes and shallow wide washes with sandy bottoms


Central Washes

Heavily disected area with numerous braided washes and undulating topography


Northeastern Drainages

Gently falling grade with rolling topography and undulating wash ***corridors***

Topography:

Drainages running across the site have created a topographic patternt that is generally angular in character with sharp transitions in form. Large flat areas are dissected by numerous washes, often braided, that cross the site. There is roughly 26 feet of fall across the site from the northeast corner to the southwest corner, producing an average slope of 2.7 percent across the site with slopes ranging from 1 percent to 4 percent.

Flood Control District of Maricopa County

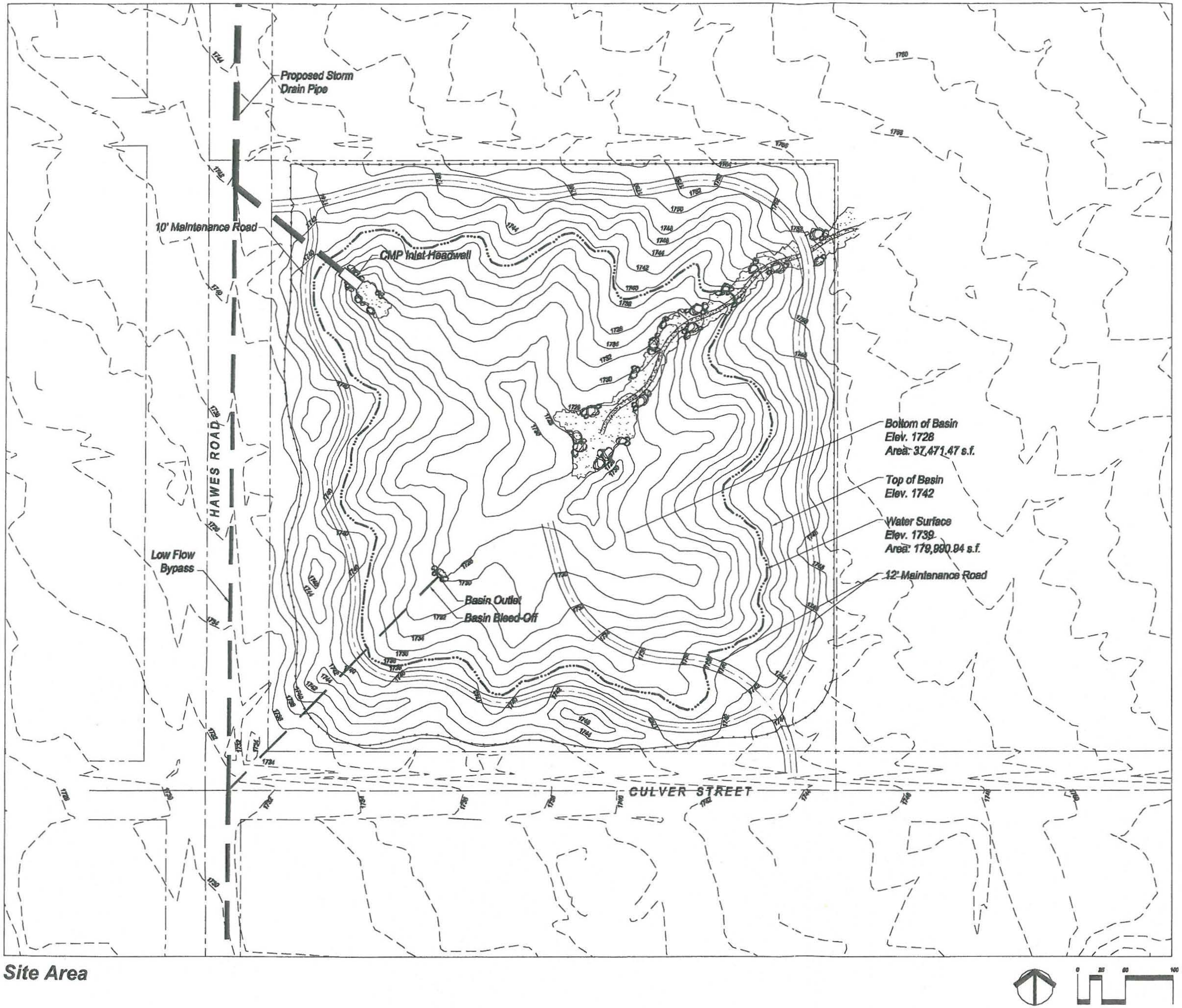
epg March 2006

PLATE 14.1

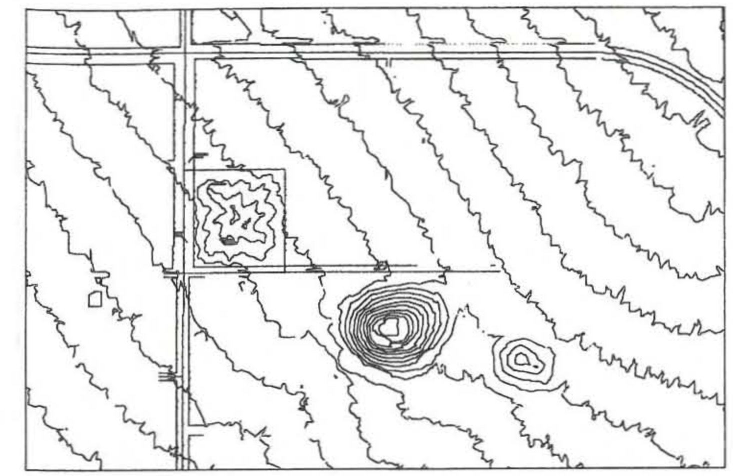
Conceptual Grading Plan

Culver Hawes Basin

Conceptual Design



Site Area



Local Area Scale: 1" = 600'-0"

Legend

- Water Surface Elevation
- Proposed Index Contour
- Proposed Intermediate Contour
- Existing Index Contour
- Existing Intermediate Contour
- Jurisdictional Wash
- Property Line
- Right-of-Way
- Centerline of Street
- Proposed Smooth Wire Fence

Flood Control District of Maricopa County

epg

April 2005

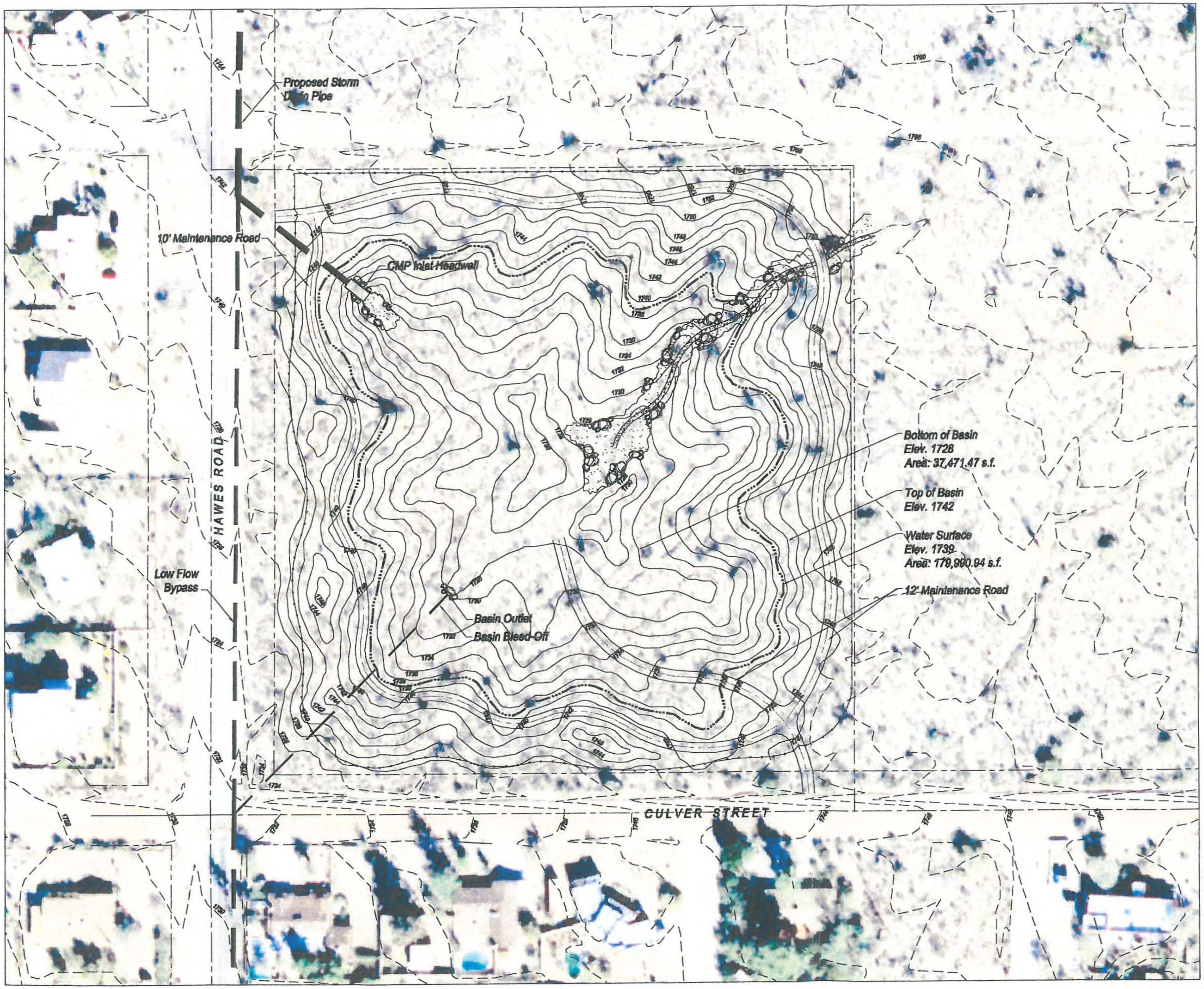
PLATE 14.1

Plate 14.2

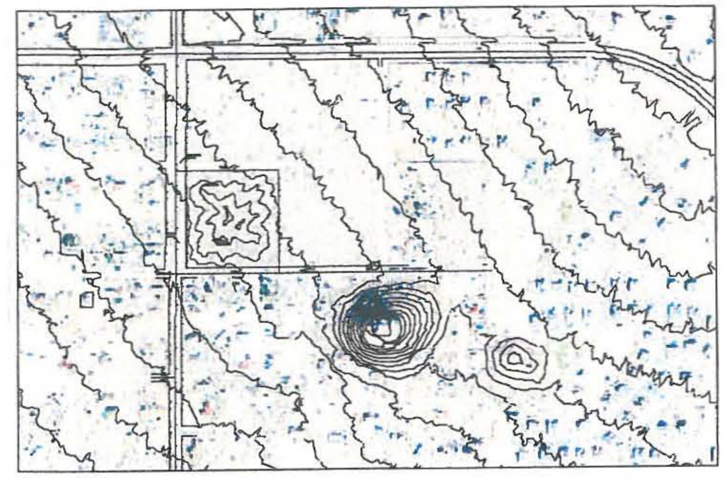
Conceptual Grading Plan with Aerial

Culver Hawes Basin

Conceptual Design



Site Area



Local Area Scale: 1" = 600'-0"

Legend

- Water Surface Elevation
- Proposed Index Contour
- Proposed Intermediate Contour
- Existing Index Contour
- Existing Intermediate Contour
- Jurisdictional Wash
- Property Line
- Right-of-Way
- Centerline of Street
- Proposed Smooth Wire Fence

Flood Control District of Maricopa County

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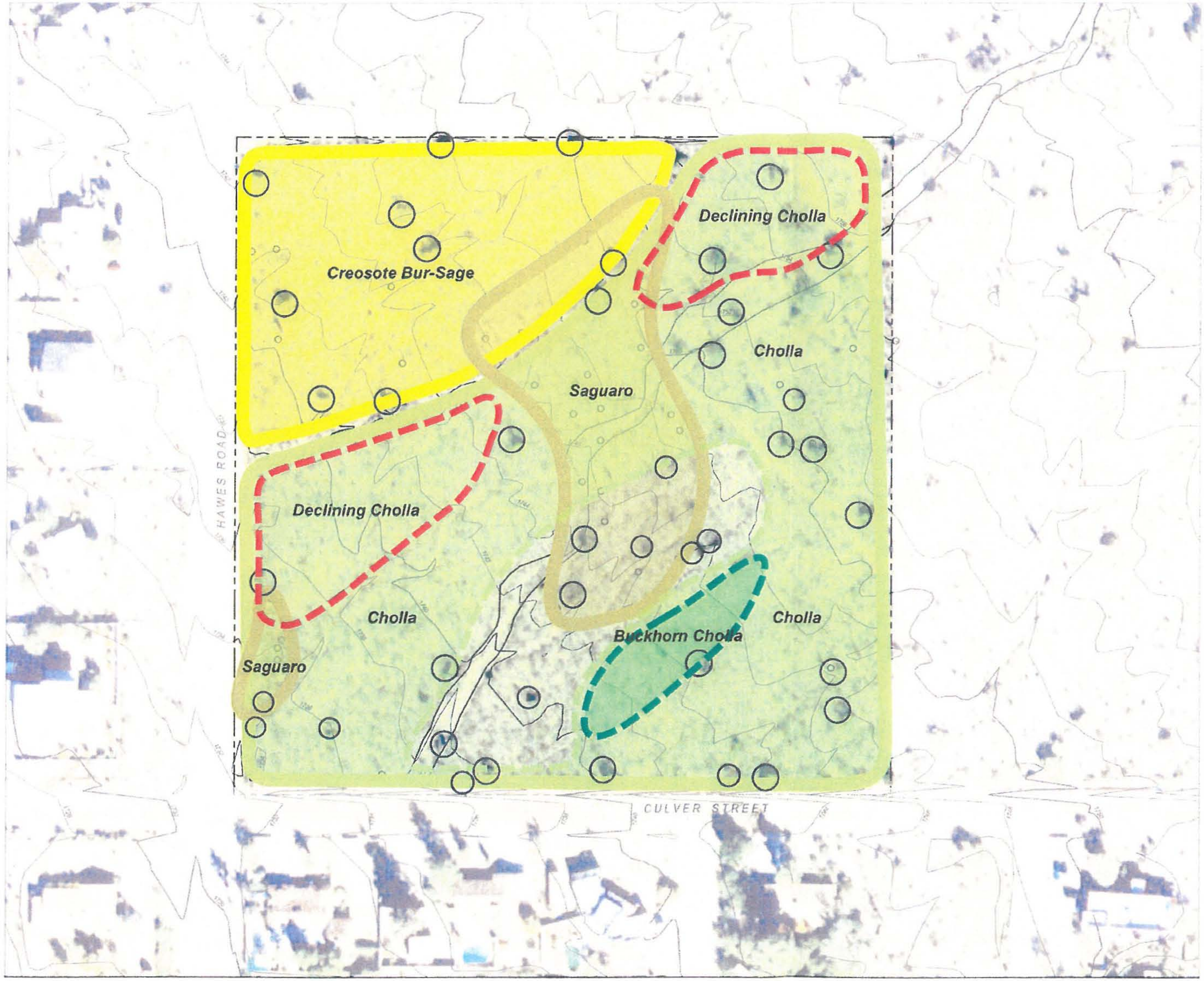
April 2005

PLATE 14.2

PLATE 15

Vegetation and Ecology



Site Area

Culver Hawes Basin

Site Analysis - Vegetation

Creosote Bur-Sage

Dominant Vegetation:
Creosote Bush
Triangleleaf Bur-sage

Secondary Vegetation:
Palo Verde
Brittlebush
Barrel Species
Desert Lupine
Mariola

Cholla

Dominant Vegetation
Chainfruit Cholla

Secondary Vegetation
Palo Verde
Ironwood
Creosote Bush
Triangleleaf Bur-sage
Desert Milkweed
Ragweed
Desert Broom
Brittlebush
Barrel Species
Desert Lupine
Wolfberry
Mariola
Beavertail Prickly-pear
Tree Cholla

Saguaro

Dominant Vegetation
Saguaro

Secondary Vegetation
Palo Verde
Ironwood
Chainfruit Cholla
Creosote Bush
Triangleleaf Bur-sage
Desert Milkweed
Ragweed
Desert Broom
Brittlebush
Barrel Species
Desert Lupine
Wolfberry
Mariola
Beavertail Prickly-pear
Tree Cholla

Buckhorn Cholla

Declining Cholla

Ecology

Sonoran Desert biome
Arizona Upland Subdivision
Sonoran Palo Verde Mixed Cacti - Mixed Shrub Community
Xeroriparian Desert Habitat

Suitable Habitat for noted species
cactus ferriginous pygmy-owl
lesser long-nosed bat
Sonoran desert tortoise
American peregrine falcon

Prominant species observed on site
Gambel's quail
desert cottontail
hummingbird

March 2006

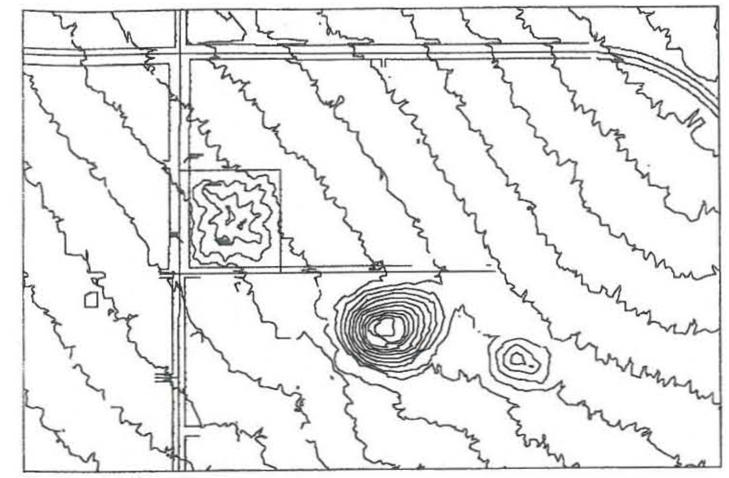
PLATE 15

PLATE 16.1

Conceptual Planting Plan

Culver Hawes Basin

Conceptual Planting



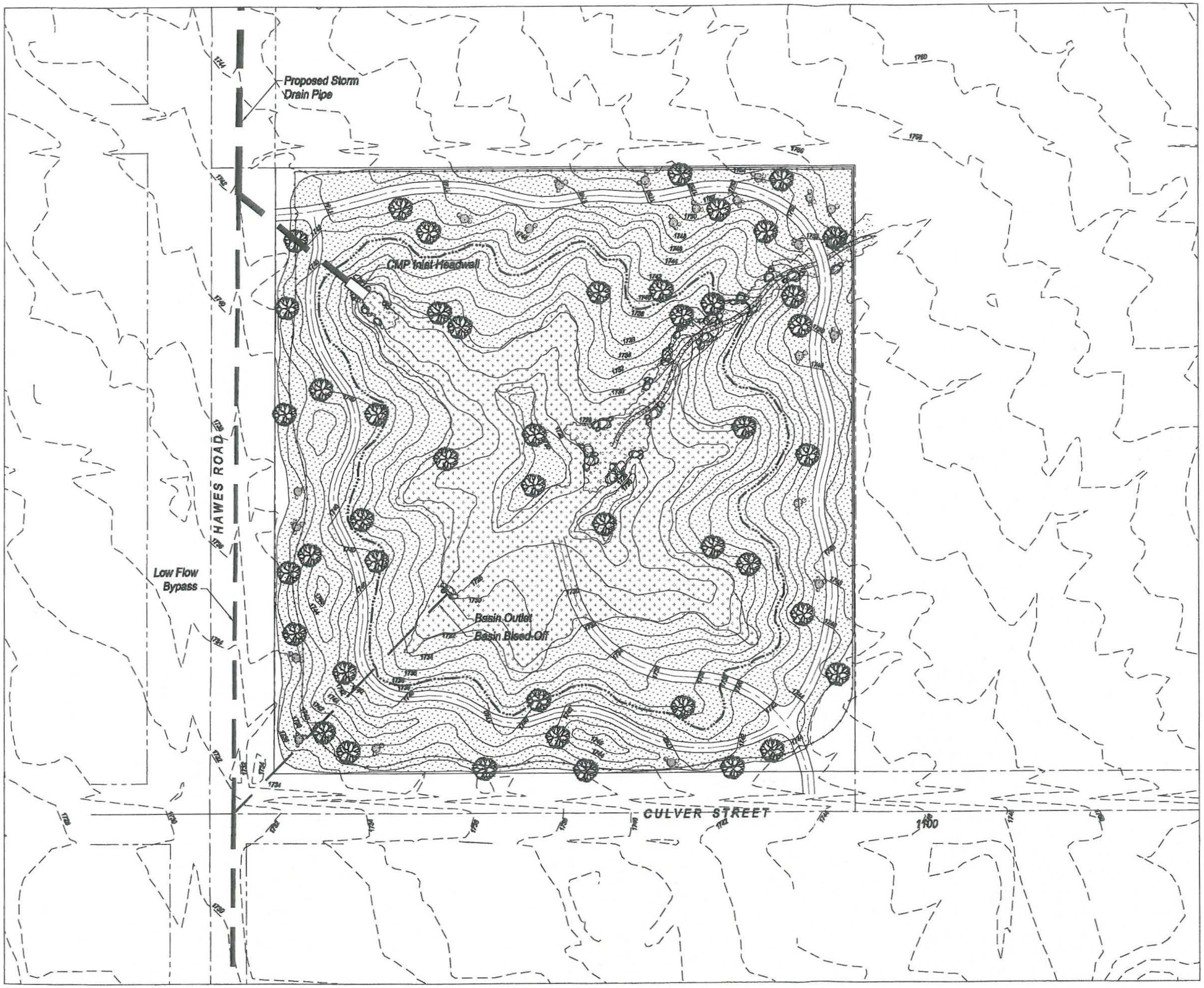
Local Area Scale: 1" = 600'-0"

Basin Hydroseed

Item	Quantity
Grass Hydroseed Mix	1.76 acres
Shrub Hydroseed Mix	5.80 acres
Salvaged Saguaro	21
Tall Pot Tree (Palo Verde, Mesquite, or Ironwood)	45

Legend

- Water Surface Elevation
- Proposed Index Contour
- Proposed Intermediate Contour
- Existing Index Contour
- Existing Intermediate Contour
- Jurisdictional Wash
- Property Line
- Right-of-Way
- Centerline of Street
- Proposed Straight Wire Fence



Site Area

April 2005

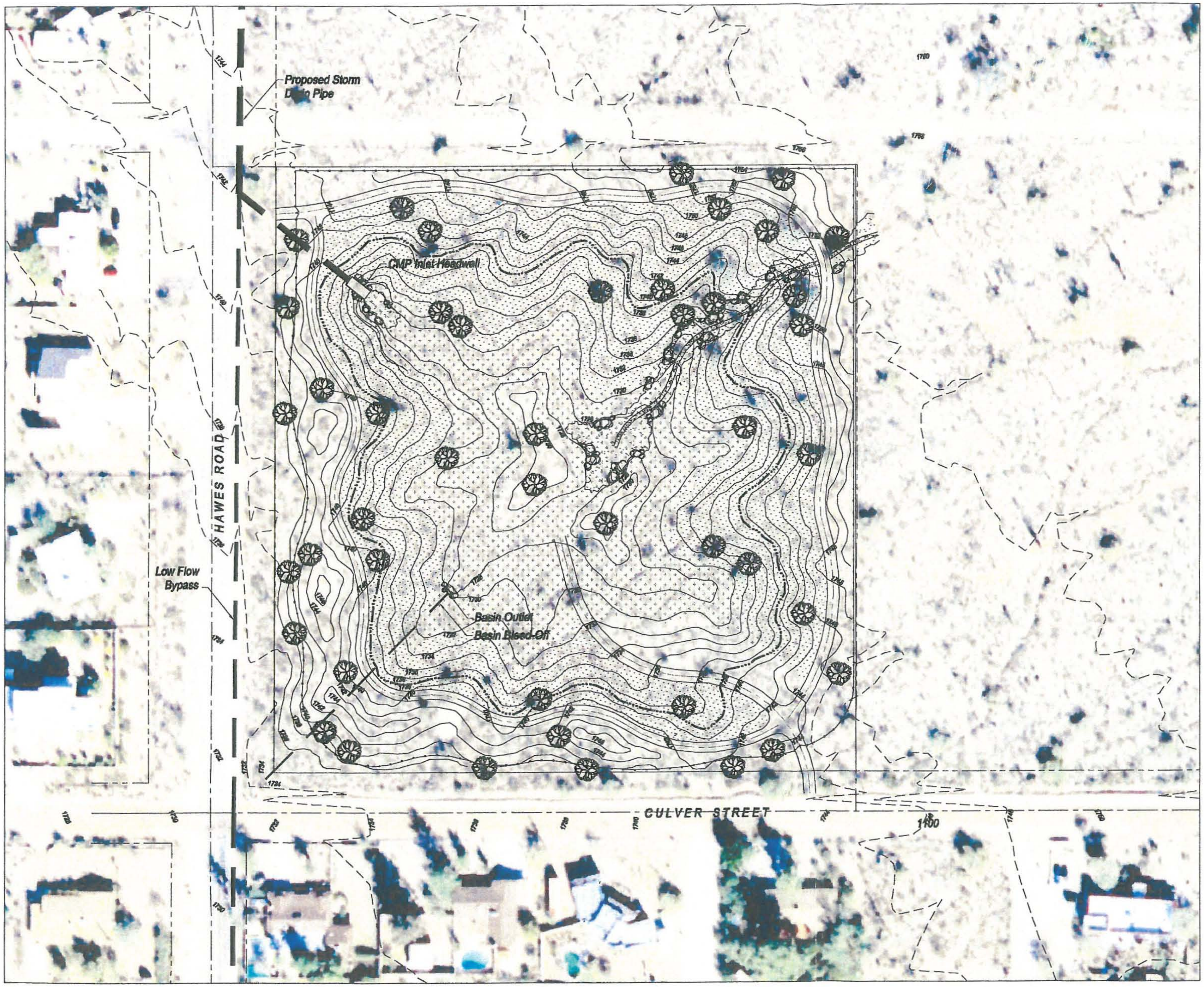
PLATE 16.1

PLATE 16.2

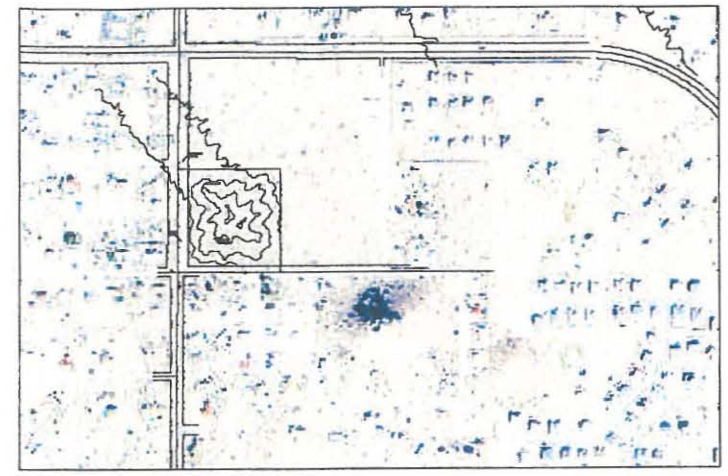
Conceptual Planting Plan with Aerial

Culver Hawes Basin

Conceptual Planting



Site Area



Local Area Scale: 1" = 600'-0"

Basin Hydroseed

Grass Hydroseed Mix		1.76 acres
Shrub Hydroseed Mix		5.80 acres
Salvaged Saguaro		21
Tall Pot Tree (Palo Verde, Mesquite, or Ironwood)		45

Legend

- Water Surface Elevation
- Proposed Index Contour
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- Existing Index Contour
- Existing Intermediate Contour
- Jurisdictional Wash
- Property Line
- Right-of-Way
- Centerline of Street
- Proposed Straight Wire Fence

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PLATE 16.2

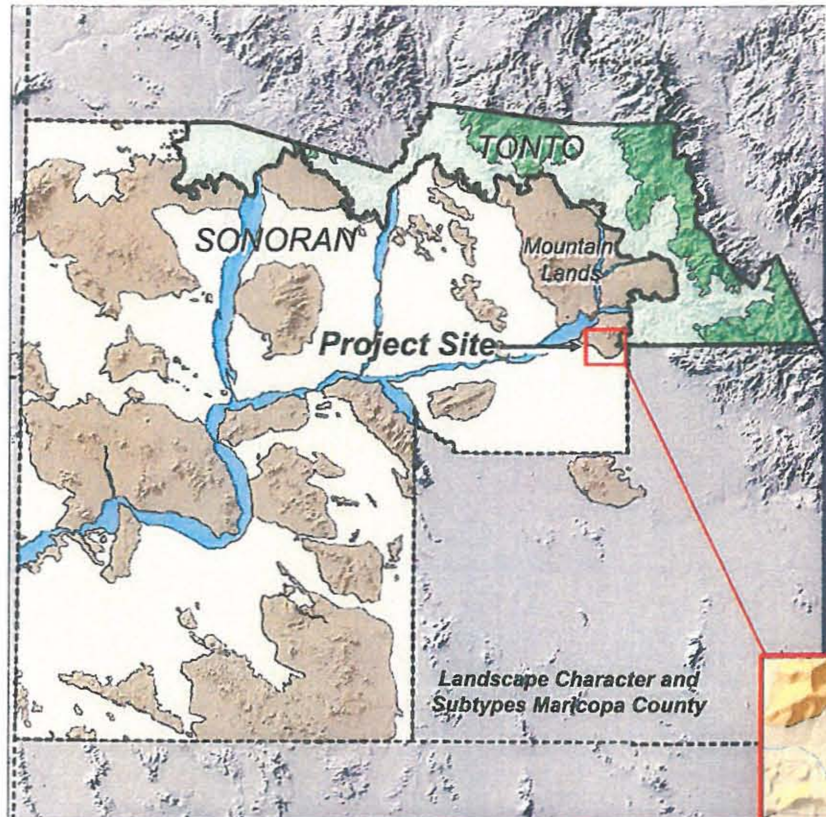
PLATE 16.3

Conceptual Planting Rendered Plan

PLATE 17

Landscape Character

Character Type: Sonoran Desert
Character Subtype: Mountain Lands



Mountain Lands: Visual Character

Line – The dominant lines of this subtype include soft, slightly sloping straight lines of the lower portion of the mountains (bajadas) abutting the very angular, jagged, and bold lines associated with the upper slopes and peaks of the mountains. Subordinate lines are those of the foothills that are intermediate between the lower and upper portions of the unit.

Form – Essentially, three forms occur in this subtype—slightly sloping plains (bajada), rounded to slightly jagged foothills, and the prominent, rough, and concave form of the mountains.

Color – The colors associated with this subtype tend to be subtle grays, blacks, reds, and purples depending on sun position. The vegetation adds a general gray-green to the lower portions of this subtype but is subordinate to the striking bold colors of the exposed rock with desert varnish.

Texture – At this scale, the texture is attributed to the variation of form close to the surface of the mountains. These variations cause shadow, which give the mountain lands a general fine to course texture. Towards the upper half of the mountain units where rock outcroppings exists the texture is course. At the lower elevations, the saguaro forests associated with the bajadas result in a fine texture.

Scale – The scale of the mountain lands varies, from a few hundred acres to several thousand acres.

Composition – The mountains lands are of a feature landscape composing because of their vertical nature and visual presence in the landscape.

Bajada: Visual Character

Form – Flat predominately fan-shaped rectilinear form.

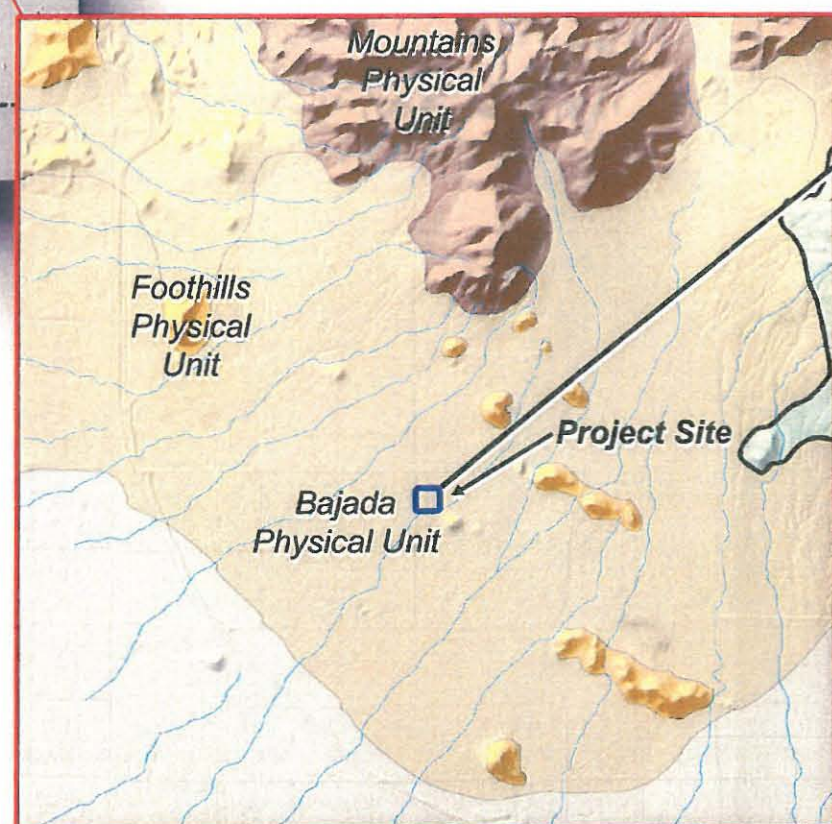
Line – Curvilinear line covers the surface of the bajada dominating the horizontal line of the horizon.

Color – Grey greens are typical of the bajada and associated with the native desert vegetation. Grays to blacks occur where bare rock exists sometimes with green lichen.

Texture – The medium to course texture of this physical unit is caused by the saguaro cactus poking out of the mass of tree and shrubs that typically blanket the land.

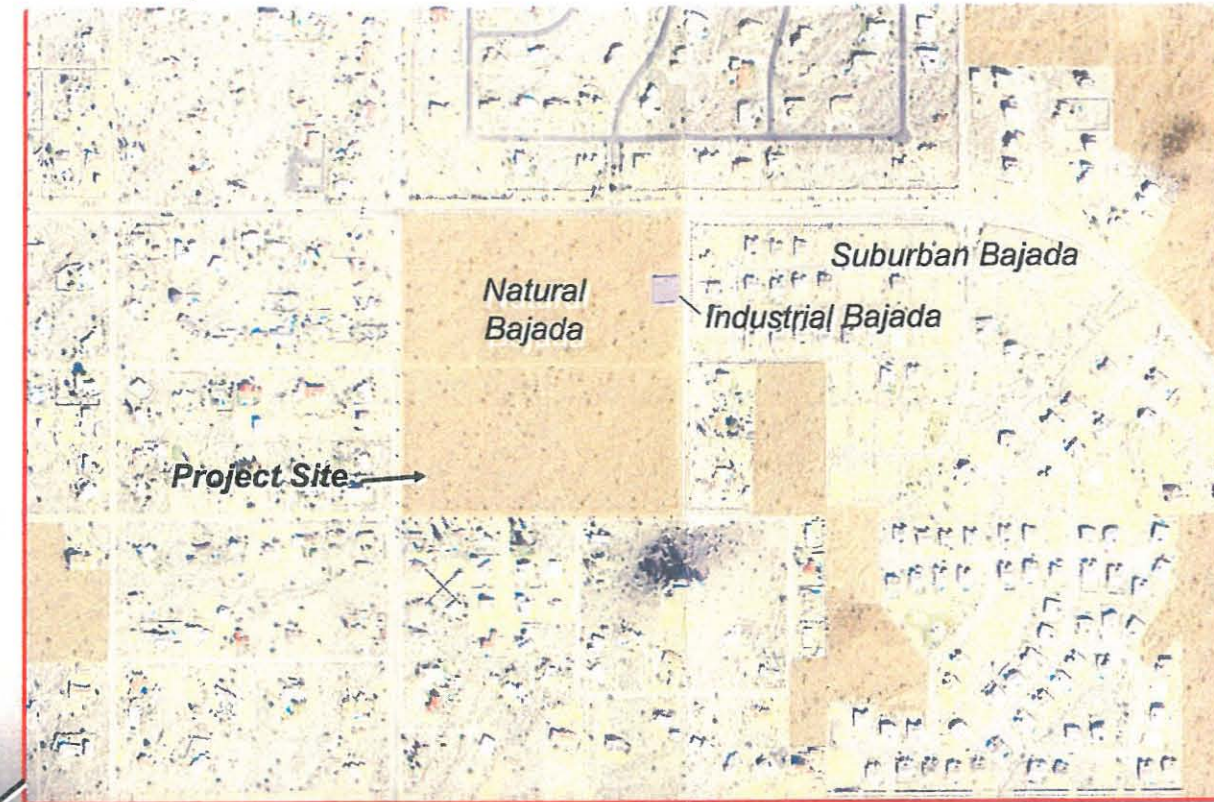
Scale – Scale is not articulated in this landscape because the dominant element is vegetation.

Composition – The sloping nature of the bajada and associated wide open views are typical of a panoramic landscape.



Physical Division: Bajada

Site Specific Landscape Unit: Natural Bajada



Natural Bajada: Landscape Character Description

The Bajada physical unit occupies approximately 5 percent of Maricopa County. The Bajada is a slightly sloping landform exhibiting a braided network of u-shaped shallow arroyos and shallow drainages. Typically, this physical unit begins at the base of a mountain and extends downward to the valley plains. The soil, composed of primarily detritus (eroded rock, sand, and silt) originating from the mountain slopes and peaks, is extremely fertile and provides excellent drainage. These soil conditions allow Sonoran vegetation to flourish, especially the saguaro, which typically requires excellent drainage for its small root system to function properly. The resulting dense saguaro forests characterize the Sonoran Desert more than any other physical unit.

Landscape Elements

Landform – Slightly downward sloping landform with surface undulations.

Vegetation – Saguaro forests mixed with characteristic dense mixed Sonoran vegetation including, palo verde, ocotillo, ironwood, and cactus.

Water form – Non-existent except for arroyos that occur within the area and occasionally flow for very short durations because of summertime monsoon storms.

Rock form – Occasionally rock cockcrows occur that are void of vegetation.

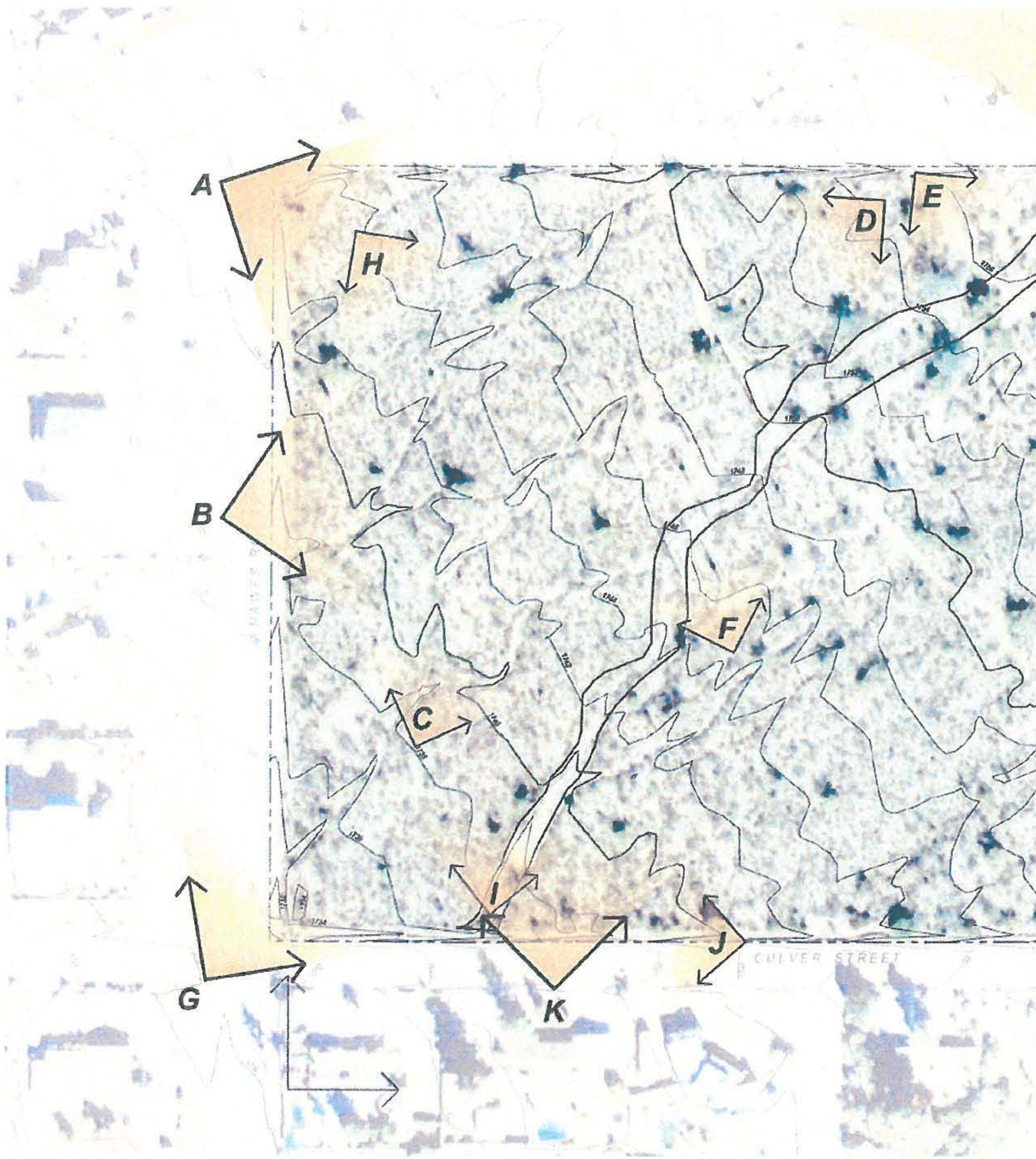
Adjacent Landscape Units:
Suburban Bajada
Natural Foothills
Suburban Foothills

PLATE 18

Key Viewpoints and Visual Character

Culver Hawes Basin

Site Analysis - Key Viewpoints and Visual Character



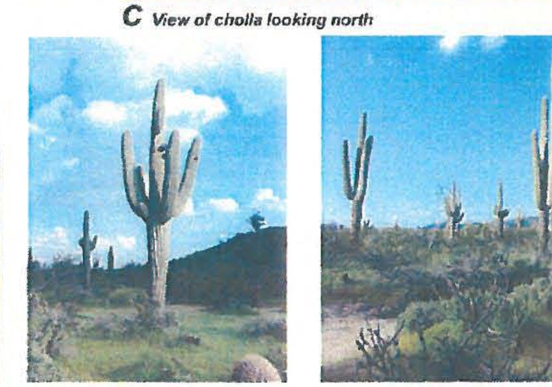
A View from northwest corner of site looking southeast

B View from Culver Road looking east across site

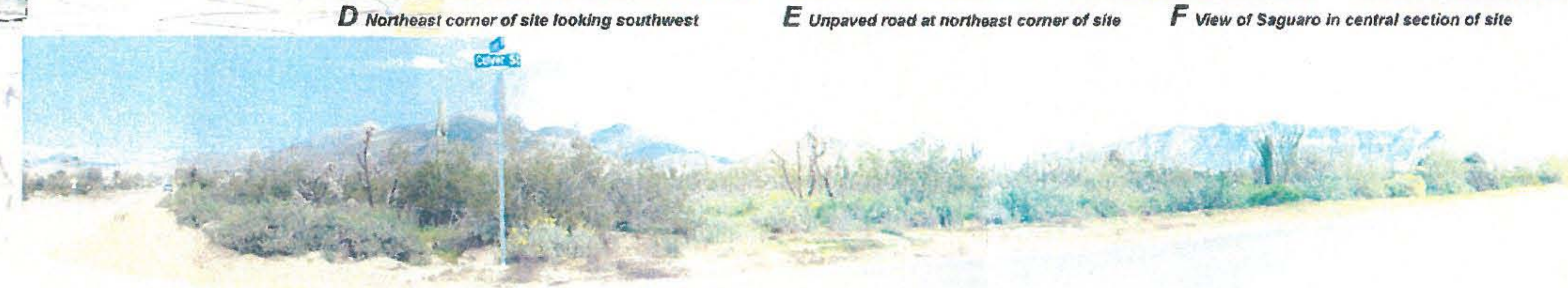
C View of cholla looking north

D Northeast corner of site looking southwest

E Unpaved road at northeast corner of site



F View of Saguaro in central section of site

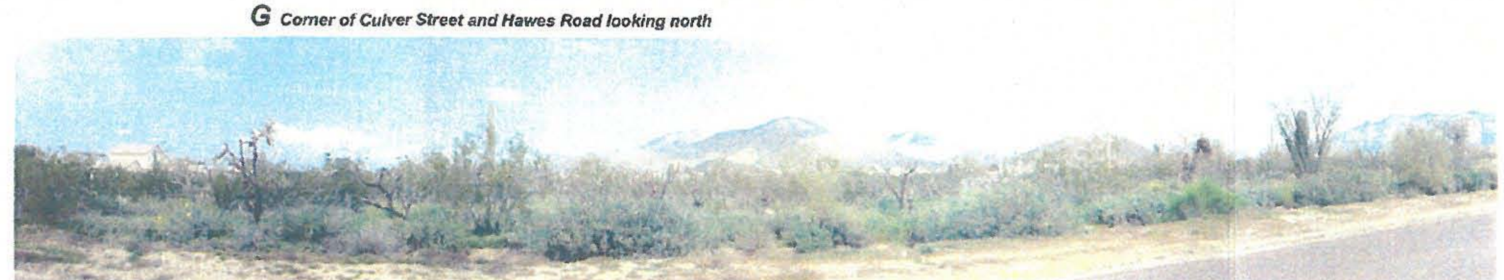


G Corner of Culver Street and Hawes Road looking north

H View towards southeast from northeastern section of site

I View of 404 wash looking north

J Drainage channel along Culver Street looking west



K View along Culver Street looking north

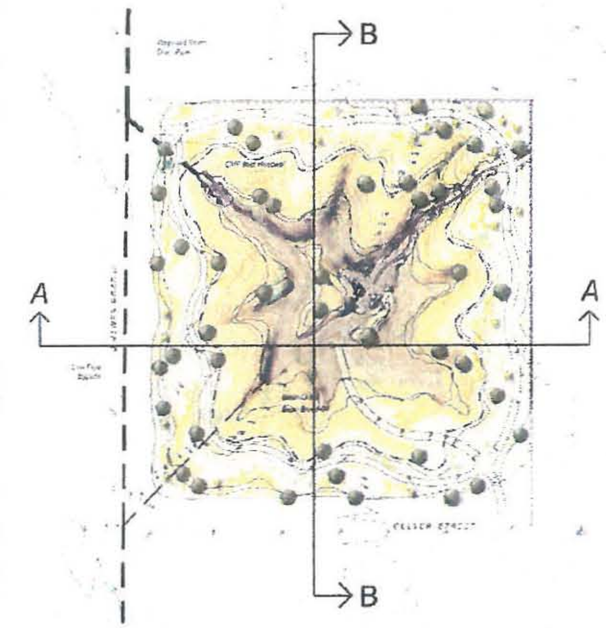
PLATE 19

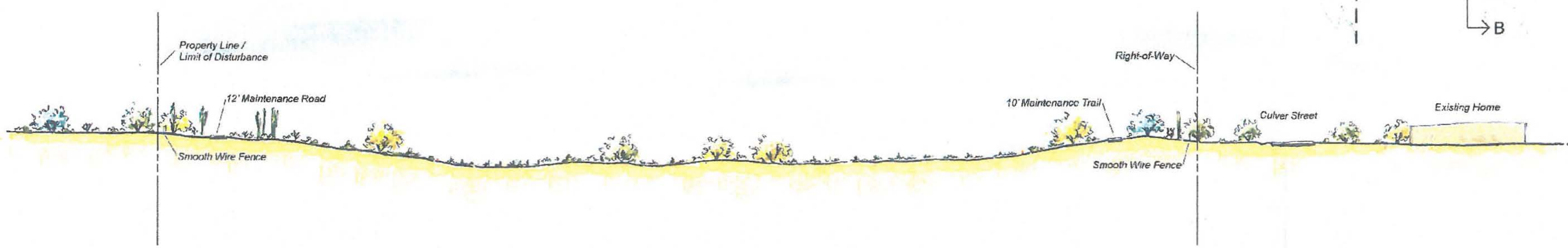
Conceptual Basin Sections

Culver Hawes Basin

Conceptual Basin Sections

Section A





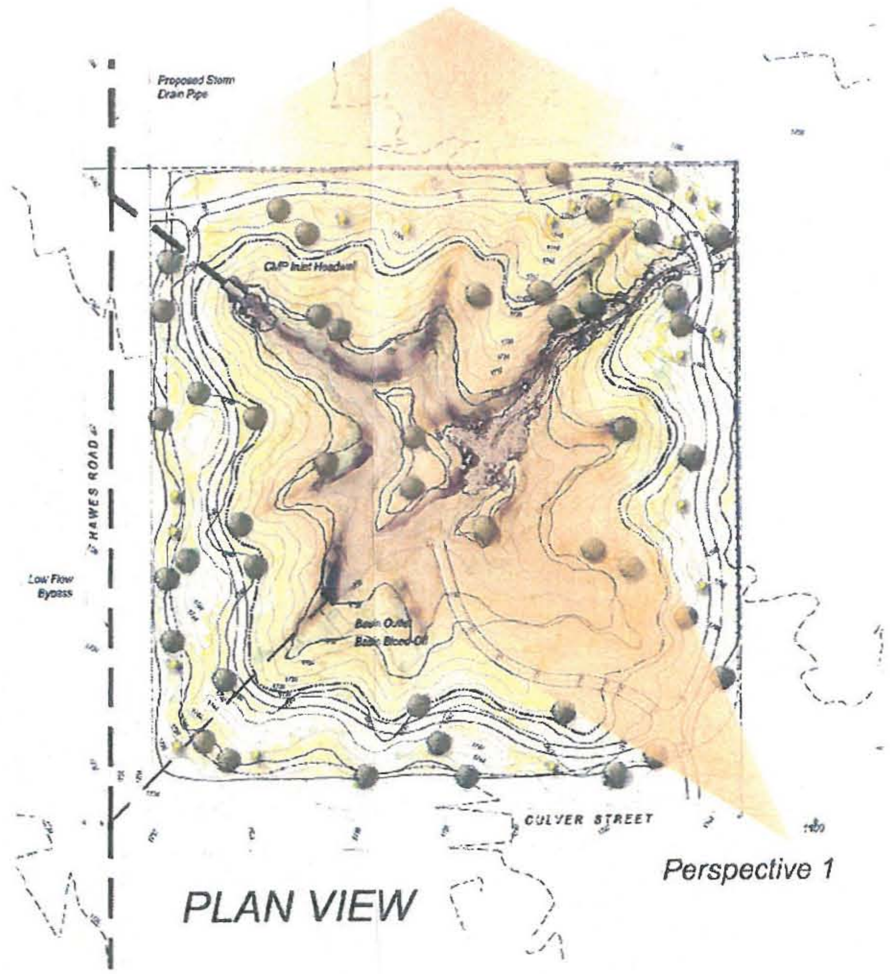
Section B

PLATE 20

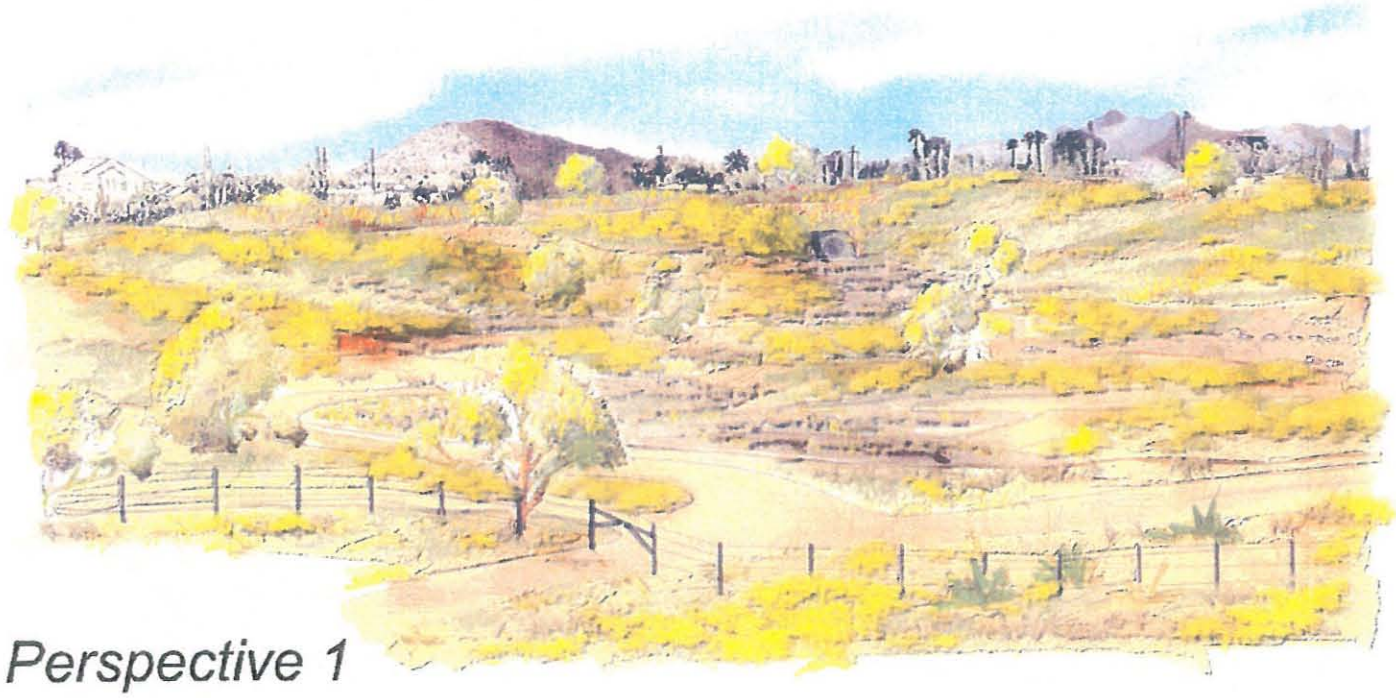
Conceptual Basin Perspectives

Culver Hawes Basin

Conceptual Basin Perspectives



PLAN VIEW



Perspective 1

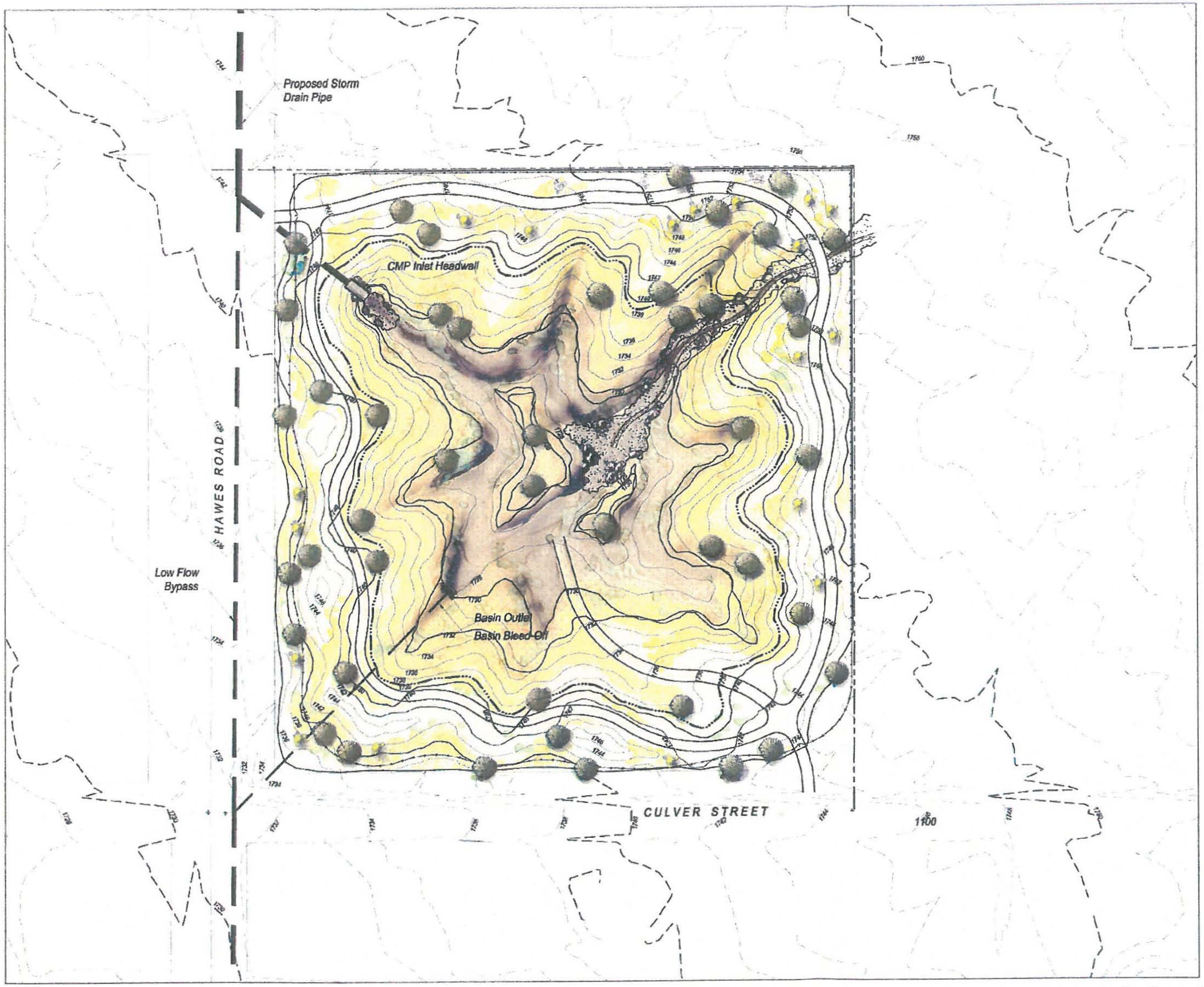
Perspective2

April 2005

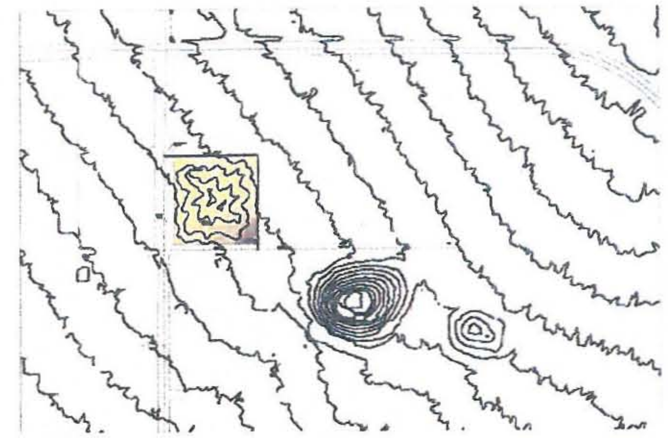
PLATE 20

Culver Hawes Basin

Conceptual Planting



Site Area



Local Area Scale 1" = 600'-0"

Basin Hydroseed

	Grass Hydroseed Mix	1.76 acres
	Shrub Hydroseed Mix	5.80 acres
	Salvaged Saguaro	21
	Tall Pot Tree (Palo Verde, Mesquite, or Ironwood)	45

Legend

- Water Surface Elevation
- Proposed Index Contour
- Proposed Intermediate Contour
- Existing Index Contour
- Existing Intermediate Contour
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- Property Line
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- Proposed Straight Wire Fence

Flood Control District of Maricopa County

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April 2005

PLATE 16.3

PLATE 12

Hydrology