LEVEL ‘A’ PLANNED COMMUNITY
TECHNICAL REPORT

FOR

SANTOLINA LEVEL ‘A’
MASTER PLAN

DRAINAGE (STORMWATER)
MASTER PLAN

AUGUST 26, 2013

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I. INTRODUCTION

The Santolina Level 'A' Master Planned Community (Santolina) is a large scale master planned development located south of Interstate 40 (I-40), and west of the Rio Grande River, in the County of Bernalillo, New Mexico.

The Santolina Planned Community Level 'A' Master Plan (the "Santolina Master Plan") covers approximately 13,700 acres of land owned by Western Albuquerque Land Holdings (WALH). Santolina is located on the Southwest Mesa and is generally bounded by I-40 to the north, the Atrisco Terrace open space and the area around 118th Street on the east, Pajarito Mesa on the south, and the natural escarpment separating this property from the Rio Puerco Valley on the west.

The Santolina Plan area has been the subject of prior planning efforts, but this property has never been covered by an approved master plan. All of the lands in the Santolina Master Plan are located outside the municipal boundaries of the City of Albuquerque within the Southwest Planning Area of Bernalillo County. The existing zoning of the property is primarily County A-1, with some parcels near I-40 and Central Avenue having C-1 and M-1 zoning.

This Level 'A' Master Plan follows the Planned Community Criteria as adopted and amended by the Board of County Commission in 2012. The Level 'A' Master Plan is accompanied by a simultaneous request for Planned Community Zoning that is defined within this Master Plan. In accordance with County process, future Level 'B' and Level 'C' master plans will be required to develop the property. These plans will supply detailed development information and will refine or perhaps modify the guidelines of this conceptual master plan report.

"The Santolina Community is envisioned to have 38,810 residential units at full build-out; a potential population of 95,472, approximately 77,301 jobs, 2.0 jobs per household, and over 3,000 acres of parks and open space."

The Santolina development provides opportunities for creative and inventive drainage management solutions given the uniqueness of the site. Santolina is expected to develop in a way that embraces naturalistic, context sensitive infrastructure engineering to create a sustainable community.

This report is a supplemental technical report to the "Level 'A' Santolina Master Plan" submitted to the County Planning Department, under Planned Community Criteria guidelines.
Level 'A' guidelines call for the stormwater master plan to provide "a drainage strategy for management and maintenance of watersheds and floodplains."

The primary goal of this Level 'A' Stormwater Management Plan is to provide framework for future development of Santolina. Specifically, major goals include:

- Provide conceptual guidance to future Level 'B' master plans and Level 'C' site development plan submittals within Santolina.
- Protect undeveloped and developed property, both onsite and downstream offsite, from flooding in the 100-year and smaller storm events.
- Provide sustainable engineering approaches for trunk and site-level infrastructure, for the control, conveyance, storage and discharge of stormwater.
- Improve water quality by the use of stormwater retention and detention facilities.
- Shallow groundwater recharge and landscaping passive irrigation by the use of water harvesting techniques.
- Provision of co-located recreational, open space and multi-purpose water storage opportunities.

County and other appropriate jurisdictions must approve all future Level 'B' master plans or Level 'C' site development plan submittals which deviate from the guidelines presented herein.

A. METHODOLOGY

The Santolina development area was divided into appropriate drainage basins related to the existing topography and anticipated use of the land. The onsite project area analysis includes approximately 13,700 acres of developable acreage, road rights-of-way, public open space, parks, and stormwater facilities. There are also major offsite basins included in this analysis. Hydrologic modeling was performed using Arid Lands Hydrologic Model (AHYMO), as detailed within the City of Albuquerque's Design Process Manual (DPM), Section 22.2. This model has been adopted by all local authorities responsible for design and management of storm water facilities including Bernalillo County, Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) and the Federal Emergency Management Agency (FEMA). Santolina falls within the jurisdictions of all of these agencies responsible for protection of the public and design of public drainage infrastructure.

PRECIPITATION. The 100-year, 6-hour storm event was selected as the design event to calculate all peak flows. The 100-year, 10-day or 24-hour storms were selected as the
design events to calculate the runoff volume used to design retention/detention facilities throughout the site. Specifically, the 100-year, 24-hour storm event will be used for detention calculations, while the 100-year, 10-day storm event will be used for retention calculations. Rainfall values for the study were provided from the City of Albuquerque’s Development Process Manual. Rainfall depths for the 2-year, 5-year, and 100-year storm events are shown in Table 1 below.

<table>
<thead>
<tr>
<th>Table 1 – Rainfall Data</th>
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<tbody>
<tr>
<td>STORM EVENT (YR)</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>100</td>
</tr>
</tbody>
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The 100-year, 10-day storm event volume was determined in this report by converting the 6-hour storm event volume into the 10-day storm event volume per equation a-9 from the City of Albuquerque’s DPM, Section 22.2.

**LAND TREATMENTS.** Land treatments related to the amount of pervious and impervious area within the developed watershed were assigned based on land treatments specified in the DPM. These methods are widely accepted for hydrologic analyses in the region. Table 2 shows land treatment percentages relative to land use type based on zoning categories.

<table>
<thead>
<tr>
<th>Table 2 – Land Treatments by Land Use Category, Developed Condition</th>
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<tbody>
<tr>
<td>%A</td>
</tr>
<tr>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Residential, N=4.5 DU/AC</td>
</tr>
<tr>
<td>Commercial</td>
</tr>
<tr>
<td>Industrial/Energy</td>
</tr>
<tr>
<td>Open Space (Mesa)</td>
</tr>
<tr>
<td>Open Space (Escarments)</td>
</tr>
<tr>
<td>Urban Center**</td>
</tr>
<tr>
<td>Mobile Home Park</td>
</tr>
</tbody>
</table>

*Land treatment percentages specified by criteria in the City of Albuquerque's Development Process Manual (DPM)*

**Percentages are based on an assumed mix of uses in an urban center, including commercial, park, school, multi-family, etc.
SEDIMENT BULKING. Sediment bulking parameters for the existing conditions were established from the "West I-40 Drainage Management Plan (DMP)," prepared by Bohannan Huston on June 29, 2000. Basins on the mesa top used factors from the Amole Watershed, while the remaining basins in the escarpment areas used factors from Dam 9 of the Ladera Ponds, East of Paseo del Volcan as stated in the report. These factors were applied due to the areas having similar characteristics, such as terrain and slope. The bulking factors from the "West I-40 Drainage Management Plan (DMP)" are shown for the 2-year, 10-year and 100-year storm events. The 10-year bulking factors will be applied to calculate the 5-year storm events as shown later in this report. Please see Table 3 for bulking factors for existing and proposed conditions.

<table>
<thead>
<tr>
<th>Table 3 – Bulking Factors</th>
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<tr>
<td></td>
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<tr>
<td>EXISTING BASINS</td>
</tr>
<tr>
<td>MESA TOP BASINS</td>
</tr>
<tr>
<td>ESCARPMENT BASINS</td>
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<tr>
<td>DEVELOPED BASINS</td>
</tr>
</tbody>
</table>

* Used 10-Year Bulking Factor as established in the West I-40 DMP

II. EXISTING CONDITIONS

A. GENERAL

Currently, Santolina lies in a substantially undeveloped condition, used primarily for cattle grazing and related activities, with the land being vegetated by sparse grasses and shrubs. Sporadic developed properties lie within or around Santolina, including an Air Force facility, an AT&T facility, the Tierra West manufactured home community, the Metropolitan Detention Center, the Speedway facility and multiple small commercial developments along the I-40 South Frontage Road (Central Avenue extension).

These developed properties generally release their flows at pre-development levels, or retain flows on their own lands. None of the properties are known to be damaging single point (concentrated) flow contributors to the historic drainage patterns. There are many existing FEMA floodplains in the site; please refer to the Floodplains figure.

B. ONSITE

The Stormwater Management Plan, Existing Conditions figure, graphically portrays the existing drainage basins and major flow paths that impact Santolina in today's primarily undeveloped condition. The tables on the figure further provide the information from
hydrologic analysis of these basins. There are numerous, existing drainage crossings along Atrisco Vista and Dennis Chavez Blvd., with the larger concrete box culverts (CBC’s) being shown in the Existing Conditions figure.

CLOSED BASINS. A majority of the Santolina site is located on a mesa top with escarpments located along the east and west boundaries. Large portions of the project area comprise of drainage basins that are fully contained within the mesa top (i.e., do not discharge to the Rio Grande River). These basins are referred to as ‘closed basins’ because all storm water runoff that is produced within the basin is also contained within the basin limits, within existing large natural land depressions. Runoff from offsite basins north of I-40 are also contained by these existing natural depressions. These closed basins are identified as existing Basins B, C, H, M and Offsite Basins A & B.

The table on the Existing Conditions figure reveals that the existing natural depressions of these closed basins have sufficient existing volume to fully capture the large storm events of this study (100-yr, 10-day event). In most cases, much greater volume in the depressions is available than the volume generated in the design storm event, as indicated by the analysis. Accordingly, these large drainage basins can be considered as if they never drain to the Rio Grande River. On the Floodplain figure, FEMA has graphically identified these depressions as “closed floodplains”.

RIO PUERCO BASINS. A small portion of the site, existing Basin A, discharges westerly into the Rio Puerco watershed.

BASINS DISCHARGING TO THE SOUTH. Existing Basins D, E, F and I all free discharge southerly to the adjacent property (the Pajarito Grant lands). Eventually, most if not all of this drainage discharge flows eventually into the Rio Grande River.

BASINS DISCHARGING EASTERLY TO THE RIO GRANDE. The remaining basins, existing Basins G, K, L, M, N, O, P and Offsite Basin C, are conveyed easterly down the escarpment to existing drainage facilities. These facilities include the AMAFCA’s Westgate Dam, Borrega Dam and Don Felipe Dam, AMAFCA’s Powerline Channel and North Borrega Channel, Bernalillo County’s Rio Bravo Channel and currently private Powerline Ponds (ultimately to be maintained by the City of Albuquerque).

C. OFFSITE

As stated in the "West I-40 Drainage Management Plan (DMP) Update," prepared by Bohannan Huston on December 21, 2006, all flows north of Offsite Basin C, will be diverted east into the I-40 conveyance system. The remaining flow south of that diversion, north of I-40, namely Offsite Basin C, will follow historic paths and ultimately discharge into the
Westgate Dam. The remaining offsite basins north of I-40, Offsite Basins A and B, are part of closed basins and are fully or partially contained by multiple existing natural depressions.

Flows that are not retained in offsite existing natural depressions (north of I-40) discharge into Santolina via existing drainage structures that cross I-40. Those flows combine with onsite flows and are retained onsite by existing natural depressions, as described in the previous “Onsite” subsection.

III. DEVELOPED CONDITIONS

A. GENERAL

The Stormwater Management Plan, Developed Conditions figure graphically portrays the proposed stormwater management guidelines for the Santolina master planned community. In a sustainable and ecologically beneficial manner, the plan provides for continuation of the existing and historic stormwater characteristics of the Santolina property, including:

- Continued onsite retention of ‘developed condition’ stormwater, as generated in the existing closed basins.
- Continued discharge of ‘developed condition’ stormwater to the south (Pajarito Land Grants), but at historic flow rates (or less) and frequencies.
- Continued discharge of ‘developed condition’ stormwater to the Rio Grande or Rio Puerco, from the escarpment areas, via historic flow paths and existing drainage facilities, but at historic flow rates (or less) and frequencies.

The Developed Conditions figure shows the basins, drainage conveyances, detention and retention facilities proposed for the fully developed condition of Santolina. The tables further show the data inputs used for watershed modeling and the resulting runoff rates and volumes generated by the 2-yr, 5-yr and 100-yr frequency storms.

In compliance with this master plan, it is anticipated that all future Level ‘B’ master plans and Level ‘C’ site development plans will provide unique stormwater solutions that meet the Level ‘A’ goal of sustainable and ecological development.

To this end, where practical, future development plans in Santolina are guided wherever practical toward the drainage goals and criteria of Low Impact (or Light Imprint) Development (LID). This design concept includes:
- Water Harvesting
- Engineered Natural Drainage Conveyances
- Engineered Naturalistic Drainage Storage
- Water Quality

Water harvesting techniques shall be utilized where practical throughout Santolina, particularly in the non-single family residential land uses. On a site by site basis, rainwater harvesting approaches should be employed and capable of storing runoff volumes typically from the 2-year, 24-hour storm event (approximately 1" of initial rainfall). Water harvesting techniques include small shallow ponds, swales or depressions in the site landscaping, cisterns, generally adjacent to developed site areas (i.e., parking lots, park areas, etc.), and more. High density urban development should be considered for reduced or modified application of these water harvesting principles to reflect development constraints.

Water harvesting will act as a clarifier by removing suspended solids (often floatable debris), prior to being transported to the major stormwater systems within Santolina and ultimately the River. Water shall pass through ponds or swales at rates slow enough to drop out silt and sediment. This strategy treats the early site runoff that carries higher concentrations of pollutants. Ponding or slowing down stormwater onsite from these smaller higher frequency storm events also permits beneficial use by landscape, wildlife and native vegetation, while allowing the water to infiltrate the soil. Larger storm events are allowed to pass through or around these ponds and be conveyed downstream by appropriate public drainage facilities.

OPEN SPACE. Designated 'open space' areas on the land use master plan will be largely undisturbed lands. Minor passive uses will be permitted in a manner that does not contribute to erosion or excessive concentrated runoff.

FEMA FLOODPLAINS. As shown on the Floodplains figure, several Federal Emergency Management Agency (FEMA) floodplains exist on Santolina. Upon development in the drainage basin that affects these floodplains, formal floodplain modification approvals must be sought from FEMA and approved by the County.

B. STORMWATER MANAGEMENT PLAN

DRAINAGE MANAGEMENT WITHIN CLOSED BASINS. Developing lands that are contained within existing closed basins boundaries will have their developed runoff conveyed to permanent drainage storage (retention) facilities, in keeping with historic drainage patterns. Other than evaporation and infiltration, there is no designed discharge from these
retention facilities. This concept is similar to that employed by the Mesa del Sol community and permitted by the State Engineer's Office.

These facilities can be referred to as 'stormwater retention facilities' and will retain the 100-year, 10-day storm event. These retention facilities will generally consist of:

- Large deep earthen lined (and often landscaped) ponds
- Mild sides of typically 3:1 maximum slopes
- Aesthetically designed piping system inlets (with water quality and energy dissipation features)
- Infiltration basins to minimize/eliminate standing water
- Recreational and open space opportunities
- Naturalistic engineering design (grading, contoured edges, etc.)
- Multi-purpose water storage

The retention facilities are generally recommended to be placed in and coordinated with large, open space areas and parks, and may also include other active and passive recreational uses, such as playgrounds, benches, trails and sports fields. Due to the relatively even terrain of Santolina and the large size requirements of these retention facilities, it is probable that final design of the facilities will incorporate a series of smaller, connected retention facilities which, from a total volume standpoint, serve as one large ponding facility. The retention ponds, provided that required volumes are attained, may be placed anywhere within the closed basins area.

While not strictly applicable to 'retention ponds' of Santolina, the State Engineer's Office criteria requiring dams to discharge in 96 hours is applied to the onsite retention ponds as a logical goal for discharge of standing ponded stormwater. A time-to-discharge goal to substantially empty (not fully) the retention ponds is desirable for safety, aesthetic, mosquito control and other public nuisance reasons. Discharge is typically accomplished through infiltration, evaporation, evapotranspiration and other means.

Please refer to Developed Conditions figure for tables which identify the volume requirements of the 'engineered natural retention facilities' and basin flows and volumes. The retention facilities are assumed at a depth of 10' at this time, for illustration purposes, but this may vary depending on final design conditions.

Note that Offsite Basins A and B are cut off from draining across I-40 via proposed retention ponding sites, located just upstream of I-40. Since these lands are also owned by the developer of Santolina, appropriate easements and construction permits can be obtained.
when required. The 96 hour discharge goal, described above, is also applicable to these offsite retention ponds.

**DRAINAGE MANAGEMENT IN BASINS DISCHARGING SOUTH.** Runoff from the mesa top basins that discharge to adjacent lands south of the site shall be managed at minimum by providing stormwater detention facilities just prior to the stormwater’s departure from Santolina, i.e., the downstream terminus of the drainage basin. The Developed Conditions figure identifies the several large basins that discharge in a southerly manner. These ‘detention’ facilities are functionally ‘dams’ and will generally be comprised of the following key elements:

- Large detention ponding volume, as required to reduce the dam’s outflow to historic discharge rates, or lower.
- Volumes are determined by 100-yr, 24-hr storm event analysis.
- Dam detention volumes are restricted to under 50 acre feet and embankment heights under 25’, which will place the dams under AMAFCA jurisdiction.
- Full retention of small storm events (5-yr, 24-hr).
- Carefully designed outlet structures to minimize adverse erosion impacts to downstream undeveloped properties.
- Recreational and open space opportunities.
- Naturalistic engineering design (grading, contoured edges, etc.).

For both economic and sustainable design purposes, these detention facilities will generally be designed to include retention of up to the 5-year, 24-hour storm unbulked volume (while detaining and releasing the 100-year, 24-hour bulked drainage volume). This design element is provided to:

- Allow some permanent stormwater capture for increased protection of downstream natural drainage systems (from increased frequency of flows from developed lands)
- Minimization of future downstream drainage infrastructure
- Downstream water quality enhancement (by permanently holding the runoff of smaller, more frequent storm events which tend to carry more development pollutants and debris)
- Shallow groundwater recharge
This approach captures and retains only those drainage flows, from the smaller storms or the initial portion of larger storm events that do not historically reach the river. These "retained" flows represent the initial capture of rainfall by the existing undeveloped natural soil surfaces (vegetative capture, depressions, etc.), whereby reducing or eliminating excess runoff flows from the land to the drainage arroyos. All runoff exceeding this historic 'initial capture' is discharged to the River.

The Developed Conditions figure provides a table with runoff volumes for several storm events. The 5-year, 24 hour storm event is selected from the table to represent the historic "initial capture" for the following reasons:

- The hydrologic analysis demonstrates minimal or no excess runoff from this 5-yr storm event, and so most closely represents the single storm event of the initial capture phenomenon.
- The "Quail Ranch, Phase One Conceptual Infrastructure Analysis Report," prepared by Bohannan Huston on January 26, 2005 and reviewed with the OSE, has similar site characteristics (location, vegetation, soil type and terrain) and had recommended this 5-yr storm event based on a hydrologic analysis that showed no runoff is produced, under existing natural conditions by storm events less than or equal to the 5-year event.
- The 5-year storm event is a widely used standard and available data set for use in these hydrologic calculations.

Sediment storage volume will also be factored into the design of these detention facilities, typically to be a three year sediment volume (but to be coordinated with AMAFCA).

Dam outfall structures (principal spillways) will preserve existing downstream drainage ways and will be achieved by limiting the discharge that leaves Santolina to at or below historic conditions. To achieve this, a key feature of these detention facilities will be the design of a principal spillway outfall that will allow (a) historic runoff flowrates, or less, (b) to be discharged from the dams in a manner that most closely mimics the historic or existing condition.

The Developed Conditions figure also portrays additional supplemental stormwater management concepts within the basins, upstream of the primary detention dams. These 'intermediate' detention facilities, including potential conveyances (channels, etc.), are shown conceptually only and will be refined in future Level 'B' and 'C' development submittals to the
County. These intermediate structures will minimize the size of the primary dams and conveyances downstream by reducing the peak flows be managed.

**DRAINAGE MANAGEMENT IN BASINS DISCHARGING OFF THE ESCARPMENTS.**

Stormwater runoff from a developed Santolina impacts both escarpments and both river systems.

The site drainage basin discharging to the westerly Rio Puerco escarpment is proposed for open space in the land use master plan. Accordingly, no stormwater facilities are proposed for this minimally impacted escarpment area.

Runoff from Santolina’s mesa top area that discharges off the easterly escarpment will eventually drain to the Rio Grande River. Stormwater runoff draining easterly will be managed by both existing and proposed drainage facilities. The Proposed Conditions figure shows proposed stormwater detention dams for many of the Santolina development areas which lie on the easterly escarpment. This approach then is similar to that proposed for the Santolina drainage basins which discharge southerly to the Pajarito Land grant area and one may refer to that section for more information.

Of particular note for the easterly escarpment is the incised Amole Arroyo system. Both the east and west branches of this large arroyo cut deeply through the easterly escarpment. Both arroyo branches are natural arroyos for most of their lengths, but are affected in minor ways by existing development drainage discharges in their drainage basins. The arroyos drain to the AMAFCA Westgate Dam facility, an existing dam located at the east boundary of Santolina. The dam is further described in a following section. With development of Santolina, due to the greater and more frequent drainage flows, sandy bottom arroyo conditions and steep hydraulic slopes, it is anticipated that the existing natural arroyos will needed to be channelized in order to avoid severe erosive impacts. If channelization is required by future Level ‘B’ master plans, naturalistic design measures should be employed to include the use of tinted concrete, soil cement, side-only embankments with soft (sandy) bottom, and other light impact techniques.

In part due to the very large size of the Santolina master plan area, the analysis results and infrastructure portrayed in this Master Plan illustratively show large single point facilities to manage drainage, i.e., a large detention dam serving an entire drainage basin. It is hoped and anticipated that future Level ‘B’ and ‘C’ development submittals will refine this high level conceptual view to more specific stormwater management proposals. In this refinement, stormwater management tools can be distributed more broadly across drainage basins and reduced in size and visual impact to the community.
The following paragraphs provide discussion and data regarding some of the key existing AMAFCA drainage facilities and drainage basin plans serving Santolina.

**WESTGATE DAM.** AMAFCA’s Westgate Dam lies essentially within the Santolina master plan boundary. It is an existing earthen dam facility, providing an inflow volume of 347 acre feet, and accepts an estimated 2418 cfs inflow in the large storm event, and discharges 80 cfs through its principal spillway outlet structure (see Appendix B). With the diversion of flows north of I-40, as stated in the “West I-40 Drainage Management Plan (DMP) Update,” the drainage basin area that discharges into the Westgate Dam has been significantly decreased and the Dam may hold excess capacity at this time. The Developed Conditions figure shows only a minor increase in basin area (over the Existing Conditions) discharging to Westgate Dam. Future submittals of Level ‘B’ master plans may find opportunity to increase the extent of developed basins that drain to the Westgate Dam. Alternatively, and/or simultaneously, the Dam may be considered for additional uses, such as recreational or water quality purposes. Development within the Westgate Dam upstream basins may require additional analysis and modeling of the Westgate Dam drainage system to ensure that the Westgate Dam is capable of managing the developed flows and any other uses that may be envisioned. This additional analysis will be completed in future Level ‘B’ technical master drainage plans and reports, as required.

Due to the steeper terrain in the westerly Westgate Dam basins and a significant amount of flow, engineered natural arroyos and/or buried large diameter pipe or similar, will be essential to convey flows within the westerly Westgate Dam basins. Final recommendation for drainage management facilities within the Westgate Dams shall be refined in greater detail in the future Level ‘B’ and Level ‘C’ reports. The basins that contribute to the Westgate Dam are Basins G & I and Offsite Basin C.

**DON FELIPE DAM.** Azul Village lies in the extreme southeast corner of Santolina. Within Azul Village, proposed Basin N covers the northern portion of the basin area that discharges into AMAFCA’s Don Felipe Dam. The “Drainage Management Plan for Don Felipe Dam,” prepared by Bohannan Huston in July 2011, provides options on how to mitigate the increase of flows created by developing areas upstream of the Dam. When development occurs within Basin N, drainage management plans shall comply with the options recommended in that report. Santolina proposes to comply with the DMP option that places upland (intermediate) detention ponds, which are to be designed to reduce the peak flow to historic levels into the Dam, without modifying the current geometry of the Dam.

Drainage management in Basins J and L, shall mirror the drainage planning of basins that discharge south off the site (see previous “Drainage Management in Basins Discharging South” section). In brief review, drainage management facilities shall be placed in these basins to retain the 5-year, 24-hour volume, while detaining the 100-year, 24-hour storm volume. Preservation of existing downstream facilities east of the project site shall also be achieved by limiting the discharge flow rate that leaves the site to be at or below historic conditions.

The privately maintained Powerline Ponds are currently designed as retention ponds but as development occurs, the ponds will need to be expanded to be detention ponds in fully developed conditions as described in the “Amole-Hubbell Drainage Management Plan.” Once these improvements are made, the City of Albuquerque will then maintain the ponds.

BORREGA DAM. The Borrega Dam was a proposed alternative when the “Amole-Hubbell Drainage Management Plan” was completed in 1999. Since then, the Borrega Dam has been designed and constructed. Basin M of Santolina lies within the western portion of the basin areas that discharges into the Borrega Dam. Flows from this basin enter the AMAFCA maintained North Borrega Channel and are routed east to the Borrega Dam. Stormwater management facilities, as previously discussed, will be used to retain the 5-year, 24-hour volume storm event, while detaining the 100-year, 24-hour volume event. Runoff from the basin that discharges off of the site shall be at or below historic conditions and be compliant with the drainage requirements of the Borrega Dam.

The “Amole-Hubbell Drainage Management Plan” is currently being updated by AMAFCA to compile all modifications within the plan area, such as the addition of the Borrega Dam and other improvements. As development occurs within this area, drainage management design shall comply with the updated “Amole-Hubbell Drainage Management Plan.”
IV. OPERATION AND MAINTENANCE

The stormwater infrastructure of Santolina will primarily consist of several major elements that will require maintenance and operational management attention:

- The closed basin retention ponding system, including the retention ponds, landscaping, recreational uses, water quality and infiltration devices.
- The detention ponding system, including the detention ponds, embankments, landscaping, recreational uses, water quality and infiltration devices, and required right-of-way.
- The public stormwater infrastructure system, including the underground drainage pipes and open channels (with appurtenances) street drainage infrastructure, landscaping, recreational uses, and required right-of-way.

The County of Bernalillo is anticipated to manage the public stormwater infrastructure and closed basin ponding systems. These systems will serve large areas of the community and will be located in public right-of-way and are suitable, therefore, for public ownership, operation and maintenance. The County will oversee the studies, design and construction of these facilities.

It is anticipated that AMAFCA will own, operate and maintain the large detention dams proposed in south and east discharging basins of Santolina. AMAFCA will therefore oversee the studies, design and construction of these facilities. Westgate Dam will continue to be an active AMAFCA facility.

A maintenance agreement or covenant may be required with the County and AMAFCA for all drainage facilities and infrastructure that are proposed to allow other secondary uses, including landscaping, parks, playgrounds, sports fields, trails, etc. The agreement would define operational and maintenance responsibilities for all elements anticipated within the facility. Generally, only the strictly drainage-related aspects of the facilities will be maintained by the County or AMAFCA.

Future Level 'B' and Level 'C' master planning and final design of the integrated stormwater system is required to refine the drainage management concepts and jurisdictional elements.
V. PHASING

The Developed Conditions, 2035 Projected Development Plan figure portrays stormwater infrastructure potentially required for the Santolina 2035 Projected Development Plan Master Plan area, estimated to be fully developed in approximately 2035. The plan illustratively shows the fully developed 2035 Projected Development Plan Stormwater infrastructure; however, this infrastructure itself will in actuality be phased in and implemented over time. Final infrastructure phasing scenarios will depend on and be presented with future Level 'B' and 'C' plans.

VI. SUMMARY

Stormwater management master planning within the Santolina Master Planned Community reveals the opportunity for uniquely engineered naturalistic systems that address water harvesting, water quality enhancement, mitigation of erosion potential, recreational and open space opportunities and beneficial use of storm water for wildlife, open space and native vegetation.

Santolina strives to preserve the pre-development hydrologic history and to integrate natural drainage approaches into a modern sustainable community environment in the developed condition.

This technical report is provided in support of the Level 'A' master plan submitted to County of Bernalillo Planning Department. It establishes a Level 'A' master plan framework for the management of storm runoff within Santolina. Future Level 'B' master plans and Level 'C' site development plans will refine this conceptual level framework to best fit the more detailed master plans of future County submittals.
FIGURES

FIGURE 1 – EXISTING CONDITIONS
FIGURE 2 – TOPOGRAPHY WITH AERIAL IMAGERY AND MASTER PLAN OVERLAID
FIGURE 3 – FLOODPLAIN MAP
FIGURE 4 – DEVELOPED CONDITIONS
FIGURE 5 – DRAINAGE DETENTION FACILITY CONCEPT
FIGURE 6 – 2035 PROJECTED DEVELOPMENT PLAN DEVELOPED CONDITIONS
FIGURE 1 – EXISTING CONDITIONS
<table>
<thead>
<tr>
<th>BASIN</th>
<th>AREA</th>
<th>LAND TREATMENT</th>
<th>TIME OF CONCENTRATION (HOURS)</th>
<th>PEAK FLOW 100 YR - 6 HR (CFS)</th>
<th>PEAK FLOW 2 YR - 24 HR (AC-FT)</th>
<th>PEAK FLOW 100 YR - 24 HR (AC-FT)</th>
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* All 5 storm events are calculated using bulked factors except for the 5 YR - 24 HR storm event which is unbulkled.
FIGURE 2 – TOPOGRAPHY WITH AERIAL IMAGERY AND MASTER PLAN OVERLAID
FIGURE 2: EXISTING TOPOGRAPHY

NOTES:
1. A 20' CONTOUR INTERVAL IS DISPLAYED
2. AERIAL IMAGERY IS SPRING 2010 ORTHOPHOTOGRAPHY
3. EXISTING TOPOGRAPHY IS APPROXIMATE AND ILLUSTRATIVE, SUBJECT TO CHANGE
FIGURE 3: EXISTING FLOODPLAINS

LEGEND

- EXISTING FEMA FLOOD PLAINS (TYE)
- EXISTING NATURAL DEPRESSION (DEFINED BY CONTOUR MAPS)

NOTES:

1. 100-YEAR FLOOD (1% CHANCE OF OCCURRENCE IN ONE YEAR) PLAIN LIMITS ARE SHOWN.
FIGURE 4 – DEVELOPED CONDITIONS
FIGURE 4:
STORMWATER MANAGEMENT MASTER PLAN

DEVELOPED CONDITIONS

NOTES:

1. WITH DEVELOPMENT OF BASINS B AND C, FLOW ACROSS 140 FROM OFFSITE BASINS A AND B WOULD BE CUTOFF AND RETAINED UPSTREAM OF 140 (IE, WITHIN THE OFFSITE BASINS RESPECTIVELY).

2. STORMWATER FACILITIES ARE APPROXIMATE AND ILLUSTRATIVE, SUBJECT TO CHANGE.

3. THE INTERMEDIATE DETENTION / RETENTION FACILITIES AND HIGH FLOW CONVEYANCE FACILITIES ARE ILLUSTRATIVE ONLY. WITH CREATIVE USE OF OPEN SPACE CORRIDORS AND PARKS, IT IS ANTICIPATED THAT FUTURE LEVEL "B" REPORTS WILL MINIMIZE THE NUMBER OF THESE LARGE FACILITIES.

4. CONVEYANCE FACILITIES (SUCH AS ABOVE GROUND CHANNELS) WILL BE DESIGNED AS ENGINEERED NATURAL ARROYOS WITH MULTIPURPOSE USES.

5. STORMWATER MANAGEMENT FACILITIES LOCATED ON THE SOUTH BOUNDARY ARE DESIGNED TO DETAIN THE 100-yr 24-HR STORM WHILE DISCHARGING HISTORIC PEAK FLOW OFFSITE.

LEVEL A MASTER PLAN
ANTIGUA LAND COMPANY

Prepared by:
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302 Eights Street SW
Albuquerque, NM 87102

Bohanon-Huston, Inc.
Courtland 1, 7330-04 Avenue NE
Albuquerque, NM 87109-0020

JANUARY 7, 2013
FIGURE 5 – DRAINAGE DETENTION FACILITY CONCEPT
FIGURE 5: SANTOLINA OUTFALL DRAINAGE DETENTION FACILITY CONCEPT
NOT TO SCALE
FIGURE 6 – 2035 PROJECTED DEVELOPMENT PLAN DEVELOPED CONDITIONS
FIGURE 6: STORMWATER MANAGEMENT MASTER PLAN

2035 PROJECTED DEVELOPMENT PLAN

DEVELOPED CONDITIONS

NOTES:

1. WITH DEVELOPMENT OF BASINS B AND C, FLOW ACROSS 160 FROM OPPOSITE BASINS A AND D WILL BE CUT OFF AND RETAINED UPSTREAM OF 160 (IE, WITHIN THE OFFSET BASINS RESPECTIVELY).

2. STORMWATER FACILITIES ARE APPROXIMATE AND ILLUSTRATIVE, SUBJECT TO CHANGE.

3. THE INTERMEDIATE DETENTION / RETENTION FACILITIES AND HIGH FLOW CONVEYANCE FACILITIES ARE ILLUSTRATIVE ONLY. WITH CREATIVE USE OF OPEN SPACE CORRIDORS AND PARKS, IT IS ANTICIPATED THAT FUTURE LEVEL "B" REPORTS WILL MINIMIZE THE NUMBER OF THESE LARGE FACILITIES.

4. CONVEYANCE FACILITIES SUCH AS ABOVE GROUND CHANNELS WILL BE DESIGNED AS ENGINEERED NATURAL ARROYOS WITH MULTI-PURPOSE USES.

5. STORMWATER MANAGEMENT FACILITIES LOCATED ON THE SOUTH BOUNDARY ARE DESIGNED TO DETAIN THE 100-YR 24-HR STORM WHILE DISCHARGING HISTORIC PEAK FLOW OFFSITE.

LEVEL A MASTER PLAN
ANTIGUA LAND COMPANY

Prepared by:
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Bohannan Huston, Inc.
Conxdesign 1700dffice NE
Albuquerque, NM 87120-4350

JANUARY 7, 2013
APPENDICES

APPENDIX A – AHYMO INPUT AND SUMMARY FILES
APPENDIX B – EXCERPTS OF RELATED AREA DMP’S
  • WESTGATE DAM
  • AMOLE HUBBEL DMP
  • DON FELIPE DAM
  • BORREGA DAM

APPENDIX C – REQUEST FOR CONCURRENCE
   LETTER FROM THE OFFICE OF THE
   STATE ENGINEER
APPENDIX A – AHYMO INPUT AND SUMMARY FILES
COMPUTE LT TP
LCODE=1 N=0 ISLOPE=1
LENGTH=13980 FT SLOPE=0.02 k=3
K=0.03 CENTROID DISTANCE=6500 FT

COMPUTE LM HYD
ID=7 HYD=EI.0 AREA=0.2565 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

PRINT HYD
ID=7 CODE=1

------------------------------

COMPUTE LT TP
LCODE=1 N=0 ISLOPE=1
LENGTH=20980 FT SLOPE=0.017 k=3
K=0.03 CENTROID DISTANCE=6000 FT

COMPUTE LM HYD
ID=8 HYD=EI.1 AREA=1.0894 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

PRINT HYD
ID=8 CODE=1

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COMPUTE LT TP
LCODE=1 N=3 ISLOPE=1
LENGTH=400 FT SLOPE=0.021 k=3
LENGTH=1600 FT SLOPE=0.021 k=2
LENGTH=5700 FT SLOPE=0.021 k=3
K=0.03 CENTROID DISTANCE=3000 FT

COMPUTE LM HYD
ID=9 HYD=EI.1 AREA=1.6586 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

PRINT HYD
ID=9 CODE=1

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COMPUTE LT TP
LCODE=1 N=2 ISLOPE=1
LENGTH=400 FT SLOPE=0.017 k=3
LENGTH=700 FT SLOPE=0.017 k=2

COMPUTE LM HYD
ID=10 HYD=EX.2 AREA=0.0259 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

PRINT HYD
ID=10 CODE=1

------------------------------

COMPUTE LT TP
LCODE=1 N=0 ISLOPE=1
LENGTH=400 FT SLOPE=0.079 k=3
LENGTH=6000 FT SLOPE=0.029 k=3
K=0.03 CENTROID DISTANCE=3400 FT

COMPUTE LM HYD
ID=11 HYD=EX.K AREA=1.0531 PER A=50.0 PER B=50.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

PRINT HYD
ID=11 CODE=1

------------------------------

COMPUTE LT TP
LCODE=1 N=3 ISLOPE=1
LENGTH=400 FT SLOPE=0.076 k=3
LENGTH=1600 FT SLOPE=0.076 k=2
LENGTH=8000 FT SLOPE=0.076 k=3
K=0.03 CENTROID DISTANCE=2500 FT

COMPUTE LM HYD
ID=12 HYD=EX.K AREA=0.6219 PER A=50.0 PER B=50.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

PRINT HYD
ID=12 CODE=1

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COMPUTE LT TP
LCODE=1 N=3 ISLOPE=1
LENGTH=400 FT SLOPE=0.015 k=3
LENGTH=1600 FT SLOPE=0.015 k=2
LENGTH=3600 FT SLOPE=0.015 k=3
K=0.03 CENTROID DISTANCE=2500 FT

COMPUTE LM HYD
ID=13 HYD=EX.K AREA=1.1844 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

PRINT HYD
ID=13 CODE=1

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COMPUTE LT TP
LCODE=1 N=3 ISLOPE=1
LENGTH=400 FT SLOPE=0.059 k=3
LENGTH=1600 FT SLOPE=0.059 k=2
LENGTH=4000 FT SLOPE=0.059 k=3
K=0.03 CENTROID DISTANCE=4000 FT

COMPUTE LM HYD
ID=14 HYD=EX.K AREA=0.6047 PER A=50.0 PER B=50.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

PRINT HYD
ID=14 CODE=1
**COMPUTE LT TP**
L Code=1, NC=3, ISLOPE=1
LENGTH=400 FT SLOPE=0.054 K=1
LENGTH=1600 FT SLOPE=0.054 K=2
LENGTH=5500 FT SLOPE=0.054 K=3
RE=0.03 CENTROID DISTANCE=1300 FT

**COMPUTE RN HYD**
REN=15 HYD=EX.0 AREA=0.9494 PER A=0.00, PER B=0.00
PER C=0.00 PER D=0.00 TP=0.00 RAINFALL=0.0

**PRINT HYD**
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LENGTH=1600 FT SLOPE=0.04 K=2
LENGTH=6500 FT SLOPE=0.04 K=3
RE=0.01 CENTROID DISTANCE=1300 FT

**COMPUTE RN HYD**
REN=16 HYD=EX.P AREA=0.9313 PER A=0.00, PER B=0.00
PER C=0.00 PER D=0.00 TP=0.00 RAINFALL=0.0

**PRINT HYD**
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LENGTH=400 FT SLOPE=0.00 K=1
LENGTH=1600 FT SLOPE=0.00 K=2
LENGTH=5500 FT SLOPE=0.00 K=3
RE=0.03 CENTROID DISTANCE=1300 FT

**COMPUTE RN HYD**
REN=17 HYD=EX.OFF.A AREA=1.6375 PER A=10.00, PER B=0.00
PER C=0.00 PER D=0.00 TP=0.00 RAINFALL=0.0

**PRINT HYD**
ID=17 CODE=1

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L Code=1, NC=3, ISLOPE=1
LENGTH=18700 FT SLOPE=0.009 K=3
RE=0.03 CENTROID DISTANCE=1300 FT

**COMPUTE RN HYD**
REN=18 HYD=EX.OFF.B AREA=0.4607 PER A=100.00, PER B=0.00
PER C=0.00 PER D=0.00 TP=0.00 RAINFALL=0.0

**PRINT HYD**
ID=18 CODE=1

**COMPUTE LT TP**
L Code=1, NC=3, ISLOPE=1
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LENGTH=1600 FT SLOPE=0.011 K=2
LENGTH=3600 FT SLOPE=0.011 K=3

**COMPUTE RN HYD**
REN=19 HYD=EX.OFF.C AREA=1.5125 PER A=60.00, PER B=35.00
PER C=0.00 PER D=15.00 TP=0.00 RAINFALL=0.0

**PRINT HYD**
ID=19 CODE=1

**FINISH**
ANKHO PROGRAM (ANKHO.S7) -
VERSION: 1997.02c
RUN DATE (MON/DAY/YEAR) = 11/26/2012
START TIME (HOURS:mm) = 09:39:47
USER NO. = ANKHO-S-5702c180hannu-AH
INPUT FILE = ZEK.6.HYM

** PROJECT NAME: SAMOTOLINA
** DATE: NOVEMBER 8, 2012
** INPUT FILE NAME: ZEK.6.HYM
** OUTPUT FILE NAME: ZEK.6.OUT
** PROJECT NUMBER: 20130236
** COMMENTS: 2 YEAR-5 HOUR STORM

## START TIMES
** TIME=0.0 HR PITCH CODE=0
** RAINFALL TYPE=3 RAIN QUARTER=0.0
** RAIN ONE=0.81 IN RAIN TWO=0.95 IN
** RAIN DAY=1.15 IN ET=0.33333

---

** COMPUTED 6-HOUR RAINFALL SEQUENCE BASED ON NMD ABLATE 3 - PEAK AT 1.40 HR.
** DT = .033333 HOURS END TIME = 5.099940 HOURS

---

** COMPUTE BASINS IN SAMOTOLINA - EXISTING CONDITION

---

** SEDIMENT BULK FACTOR FOR 2 VR STORM IS 0 FOR BOTH MESA AND ESCARPMENT BASIN
** SEDIMENT BULK CODE=1 BULK FACTOR=0.0

---

** BASIN EX.A ***************

** COMPUTE LT TP LCODE=1 HR=3 ISLOPE=1
** LENGTH=460 FT SLOPE=0.05 K=1
** LENGTH=1600 FT SLOPE=0.05 K=2
** LENGTH=4600 FT SLOPE=0.05 K=3

** TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

---

** SCS UPLAND METHOD FACTORS
** SHEET FLOW PORTION LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
** SHALLOW FLOW PORTION 1600.0 0.050000 2.00000
** CHANNEL FLOW PORTION 400.0 0.050000 1.00000
** TOTAL BASIN 2400.0 0.050000 1.80000

** TIME OF CONCENTRATION (HRS)= 1.0656 TIME TO PEAK (HRS)= 1.104 LAG TIME (HRS)= 1.1242

** TIME TO PEAK COMPUTED TO BE LESS THAN 0.123333 HOUR MINIMUM VALUE.
** REVISED VALUES: TIME OF CONCENTRATION (HRS)= 2.000 TIME TO PEAK (HRS)= 1.333 LAG TIME (HRS)= 1.500

** COMPUTE NH HYD ID=1 HYD-EX.A AREA=0.5438 PER A=0.0 PER B=50.0
** PER A=50.0 PER B=0.0 HYDRI=0 RAINFALL=1

** TIME TO PEAK (HRS)= 1.333

---

** K = 1.683994 TP = 3.933334 K/T P=1.274935 SHAPE CONSTANT, N = 2.857743
** UNIT PEAK X = 110.12 CFS UNIT VOLUME Y = .9959 B = 170.01 PE = .81025
** AREA = .5438 INCHES X = 54.3800 Y = 1.0461 INCHES PER HOUR
** RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = 0.33333

** PRINT HYD ID=1 CODE=1

** HYDROGRAPH FROM AREA EX.A
** RUNOFF VOLUME = 0.5334 INCHES = 1.5470 ACRE-FEET
** PEAK DISCHARGE RATE = 19.83 CFS AT 1.533 HOURS BASIN AREA = .5438 SQ. MI.

---

Page 1
**BASIN EX.B**

**COMPUTE LT TP**  
**CODE=1**  
**NC=3**  
**ISLOPE=1**  
**LENGTH=400 FT**  
**SLOPE=0.005**  
**LENGTH=1600 FT**  
**SLOPE=0.005**  
**LENGTH=5500 FT**  
**SLOPE=0.005**  
**K=1**  
**K=0.03**  
**CENTRIDE DISTANCE=2100 FT**

**TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

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**TIME OF CONCENTRATION (HRS)=**  
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**TIME TO PEAK (HRS)=**  
**0.4380**  
**LAG TIME (HRS)=**  
**0.4927**

**COMPUTE NH HYD**  
**ID=2**  
**HYD EX.B**  
**AREA=2.9109**  
**PER A=100.0**  
**PER B=0.0**  
**PER C=0.0**  
**PER D=0.0**  
**TP=0.0**  
**RAINFALL=1**

**TIME TO PEAK (HRS)=**  
**0.4380**

**K = 0.59354**  
**CPH = 1.62**  
**TPH = 0.95**  
**INF = 1.67**

**UNIT PEAK = 0.363**  
**UNIT VOLUME = 0.126**  
**INF = 0.126**

**AREA = 2.9109**  
**INCHES**

**Runoff Volume = 0.000600**  
**Peek Discharge Rate = 0.00 CFS AT -0.033 HOURS**  
**BASIN AREA = 2.9109 SQ. MI.**

---

**BASIN EX.C**

**COMPUTE LT TP**  
**CODE=1**  
**NC=3**  
**ISLOPE=1**  
**LENGTH=400 FT**  
**SLOPE=0.01**  
**LENGTH=1600 FT**  
**SLOPE=0.01**  
**LENGTH=2200 FT**  
**SLOPE=0.01**  
**K=0.03**  
**CENTRIDE DISTANCE=500 FT**

**TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

<table>
<thead>
<tr>
<th>LENGTH (FT)</th>
<th>SLOPE (FT/FT)</th>
<th>COMPOSITE K</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHEET FLOW PORTION</td>
<td>1000.0</td>
<td>0.03000</td>
</tr>
<tr>
<td>SHALLOW FLOW PORTION</td>
<td>1600.0</td>
<td>0.03000</td>
</tr>
<tr>
<td>CHANNEL FLOW PORTION</td>
<td>2200.0</td>
<td>0.03000</td>
</tr>
<tr>
<td>TOTAL BASIN</td>
<td>4200.0</td>
<td>0.03000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LAG EQUATION FACTORS</th>
<th>Kmh</th>
<th>TOTAL BASIN LENGTH (FT)</th>
<th>TOTAL BASIN SLOPE (FT/FT)</th>
<th>CENTRIDE LENGTH (FT)</th>
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</thead>
<tbody>
<tr>
<td>PERIOD 0.00</td>
<td>0.03000</td>
<td>4200.0</td>
<td>0.010000</td>
<td>500.0</td>
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**TIME OF CONCENTRATION (HRS)=**  
**0.5302**  
**TIME TO PEAK (HRS)=**  
**0.3901**  
**LAG TIME (HRS)=**  
**0.3826**

**COMPUTE NH HYD**  
**ID=3**  
**HYD EX.C**  
**AREA=1.3750**  
**PER A=100.0**  
**PER B=0.0**  
**PER C=0.0**  
**PER D=0.0**  
**TP=0.0**  
**RAINFALL=1**

**TIME TO PEAK (HRS)=**  
**0.3401**

**K = 0.44236**  
**TP = 0.4100**  
**INF = 0.1200**

**UNIT PEAK = 0.355**  
**UNIT VOLUME = 0.080**  
**INF = 0.080**

**AREA = 1.3750**  
**SQ. INCHES**

**Runoff Volume = 0.000600**  
**Peek Discharge Rate = 0.00 CFS AT -0.033 HOURS**  
**BASIN AREA = 1.3750 SQ. MI.**

---

**BASIN EX.D**

**COMPUTE LT TP**  
**CODE=1**  
**NC=3**  
**ISLOPE=1**  
**LENGTH=400 FT**  
**SLOPE=0.003**  
**LENGTH=1600 FT**  
**SLOPE=0.003**  
**LENGTH=4700 FT**  
**SLOPE=0.003**  
**K=0.03**  
**CENTRIDE DISTANCE=3500 FT**

**TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

TIME TO PEAK (HRS)= .4665
K = .06399HR  TR = .46881HR K/TR RATIO = 1.300000 SHAPE CONSTANT, N = 2.756220
UNIT PEAK = 554.55  CPS UNIT VOLUME = 1.000  B = 261.30  PEO = 81000
AREA = 1.70470 SQ. MI  IA = -65000 INCHES INF = 1.67000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = .033333

PRINT HYD  ID=6  CODE=1

RUNOFF VOLUME = .000000 INCHES = .0000 ACRE- FEET
PEAK DISCHARGE RATE = .00 CFS AT -.033 HOURS BASIN AREA = 1.7047 SQ. MI.

******************************************************************************
#******************************************************************************
#******************************************************************************

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS:  KN = .0900 TOTAL BASIN LENGTH (FT)= 13300.0
TOTAL BASIN SLOPE (FT/FT)= .002600 CENTROID LENGTH (FT)= .63000.

TIME OF CONCENTRATION (HRS)= .0932 TIME TO PEAK (HRS)= .4621 LAG TIME (HRS)= .5900

COMPLETE HYD  ID=7  CODE=1

RUNOFF VOLUME = .000000 INCHES = .0000 ACRE- FEET
PEAK DISCHARGE RATE = .00 CFS AT -.033 HOURS BASIN AREA = 2.2625 SQ. MI.

******************************************************************************
#******************************************************************************
#******************************************************************************

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS:  KN = .0300 TOTAL BASIN LENGTH (FT)= 20160.0
TOTAL BASIN SLOPE (FT/FT)= .017000 CENTROID LENGTH (FT)= .66000.

TIME OF CONCENTRATION (HRS)= .8560 TIME TO PEAK (HRS)= .5560 LAG TIME (HRS)= .6235

COMPLETE HYD  ID=8  CODE=1

RUNOFF VOLUME = .000000 INCHES = .0000 ACRE- FEET
PEAK DISCHARGE RATE = .00 CFS AT -.033 HOURS BASIN AREA = 4.5969 SQ. MI.

******************************************************************************
#******************************************************************************
#******************************************************************************

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS:  KN = .0030 TOTAL BASIN LENGTH (FT)= 40000 FT
TOTAL BASIN SLOPE (FT/FT)= .002500 CENTROID LENGTH (FT)= .9000.

TIME OF CONCENTRATION (HRS)= .5560 TIME TO PEAK (HRS)= .5560 LAG TIME (HRS)= .5560

COMPLETE HYD  ID=9  CODE=1

RUNOFF VOLUME = .000000 INCHES = .0000 ACRE- FEET
PEAK DISCHARGE RATE = .00 CFS AT -.033 HOURS BASIN AREA = 4.5969 SQ. MI.
TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

<table>
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<tr>
<th>LENGTH (FT)</th>
<th>SLOPE (FT/FT)</th>
<th>COMPOSITE K</th>
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</thead>
<tbody>
<tr>
<td>SHEET FLOW VORTION</td>
<td>400.0</td>
<td>.021000</td>
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<td>SHEALLOW FLOW VORTION</td>
<td>5900.0</td>
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<td>CHANNEL FLOW VORTION</td>
<td>7500.0</td>
<td>.034000</td>
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<tr>
<td>TOTAL BASIN</td>
<td>7700.0</td>
<td>.021000</td>
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</tbody>
</table>

LAG EQUATION FACTORS: K = 0.0300 TOTAL BASIN LENGTH (FT) = 7700.0
TOTAL BASIN SLOPE (FT/FT) = 0.021000 CENTERLINE LENGTH (FT) = 3000.0

TIME OF CONCENTRATION (HRS) = 0.445 TIME TO PEAK (HRS) = 0.296 TIME LAG (HRS) = 0.333

COMPUTE NH HYD ID-9 HYD=EX.1 AREA = 1.6069 PER A =100.0 PER B = 0.0 PER C = 0.00 PER D = 0.0 TP = 0.0 RAINFALL = 1

TIME TO PEAK (HRS) = 0.296

K = 0.385245H1 TP = 0.02934H1 K/TP RATIO = 1.50000 SHAPE CONSTANT, N = 2.756290
UNIT PEAK = 689.3 CFS UNIT VOLUME = 0.9899 B = 2.0193 P = 0.0000
AREA = 1.0965 SQ MI IA = 0.0833 INCHES INCH = 1.07000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD = DT = 0.033333

PRINT HYD ID=9 CODE=1

HYDROGRAPH FROM AREA EX.1

RUNOFF VOLUME = 0.000000 INCHES = 0.0000 ACRE-FEET PEAK DISCHARGE RATE = 0.00 CFS AT = 0.033 HOURS BASIN AREA = 1.6069 SQ. MI.

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

*-------------------------------------------------------------* BASIS EX.3 ***************

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*-------------------------------------------------------------* BASIS EX.3 ***************

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*-------------------------------------------------------------* BASIS EX.3 ***************

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*-------------------------------------------------------------* BASIS EX.3 ***************

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*-------------------------------------------------------------* BASIS EX.3 ***************

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*-------------------------------------------------------------* BASIS EX.3 ***************

*************************************************************************
REVISED VALUES: TIME OF CONCENTRATION (HRS)= .7000 TIME TO PEAK (HRS)= .1333 LAG TIME (HRS)= .1500

COMPUTE NN HYD ID=21 HYD=EX.K AREA=1.0931 PER A=50.0 PER B=50.0 PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

TIME TO PEAK (HRS)= .1333

K = .173333HR TP = .133333HR K/TP RATIO = 1.300000 SHAPE CONSTANT, N = 2.755220 UNIT PEAK = 1963.0 CPS UNIT VOLUME = .0084 B = 261.30 P60 = .81000 AREA = 1.093100 SQ MI YA = .575000 INCHES INF = 1.460000 INCHES PER HOUR RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=21 CODE=1

HYDROGRAPH FROM AREA EX.K

RUNOFF VOLUME = .000000 INCHES = .000000 ACRE- FEET PEAK DISCHARGE RATE = .05 CPS AT -.033 HOURS BASIN AREA = 1.0931 SQ. MI.

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COMPUTE LT TP LCON=1 NK=3 ISLOPE=1
LENGTH=600 FT SLOPE=0.076 K=1
LENGTH=600 FT SLOPE=0.076 K=2
LENGTH=800 FT SLOPE=0.076 K=3

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
SHEET FLOW PORTION 400.0 .076000 1.00000
SHALLOW FLOW PORTION 1600.0 .076000 1.00000
CHANNEL FLOW PORTION 800.0 .076000 1.00000
TOTAL BASIN 2400.0 .076000 1.00000

TIME OF CONCENTRATION (HRS)= .7478 TIME TO PEAK (HRS)= .0985 LAG TIME (HRS)= .1108

TIME TO PEAK COMPUTED TO BE LESS THAN 0.133333 HOUR MINIMUM VALUE

REVISED VALUES: TIME OF CONCENTRATION (HRS)= .7000 TIME TO PEAK (HRS)= .1333 LAG TIME (HRS)= .1500

COMPUTE NN HYD ID=12 HYD=EX.L AREA=0.6219 PER A=50.0 PER B=50.0 PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

TIME TO PEAK (HRS)= .1333

K = .173333HR TP = .133333HR K/TP RATIO = 1.300000 SHAPE CONSTANT, N = 2.755220 UNIT PEAK = 1218.8 CPS UNIT VOLUME = .0094 B = 261.30 P60 = .81000 AREA = .621900 SQ MI YA = .575000 INCHES INF = 1.460000 INCHES PER HOUR RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=12 CODE=1

HYDROGRAPH FROM AREA EX.L

RUNOFF VOLUME = .000000 INCHES = .000000 ACRE-FEET PEAK DISCHARGE RATE = .00 CPS AT -.033 HOURS BASIN AREA = .6219 SQ. MI.

==========================================================================================================

==========================================================================================================

COMPUTE LT TP LCON=1 NK=3 ISLOPE=1
LENGTH=600 FT SLOPE=0.015 K=1
LENGTH=1600 FT SLOPE=0.015 K=2
LENGTH=1600 FT SLOPE=0.015 K=3
KN=0.03 CENTRIFUGAL DISTANCE=2500 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
SHEET FLOW PORTION 540.0 .015000 2.00000
SHALLOW FLOW PORTION 1600.0 .015000 2.00000
CHANNEL FLOW PORTION 540.0 .015000 2.00000
TOTAL BASIN 5460.0 .015000 2.3243

LAG EQUATION FACTORS: KN= .0300 TOTAL BASIN LENGTH (FT)= 5400.0
TOTAL BASIN SLOPE (FT/FT)= .015000 CENTRIFUGAL LENGTH (FT)= 2500.0

TIME OF CONCENTRATION (HRS)= .4414 TIME TO PEAK (HRS)= .2942 LAG TIME (HRS)= .3310

COMPUTE NN HYD ID=33 HYD=EX.M AREA=1.1844 PER A=100.0 PER B=0.0 PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

TIME TO PEAK (HRS)= .2942

K = .382516HR TP = .294243HR K/TP RATIO = 1.300000 SHAPE CONSTANT, N = 2.755220 UNIT PEAK = 2.2428 CPS UNIT VOLUME = .009999 B = 261.30 P60 = .81000 AREA = 1.184400 SQ MI YA = .650000 INCHES INF = 1.460000 INCHES PER HOUR RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=33 CODE=1
RUNOFF VOLUME = .00000 INCHES = .0000 ACRE-FOOT
PEAK DISCHARGE RATE = .00 CFS AT -.033 HOURS BASIN AREA = 1.1844 SQ. MI.

***********************************************************
** BASKIN EX.N ***********************************************************
***********************************************************

ACCOUNTING:

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

<table>
<thead>
<tr>
<th>Sheet Flow Portion</th>
<th>Slope (ft/ft)</th>
<th>Composite K</th>
</tr>
</thead>
<tbody>
<tr>
<td>400.0</td>
<td>.09600</td>
<td>1.0000</td>
</tr>
<tr>
<td>1600.0</td>
<td>.36400</td>
<td>2.0000</td>
</tr>
<tr>
<td>6000.0</td>
<td>.90600</td>
<td>3.0000</td>
</tr>
</tbody>
</table>

LAG EQUATION FACTORS:

| K = 0.0600 | TOTAL BASIN LENGTH (ft) = 6000.0 |
| TOTAL BASIN SLOPE (ft/ft) = 0.02000 |

TIME OF CONCENTRATION (HRS) = .2598  TIME TO PEAK (HRS) = .1993  LAG TIME (HRS) = .2242

COMPUTE NH HYD

| ID=14 HYDEXN.AREA=0.6047  PER A=50.0  PER B=50.0  PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=-1 |

TIME TO PEAK (HRS) = .1993

K = .75507HAR  TP = .195290HR  K/TP RATIO = 1.300000  SHAPE CONSTANT, N = 2.755220
UNIT PEAK = 792.87 CFS  UNIT VOLUME = .9997  PDI = .261 00  PRI = .91000
AREA = .650700 SQ MI  IA = .57500 INCHES  IMP = .14000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .03333

PRINT HYD

| ID=34 CODE=1 |

HYDROGRAPH FROM AREA EX.N

RUNOFF VOLUME = .00000 INCHES = .0000 ACRE-FOOT
PEAK DISCHARGE RATE = .00 CFS AT -.033 HOURS BASIN AREA = .6047 SQ. MI.

***********************************************************
** BASKIN EX.O ***********************************************************
***********************************************************

ACCOUNTING:

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

<table>
<thead>
<tr>
<th>Sheet Flow Portion</th>
<th>Slope (ft/ft)</th>
<th>Composite K</th>
</tr>
</thead>
<tbody>
<tr>
<td>400.0</td>
<td>.09600</td>
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<td>1600.0</td>
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<tr>
<td>6000.0</td>
<td>.90600</td>
<td>3.0000</td>
</tr>
</tbody>
</table>

LAG EQUATION FACTORS:

| K = 0.0600 | TOTAL BASIN LENGTH (ft) = 7500.0 |
| TOTAL BASIN SLOPE (ft/ft) = 0.03000 |

TIME OF CONCENTRATION (HRS) = .3649  TIME TO PEAK (HRS) = .2433  LAG TIME (HRS) = .7377

COMPUTE NH HYD

| ID=31 HYDEXO.AREA=0.9484  PER A=50.0  PER B=50.0  PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=-1 |

TIME TO PEAK (HRS) = .2433

K = .31625HR  TP = .193290HR  K/TP RATIO = 1.650000  SHAPE CONSTANT, N = 2.755220
UNIT PEAK = 1018.6 CFS  UNIT VOLUME = .6909  PDI = .262 99  PRI = .81000
AREA = .948000 SQ MI  IA = .57500 INCHES  IMP = .14000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .03333

PRINT HYD

| ID=35 CODE=1 |

HYDROGRAPH FROM AREA EX.O

RUNOFF VOLUME = .00000 INCHES = .0000 ACRE-FOOT
PEAK DISCHARGE RATE = .00 CFS AT -.033 HOURS BASIN AREA = .9484 SQ. MI.
**SCS UPLAND METHOD FACTORS**

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Sheet Flow Portion Length</td>
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<tr>
<td>Sheet Flow Portion Slope</td>
<td>0.00400000</td>
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<tr>
<td>Shallow Flow Portion Length</td>
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</tr>
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<td>Shallow Flow Portion Slope</td>
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<tr>
<td>Channel Flow Portion Length</td>
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<tr>
<td>Total Basin</td>
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<tr>
<td>Total Basin Slope (ft/ft)</td>
<td>0.040000</td>
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</tbody>
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**Lag Equation Factors:**

- Kn = 0.0300
- Total Basin Length (ft) = 8000.0
- Total Basin Slope (ft/ft) = 0.040000
- Centroid Length (ft) = 3700.0

**Time of Concentration (hrs) = 0.4236**

**Time to Peak (hrs) = 0.2824**

**Lag Time (hrs) = 0.3177**

**Compute NH HYD**

<table>
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<tbody>
<tr>
<td>ID = 36</td>
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<tr>
<td>HYD = EX.OFF.P</td>
<td></td>
</tr>
<tr>
<td>Area = 0.9313 sq mi</td>
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<tr>
<td>Peak Discharge Rate = .00000000 acres-ft</td>
<td>.00000000 acre-ft</td>
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<tr>
<td>Rainfall = 1.4596</td>
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**Print HYD**

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<th>Parameter</th>
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<td>ID = 17</td>
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<tr>
<td>CODE = 1</td>
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<tr>
<td>Hydrograph from Area Ex.Off.A</td>
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**SCS UPLAND METHOD FACTORS**

<table>
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<tr>
<th>Component</th>
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<tbody>
<tr>
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<tr>
<td>Sheet Flow Portion Slope</td>
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<tr>
<td>Shallow Flow Portion Length</td>
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<tr>
<td>Shallow Flow Portion Slope</td>
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<tr>
<td>Channel Flow Portion Length</td>
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<tr>
<td>Channel Flow Portion Slope</td>
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<td>Total Basin</td>
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<tr>
<td>Total Basin Slope (ft/ft)</td>
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**Lag Equation Factors:**

- Kn = 0.0900
- Total Basin Length (ft) = 31300.0
- Total Basin Slope (ft/ft) = 0.009000
- Centroid Length (ft) = 8400.0

**Time of Concentration (hrs) = 0.6843**

**Time to Peak (hrs) = 0.4596**

**Lag Time (hrs) = 0.5171**

**Compute NH HYD**

<table>
<thead>
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<tbody>
<tr>
<td>HYD = EX.OFF.B</td>
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<tr>
<td>Area = 1.4575 sq mi</td>
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</tr>
<tr>
<td>Peak Discharge Rate = .00000000 acres-ft</td>
<td>.00000000 acre-ft</td>
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<tr>
<td>Rainfall = 1.4596</td>
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**Print HYD**

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<th>Value</th>
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<td>ID = 17</td>
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<tr>
<td>CODE = 1</td>
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<tr>
<td>Hydrograph from Area Ex.Off.B</td>
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**SCS UPLAND METHOD FACTORS**

<table>
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<tr>
<td>Sheet Flow Portion Length</td>
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<tr>
<td>Sheet Flow Portion Slope</td>
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<tr>
<td>Shallow Flow Portion Length</td>
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<tr>
<td>Shallow Flow Portion Slope</td>
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<td>Channel Flow Portion Length</td>
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<tr>
<td>Channel Flow Portion Slope</td>
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</tr>
<tr>
<td>Total Basin</td>
<td>113700.0</td>
</tr>
<tr>
<td>Total Basin Slope (ft/ft)</td>
<td>0.009000</td>
</tr>
</tbody>
</table>

**Lag Equation Factors:**

- Kn = 0.0160
- Total Basin Length (ft) = 18700.0
- Total Basin Slope (ft/ft) = 0.021834
- Centroid Length (ft) = 9350.0

**Print HYD**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tbody>
<tr>
<td>ID = 17</td>
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<tr>
<td>CODE = 1</td>
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<td>Hydrograph from Area Ex.Off.Off.B</td>
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**SCS UPLAND METHOD FACTORS**

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<tr>
<td>Sheet Flow Portion Slope</td>
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<tr>
<td>Shallow Flow Portion Length</td>
<td>18700.0</td>
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<td>Shallow Flow Portion Slope</td>
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<tr>
<td>Total Basin</td>
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<tr>
<td>Total Basin Slope (ft/ft)</td>
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</table>

**Lag Equation Factors:**

- Kn = 0.0160
- Total Basin Length (ft) = 18700.0
- Total Basin Slope (ft/ft) = 0.021834
- Centroid Length (ft) = 9350.0

**Print HYD**

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**SCS UPLAND METHOD FACTORS**

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**Lag Equation Factors:**

- Kn = 0.0160
- Total Basin Length (ft) = 18700.0
- Total Basin Slope (ft/ft) = 0.021834
- Centroid Length (ft) = 9350.0

**Print HYD**

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</table>
TIME OF CONCENTRATION (HRS) = .4645  TIME TO PEAK (HRS) = .3097  LAG TIME (HRS) = .3444

COMPUTE NH HYD  ID=18  HYD=EX.OFF.C  AREA=0.4,6078  PER A=100.0  PER B=0.0
PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=-1

TIME TO PEAK (HRS) = .3097

K = .4035661HR  TP = .309651HR  K/TP RATIO = 1.30000  SHAPE CONSTANT, N = 2.756220
UNIT PEAK = 388.83 CFS  UNIT VOLUME = .9999  B = 161.30  PDP = .51000
AREA = .650600 SQ FT  IA = .650600 INCHES  INF = 1.67000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD  ID=18  CODE=1

HYDROGRAPH FROM AREA EX.OFF.C

RUNOFF VOLUME = .000000 INCHES  .000000 ACRE-FT
PEAK DISCHARGE RATE = .00 CFS AT .033 HOURLS  BASIN AREA = .4608 SQ. MI.

COMPUTE LT TP  LCCDE=1  NN=3  ISLOPE=-1
LENGTH=400 FT  SLOPE=0.011  K=1
LENGTH=1500 FT  SLOPE=0.011  K=2
LENGTH=1500 FT  SLOPE=0.011  K=3

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SEE UPLAND METHOD FACTORS

SHEET FLOW PORTION  LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K

SHALLOW FLOW PORTION  1600.0  .011000  1.06000
CHANNEL FLOW PORTION  1600.0  .011000  1.06000
TOTAL BASIN  3200.0  .011000  1.06000

TIME OF CONCENTRATION (HRS) = .4591  TIME TO PEAK (HRS) = .3097  LAG TIME (HRS) = .3443

COMPUTE NH HYD  ID=18  HYD=EX.OFF.C  AREA=1.1225  PER A=60.0  PER B=11.0
PER C=10.0  PER D=13.0  TP=0.0  RAINFALL=-1

TIME TO PEAK (HRS) = .3060

K = .399351HR  TP = .30605HR  K/TP RATIO = .782893  SHAPE CONSTANT, N = 4.587825
UNIT PEAK = 291.34 CFS  UNIT VOLUME = 1.000  B = 291.34  PDP = .61000
AREA = .726675 SQ FT  IA = .726675 INCHES  INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION INFILTRATION NUMBER METHOD - DT = .033333

K = .394119HR  TP = .30605HR  K/TP RATIO = 1.287763  SHAPE CONSTANT, N = 2.779197
UNIT PEAK = 315.30 CFS  UNIT VOLUME = .9999  B = 315.30  PDP = .61000
AREA = 1.286125 SQ FT  IA = 1.286125 INCHES  INF = 1.45700 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD  ID=18  CODE=1

HYDROGRAPH FROM AREA EX.OFF.C

RUNOFF VOLUME = .309499 INCHES  .8318 ACRE-FT
PEAK DISCHARGE RATE = 137.78 CFS AT 1.760 HOURLS  BASIN AREA = 1.5125 SQ. MI.

FINISH
NORMAL PROGRAM FINISH  END TIME (HR:MIN:SEC) = 09:39:48
**COMPUTE BASINS IN SANTOLNA - EXISTING CONDITION**

START

**R**AINFALL

**TYPE=2**  
**RAIN QUANTITY=0.0**  
**RAIN OUT=0.81 IN**  
**RAIN ST=0.95 IN**  
**RAIN D=1.15 IN**  
**D=0.003333**


---

**COMPUTE LT TP**

**LOAD=1**  
**MC=1**  
**ISLOPE=1**

**LENGTH=400 FT**  
**SLOPE=0.05**  
**K=1**

**LENGTH=1600 FT**  
**SLOPE=0.05**  
**K=2**

**LENGTH=400 FT**  
**SLOPE=0.05**  
**K=3**

**COMPUTE MN HYD**

**TN=4 HYD=EX.A ARE=0.3438 PER A=60.0 PER B=50.0**

**PER C=50.0 PER D=0.0 TP=0.0 RAINFALL=1**


---

**COMPUTE LT TP**

**LOAD=1**  
**MC=2**  
**ISLOPE=2**

**LENGTH=400 FT**  
**SLOPE=0.005**  
**K=1**

**LENGTH=1600 FT**  
**SLOPE=0.005**  
**K=2**

**LENGTH=3500 FT**  
**SLOPE=0.005**  
**K=3**

**K=0.03 CENTROID DISTANCE=2100 FT**

**COMPUTE MN HYD**

**TN=4 HYD=EX.B ARE=2.0149 PER A=120.0 PER B=60.0**

**PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1**


---

**COMPUTE LT TP**

**LOAD=1**  
**MC=1**  
**ISLOPE=1**

**LENGTH=400 FT**  
**SLOPE=0.01**  
**K=1**

**LENGTH=1600 FT**  
**SLOPE=0.01**  
**K=2**

**LENGTH=2500 FT**  
**SLOPE=0.01**  
**K=3**

**K=0.03 CENTROID DISTANCE=1500 FT**

**COMPUTE MN HYD**

**TN=4 HYD=EX.C ARE=1.3750 PER A=150.0 PER B=60.0**

**PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1**


---

**COMPUTE LT TP**

**LOAD=1**  
**MC=1**  
**ISLOPE=1**

**LENGTH=400 FT**  
**SLOPE=0.008**  
**K=1**

**LENGTH=1600 FT**  
**SLOPE=0.008**  
**K=2**

**LENGTH=5000 FT**  
**SLOPE=0.008**  
**K=3**

**K=0.03 CENTROID DISTANCE=3500 FT**

**COMPUTE MN HYD**

**TN=4 HYD=EX.D ARE=0.5317 PER A=200.0 PER B=60.0**

**PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1**


---

**COMPUTE LT TP**

**LOAD=1**  
**MC=1**  
**ISLOPE=1**

**LENGTH=400 FT**  
**SLOPE=0.006**  
**K=1**

**LENGTH=1600 FT**  
**SLOPE=0.006**  
**K=2**

**LENGTH=5000 FT**  
**SLOPE=0.006**  
**K=3**

**K=0.03 CENTROID DISTANCE=3500 FT**

**COMPUTE MN HYD**

**TN=3 HYD=EX.E ARE=2.4234 PER A=250.0 PER B=60.0**

**PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1**


---

**COMPUTE LT TP**

**LOAD=1**  
**MC=1**  
**ISLOPE=1**

**LENGTH=400 FT**  
**SLOPE=0.01**  
**K=1**

**LENGTH=1600 FT**  
**SLOPE=0.01**  
**K=2**

**LENGTH=5000 FT**  
**SLOPE=0.01**  
**K=3**

**K=0.03 CENTROID DISTANCE=3500 FT**

**COMPUTE MN HYD**

**TN=5 HYD=EX.F ARE=1.7047 PER A=300.0 PER B=60.0**

**PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1**

**COMPUTE LT TP**

**LOAD=1**  
**MC=1**  
**ISLOPE=1**

**LENGTH=400 FT**  
**SLOPE=0.01**  
**K=1**

**LENGTH=1600 FT**  
**SLOPE=0.01**  
**K=2**

**LENGTH=5000 FT**  
**SLOPE=0.01**  
**K=3**

**K=0.03 CENTROID DISTANCE=3500 FT**

**COMPUTE MN HYD**

**TN=6 HYD=EX.F ARE=1.7047 PER A=300.0 PER B=60.0**

**PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1**
**COMPUTE LT TP**
LCO=4, NK=3, ISLOPE=-1
LENGTH=600 FT SLOPE=0.054 K=1
LENGTH=1620 FT SLOPE=0.054 K=2
LENGTH=5520 FT SLOPE=0.054 K=3
RX=0.03 CENTROID DISTANCE=4320 FT

**COMPUTE HM HYD**
E=25 HYD=EX.O AREA=0.9464 PER A=50.0 PER B=50.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

**PRINT HYD**
ID=13 CODE=1

**COMPUTE LT TP**
LCO=1, NK=3, ISLOPE=-1
LENGTH=600 FT SLOPE=0.044 K=1
LENGTH=1620 FT SLOPE=0.044 K=2
LENGTH=6900 FT SLOPE=0.044 K=3
RX=0.03 CENTROID DISTANCE=3700 FT

**COMPUTE HM HYD**
E=16 HYD=EX.P AREA=0.9225 PER A=50.0 PER B=50.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

**PRINT HYD**
ID=16 CODE=1

**COMPUTE LT TP**
LCO=1, NK=3, ISLOPE=-1
LENGTH=600 FT SLOPE=0.009 K=1
LENGTH=9300 FT SLOPE=0.009 K=3
RX=0.03 CENTROID DISTANCE=4600 FT

**COMPUTE HM HYD**
E=17 HYD=EX.OFF.A AREA=1.0375 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

**PRINT HYD**
ID=17 CODE=1

**COMPUTE LT TP**
LCO=1, NK=3, ISLOPE=-1
LENGTH=18700 FT SLOPE=0.009 K=3
RX=0.03 CENTROID DISTANCE=8000 FT

**COMPUTE HM HYD**
E=18 HYD=EX.OFF.B AREA=0.46708 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

**PRINT HYD**
ID=18 CODE=1

**COMPUTE LT TP**
LCO=3, NK=3, ISLOPE=-1
LENGTH=400 FT SLOPE=0.011 K=1
LENGTH=1600 FT SLOPE=0.011 K=3

**COMPUTE HM HYD**
E=19 HYD=EX.OFF.C AREA=1.5225 PER A=60.0 PER B=15.0
PER C=20.0 PER D=35.0 TP=0.0 RAINFALL=-1

**PRINT HYD**
ID=19 CODE=1

**FINISH**
### 24-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 – PEAK AT 1:40 HR

DT = 0.03333 HOURS
END TIME = 19.956470 HOURS

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<td>0.000</td>
</tr>
<tr>
<td>0476</td>
<td>0.000</td>
</tr>
<tr>
<td>0480</td>
<td>0.000</td>
</tr>
<tr>
<td>0484</td>
<td>0.000</td>
</tr>
<tr>
<td>0488</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Page 1
**COMPUTE BASINS IN SANTOLINA - EXISTING CONDITION**

**COMPUTE LY TP**
- **CODE=1**
- **NW=3**
- **I=SLP=5**
- **LENGTH=490 FT**
- **SLOPE=0.01**
- **K=1**
- **LENGTH=1600 FT**
- **SLOPE=0.005**
- **K=2**
- **LENGTH=480 FT**
- **SLOPE=0.05**
- **K=3**

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

**SCS UPLAND METHOD FACTORS**
- **SHEET FLOW PORTION:** 400.0
- **SLOPE (FT/FT): 0.01000**
- **K=1.0000**
- **SHALLOW FLOOD PORTION:** 1500.0
- **CHANNEL FLOW PORTION:** 400.0
- **TOTAL BASIN:** 2400.0

**TIME OF CONCENTRATION (HRS):** 1.565
**TIME TO PEAK (HRS):** 1.164
**LAG TIME (HRS):** 0.324

**TIME TO PEAK COMPUTED TO BE LESS THAN 0.133333 HOUR, MINIMUM VALUE RECOMMENDED:**

**ADJUSTED VALUES: TIME OF CONCENTRATION (HRS):** 1.2000
**TIME TO PEAK (HRS):** 1.133
**LAG TIME (HRS):** 0.324

**COMPUTE NH HYD**
- **ID=1**
- **HYD=EX.A**
- **AREA=0.4058**
- **PEAK DISCHARGE RATE:** 88.63 CFS
- **PER C=50.0 PER D=0.0**
- **TP=1**
- **RAINFALL=3**

**TIME TO PEAK (HRS):** 0.324

**K = 0.16639**
**TP = 0.133333**
**K/TP RATIO = 1.2497**
**SHAPE CONSTANT, N = 2.81774**
**UNIT PEAK = 270.7 CFS**
**UNIT VOLUME = 0.9959**
**R = 270.7**
**IA = 0.4250**
**INF = 1.04000**
**INCHES PER HOUR**
**RUNOFF COMPUTED BY INITIAL AWTraction INFILTRATION METHOD**

**HYDROGRAPH FROM AREA EX.A**

**RUNOFF VOLUME = 0.0534 INCHES = 1.5470 ACRE-FOOT**
**PEAK DISCHARGE RATE:** 58.63 CFS
**AT 1.533 HOURS**
**BASIN AREA = 0.5438 SQ. MI.**

**COMPUTE LY TP**
- **CODE=1**
- **NW=3**
- **I=SLP=5**
- **LENGTH=490 FT**
- **SLOPE=0.005**
- **K=1**
- **LENGTH=1600 FT**
- **SLOPE=0.005**
- **K=2**
- **LENGTH=480 FT**
- **SLOPE=0.05**
- **K=3**
- **K=20**
- **CENTROID DISTANCE=200 FT**

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

**SCS UPLAND METHOD FACTORS**
- **SHEET FLOW PORTION:** 400.0
- **SLOPE (FT/FT): 0.00050**
- **K=3.0000**
- **SHALLOW FLOOD PORTION:** 1500.0
- **CHANNEL FLOW PORTION:** 5500.0
- **TOTAL BASIN:** 7500.0

**LAG EQUATION FACTORS:**
- **K = 0.090**
- **TOTAL BASIN LENGTH (FT):** 2750.0
- **TOTAL BASIN SLOPE (FT/FT):** 0.05000
- **CENTROID LENGTH (FT):** 2100.0

**TIME OF CONCENTRATION (HRS):** 0.659
**TIME TO PEAK (HRS):** 0.4380
**LAG TIME (HRS):** 0.4927

**COMPUTE NH HYD**
- **ID=2**
- **HYD=EX.B**
- **AREA=2.9109**
- **PER A=100.0 PER B=0.0**
- **PER C=50.0 PER D=0.0**
- **TP=0.0**
- **RAINFALL=1**

**TIME TO PEAK (HRS):** 0.492

**K = 0.59034**
**TP = 0.473955**
**K/TP RATIO = 1.2400000**
**SHAPE CONSTANT, N = 2.75620**
**UNIT PEAK = 273.8 CFS**
**UNIT VOLUME = 1.680**
**R = 263.10**
**IA = 0.0000 INCHES**
**INF = 1.067000**
**INCHES PER HOUR**
**RUNOFF COMPUTED BY INITIAL AWTraction INFILTRATION METHOD**

**HYDROGRAPH FROM AREA EX.B**

**RUNOFF VOLUME = 0.0080 INCHES = 0.0000 ACRE-FOOT**
**PEAK DISCHARGE RATE:** 0.0 CFS
**AT 0.033 HOURS**
**BASIN AREA = 2.9109 SQ. MI.**
COMPUTE LT TP

LCODE=1 NK=3 ISLOPE=1
LENGTH=400 FT SLOPE=0.01 E=1
LENGTH=1500 FT SLOPE=0.01 E=2
LENGTH=2000 FT SLOPE=0.01 E=3
KN=0.03 CENTROID DISTANCE=500 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

SHEET FLOW PORTION
LENGTH (FT) = 400.0 SLOPE (FT/FT) = .001000 COMPOSITE K = 1.0099
SHALLOW FLOW PORTION = 1500.0 SLOPE = .001000 2.0099
CHANNEL FLOW PORTION = 2000.0 SLOPE = 0.001000 3.0099
TOTAL BASIN = 4200.0 SLOPE = .001000 2.3724
LAG EQUATION FACTORS: KM = .0000 TOTAL BASIN LENGTH (FT) = 4200.0
TOTAL BASIN SLOPE (FT/FT) = .000000 CENTROID LENGTH (FT) = 3900.0
TIME OF CONCENTRATION (HRS) = .5102 TIME TO PEAK (HRS) = .3401 LAG TIME (HRS) = .3826

COMPUTE NH YD ID=3 HYD-EX.C AREA=1.3750 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=3.4

TIME TO PEAK (HRS) = .3401

K = .442152 H = .340124

UNIT PEAK = 306.44 CPF UNIT VOLUME = 1.000 H = 261.30 PDI = .0099
AREA = 1.3750 SQ MI TA = .500000 INCHES INF = 1.67000 INCHES PER HOUR
RUNDY COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=3 CODE=1 HYDROGRAPH FROM AREA EX.C

RUNDY VOLUME = .00000 INCHES PEAK DISCHARGE RATE = .00 CPF AT -.0333 HOURS BASIN AREA = 1.3750 SQ. MI.

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COMPUTE LT TP

LCODE=1 NK=3 ISLOPE=1
LENGTH=400 FT SLOPE=0.01 E=1
LENGTH=1500 FT SLOPE=0.01 E=2
LENGTH=2000 FT SLOPE=0.01 E=3
KN=0.03 CENTROID DISTANCE=3500 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

SHEET FLOW PORTION
LENGTH (FT) = 400.0 SLOPE (FT/FT) = .001000 COMPOSITE K = 1.0099
SHALLOW FLOW PORTION = 1500.0 SLOPE = .001000 2.0099
CHANNEL FLOW PORTION = 2000.0 SLOPE = 0.001000 3.0099
TOTAL BASIN = 6700.0 SLOPE = .001000 2.6127
LAG EQUATION FACTORS: KM = .0000 TOTAL BASIN LENGTH (FT) = 6700.0
TOTAL BASIN SLOPE (FT/FT) = .000000 CENTROID LENGTH (FT) = 3500.0
TIME OF CONCENTRATION (HRS) = .6025 TIME TO PEAK (HRS) = .4015 LAG TIME (HRS) = .4518

COMPUTE NH YD ID=4 HYD-EX.D AREA=0.5313 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1.5

TIME TO PEAK (HRS) = .4015

K = .5121300 H = .4013300 K/TP RATIO = 1.300000 SHAPE CONSTANT, N = 2.756220
UNIT PEAK = 345.66 CPF UNIT VOLUME = .9999 H = 261.30 PDI = .0099
AREA = .531300 SQ MI TA = 1.500000 INCHES INF = 1.67000 INCHES PER HOUR
RUNDY COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=4 CODE=1 HYDROGRAPH FROM AREA EX.D

RUNDY VOLUME = .00000 INCHES PEAK DISCHARGE RATE = .00 CPF AT -.0333 HOURS BASIN AREA = .5313 SQ. MI.

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COMPUTE LT TP

LCODE=1 NK=3 ISLOPE=1
LENGTH=400 FT SLOPE=0.01 E=1
LENGTH=1500 FT SLOPE=0.01 E=2
LENGTH=2000 FT SLOPE=0.01 E=3
KN=0.03 CENTROID DISTANCE=5400 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

SHEET FLOW PORTION
LENGTH (FT) = 400.0 SLOPE (FT/FT) = .000000 COMPOSITE K = 1.9000
SHALLOW FLOW PORTION = 1600.0 SLOPE = 0.000000 2.0000

Page 3
CHANNEL FLOW PORTION = 9500.0
TOTAL BASIN = 11500.0

LAG EQUATION FACTORS: K = .0000  TOTAL BASIN LENGTH (FT) = 31500.0
TOTAL BASIN SLOPE (Ft/FT) = .000060  CENTROID LENGTH (FT) = 5400.0

TIME OF CONCENTRATION (HRS) = .7725  TIME TO PEAK (HRS) = .5150  LAG TIME (HRS) = .5794

COMPUTE IN HYD @ ID=5 HYN=EX.E AREA=2.4234 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS) = .5150
K = .000039  TP = 515000  K/TP RATIO = 1.300000  SHAPE CONSTANT, N = 2.756220
UNIT PEAK = 229.5 CFS UNIT VOLUME = 1.000  B = 261.30  P00 = .81000
AREA = 2.423400 SQ MI  IA = .65000 INCHES  INH = 1.67000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INfiltrATION NUMBER METHOD - DT = .033333

PRINT HYD @ ID=5 CODE=1

HYDROGRAPH FROM AREA EX.E

RUNOFF VOLUME = .000000 INCHES = .0000 ACRE-FEET
PEAK DISCHARGE RATE = .08 CFS AT -.003 HOURS BASIN AREA = 2.4234 SQ. MI

--------------------------------------------------------------------------

SCS UPLAND METHOD FACTORS

SHEET FLOW PORTION = 400.0  SLOPE (ST/FT) = .01000  COMPOSITE K
SHALLOW FLOW PORTION = 1600.0  SLOPE=0.0100  2.0000
CHANNEL FLOW PORTION = 9000.0  SLOPE=0.0100  3.0000
TOTAL BASIN = 11200.0  SLOPE=0.0100  2.6250

LAG EQUATION FACTORS: K = .0100  TOTAL BASIN LENGTH (FT) = 13200.0
TOTAL BASIN SLOPE (FT/FT) = .010000  CENTROID LENGTH (FT) = 5400.0

TIME OF CONCENTRATION (HRS) = .6997  TIME TO PEAK (HRS) = .4665  LAG TIME (HRS) = .5248

COMPUTE IN HYD @ ID=6 HYN=EX.F AREA=1.7047 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS) = .4665
K = .000039  TP = 4664610  K/TP RATIO = 1.300000  SHAPE CONSTANT, N = 2.756220
UNIT PEAK = 954.95 CFS UNIT VOLUME = 1.000  B = 261.30  P00 = .82000
AREA = 1.704700 SQ MI  IA = .65000 INCHES  INH = 1.67000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INfiltrATION NUMBER METHOD - DT = .033333

PRINT HYD @ ID=6 CODE=1

OUTFLOW HYDROGRAPH REACH = .00

RUNOFF VOLUME = .000000 INCHES = .0000 ACRE-FEET
PEAK DISCHARGE RATE = .00 CFS AT -.003 HOURS BASIN AREA = 1.7047 SQ. MI

--------------------------------------------------------------------------

SCS UPLAND METHOD FACTORS

SHEET FLOW PORTION = 13300.0  SLOPE=0.02  K=3
SHALLOW FLOW PORTION = 13300.0  SLOPE=0.02  K=3
CHANNEL FLOW PORTION = 13300.0  SLOPE=0.02  K=3
TOTAL BASIN = 13300.0  SLOPE=0.02  K=3

LAG EQUATION FACTORS: K = .0000  TOTAL BASIN LENGTH (FT) = 13300.0
TOTAL BASIN SLOPE (FT/FT) = .000000  CENTROID LENGTH (FT) = 6300.0

TIME OF CONCENTRATION (HRS) = .6932  TIME TO PEAK (HRS) = .4621  LAG TIME (HRS) = .5399

COMPUTE IN HYD @ ID=7 HYN=EX.G AREA=2.2625 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS) = .4621
K = .000039  TP = .4621818  K/TP RATIO = 1.300000  SHAPE CONSTANT, N = 2.756220
UNIT PEAK = 297.9 CFS UNIT VOLUME = 1.000  B = 261.30  P00 = .81000
AREA = 2.262500 SQ MI  IA = .65000 INCHES  INH = 1.67000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INfiltrATION NUMBER METHOD - DT = .033333

PRINT HYD @ ID=7 CODE=1
**EX_24.OUT**

**HYDROGRAPH FROM AREA EX. H**

**Runoff Volume = 0.0000 Inches** = **0.0000 Acre-Feet**
**Peak Discharge Rate = 0.00 CFS** AT **-0.03 Hours** Basin Area = 2.2625 SQ. MI.

---

**Basin Ex.H**

**COMPUTE LT TP**
Length=20500 FT Slope=0.03  K=2
K=0.01 CENTROID DISTANCE=6600 FT

**Tc AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**LAG EQUATION FACTORS:**
K = .0900  TOTAL BASIN LENGTH (FT) = 20500.0
TOTAL BASIN SLOPE (FT/FT) = .017000  CENTROID LENGTH (FT) = 6800.0

**TIME OF CONCENTRATION (HRS)= .8340  TIME TO PEAK (HRS)= .5360  LAG TIME (HRS)= .6233**

**COMPUTE NH HYD**

**ID=8 HYD=EX.H AREA=4.5969 PER A=100.0 PER B=0.0**

**PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1**

**TIME TO PEAK (HRS) = .5360**

**K = .722786**

**TOTAL BASIN LENGTH (FT) = 20500.0**

**TOTAL BASIN SLOPE (FT/FT) = .017000**

**AREA = 4.395900 SQ. MI.**

**Tc AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

**SHEET FLOW PORTION**

**LENGTH (FT) = 400.0 SLOPE (FT/FT) = .021000 COMPOSITE K = 1.0000**

**SMALLER FLOW PORTION**

**LENGTH=400 FT**

**SLOPE=0.021**

**MEDIUM FLOW PORTION**

**LENGTH=1600 FT SLOPE=0.021**

**TOTAL BASIN**

**LENGTH=7700 FT SLOPE=0.021**

**LAG EQUATION FACTORS:**
K = .0200  TOTAL BASIN LENGTH (FT) = 7700.0
TOTAL BASIN SLOPE (FT/FT) = .021000  CENTROID LENGTH (FT) = 3000.0

**TIME OF CONCENTRATION (HRS) = .4445  TIME TO PEAK (HRS) = .2963  LAG TIME (HRS) = .3334**

**COMPUTE NH HYD**

**ID=9 HYD=EX.I AREA=1.6969 PER A=100.0 PER B=0.0**

**PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1**

**TIME TO PEAK (HRS) = .2963**

**K = .385243**

**TOTAL BASIN LENGTH (FT) = 1495.3**

**TOTAL BASIN SLOPE (FT/FT) = .0999**

**AREA = 1.696900 SQ. MI.**

**Tc AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

**SHEET FLOW PORTION**

**LENGTH (FT) = 400.0 SLOPE (FT/FT) = .021000 COMPOSITE K = 1.0000**

---

**Basin Ex.I**

**COMPUTE LT TP**

**LENGTH=400 FT SLOPE=0.017**

**LENGTH=700 FT SLOPE=0.017**

**Tc AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

**SHEET FLOW PORTION**

**LENGTH (FT) = 400.0 SLOPE (FT/FT) = .021000 COMPOSITE K = 1.0000**

---

**Basin Ex.II**

**COMPUTE LT TP**

**LENGTH=800 FT SLOPE=0.017**

**LENGTH=1100 FT SLOPE=0.017**

**Tc AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

**SHEET FLOW PORTION**

**LENGTH (FT) = 400.0 SLOPE (FT/FT) = .021000 COMPOSITE K = 1.0000**
**EX. 24.OUT**

**SHALLOW FLOW PORTION**
- 700.0
- 0.0

**CHANNEL FLOW PORTION**
- 0.0
- 1100.0

**TOTAL BASIN**
- 1100.0

**TIME OF CONCENTRATION (HRS)** = \(0.3598\)
**TIME TO PEAK (HRS)** = \(0.3085\)
**LAG TIME (HRS)** = \(0.1198\)

**TIME TO PEAK COMPUTED TO BE LESS THAN 0.33333 HOUR MINIMUM VALUE.**

**REVISED VALUES:**
- **TIME OF CONCENTRATION (HRS)** = \(0.2000\)
- **TIME TO PEAK (HRS)** = \(0.1333\)
- **LAG TIME (HRS)** = \(0.1500\)

**COMPUTE NR HYD**

**ID = 10 HYD = EX. 3**
- AREA = 0.0250 PER A = 100.0 PER B = 0.0 PER C = 0.0 PER D = 0.0 TPW = 0.0 RAINFALL = 1

**TIME TO PEAK (HRS)** = \(0.1333\)

**K** = \(1.0000\)
**TP** = \(3.3333\)
**K/TP RATIO** = \(1.3333\)
**SHAPE CONSTANT** = \(3.3333\)
**AREA** = 0.00000

**UNITS**
- **Volume** = \(0.0000\)
- **Flow** = \(0.0000\)
- **Rainfall** = \(0.0000\)

**RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT** = \(0.0000\)

**PRINT HYD**

**ID = 10 CODE = 1**

**HYDROGRAPH FROM AREA EX. 3**

**RUNOFF VOLUME** = \(0.0000\) INCHES
**PEAK DISCHARGE RATE** = \(0.00\) CFS AT \(-0.033\) HOURS
**BASIN AREA** = 0.0250 SQ. MI.

---

**EX. 24.OUT**

**SHALLOW FLOW PORTION**
- 400.0
- 0.0

**CHANNEL FLOW PORTION**
- 0.0
- 400.0

**TOTAL BASIN**
- 400.0

**TIME OF CONCENTRATION (HRS)** = \(0.0652\)
**TIME TO PEAK (HRS)** = \(0.0435\)
**LAG TIME (HRS)** = \(0.0489\)

**TIME TO PEAK COMPUTED TO BE LESS THAN 0.33333 HOUR MINIMUM VALUE.**

**REVISED VALUES:**
- **TIME OF CONCENTRATION (HRS)** = \(0.2000\)
- **TIME TO PEAK (HRS)** = \(0.1333\)
- **LAG TIME (HRS)** = \(0.1500\)

**COMPUTE NR HYD**

**ID = 11 HYD = EX. K**
- AREA = 1.0531 PER A = 50.0 PER B = 50.0 PER C = 0.0 PER D = 0.0 TPW = 0.0 RAINFALL = 1

**TIME TO PEAK (HRS)** = \(0.1333\)

**K** = \(1.3333\)
**TP** = \(3.3333\)
**K/TP RATIO** = \(1.3333\)
**SHAPE CONSTANT** = \(3.3333\)
**AREA** = 1.05310

**UNITS**
- **Volume** = \(0.0000\)
- **Flow** = \(0.0000\)
- **Rainfall** = \(0.0000\)

**RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT** = \(0.0000\)

**PRINT HYD**

**ID = 11 CODE = 1**

**HYDROGRAPH FROM AREA EX. K**

**RUNOFF VOLUME** = \(0.0000\) INCHES
**PEAK DISCHARGE RATE** = \(0.60\) CFS AT \(-0.033\) HOURS
**BASIN AREA** = 1.0531 SQ. MI.

---

**EX. 24.OUT**

**SHALLOW FLOW PORTION**
- 400.0
- 0.0

**CHANNEL FLOW PORTION**
- 0.0
- 400.0

**TOTAL BASIN**
- 400.0

**TIME OF CONCENTRATION (HRS)** = \(0.1478\)
**TIME TO PEAK (HRS)** = \(0.0985\)
**LAG TIME (HRS)** = \(0.1108\)

**TIME TO PEAK COMPUTED TO BE LESS THAN 0.33333 HOUR MINIMUM VALUE.**

**REVISED VALUES:**
- **TIME OF CONCENTRATION (HRS)** = \(0.2000\)
- **TIME TO PEAK (HRS)** = \(0.1333\)
- **LAG TIME (HRS)** = \(0.1500\)

**COMPUTE NR HYD**

**ID = 12 HYD = EX. L**
- AREA = 0.0219 PER A = 50.0 PER B = 50.0
TIME TO PEAK (hrs)= .333
K = .33333M  Tp = .33333H  K/TP RATIO = 1.300000 SHAPE CONSTANT, N = 2.756220
UNIT PEAK = .128.8 CPS UNIT VOLUME = .9944  B = 261.30 P90 = 1.8100
AREA = .61500 SQ MI  IA = .37500 INCHES INF = 1.00000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .03333

PRINT HYD ID=12 CODE=1

HYDROGRAPH FROM AREA EX.I

RUNOFF VOLUME = .00000 INCHES = .00000 ACRE-FEET
PEAK DISCHARGE RATE = .60 CPS AT -.033 HOURS BASIN AREA = .6239 SQ. MI.

.setUp

...
RUNOFF VOLUME = .000000 INCHES = .000000 ACRE-FEET
PEAK DISCHARGE RATE = .00 CFS AT -.033 HOURS BASIN AREA = .9484 SQ. MI.

**BASIN EX.0**

**BASIN EX.0**

**BASIN EX.F**

**BASIN EX.F**

**BASIN EX. OFF A**
LENGTH=4800 FT SLOPE=0.000 K=3
KN=0.03 CENTROID DISTANCE=4800 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

SHEET FLOW PORTION LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
SHALLOW FLOW PORTION 1500.0 .0300 0.2000
CHANNEL FLOW PORTION 1500.0 .0100 1.0000
TOTAL BASIN 1500.0 .0100 1.0000

LAG EQUATION FACTORS: Kn = .0000 TOTAL BASIN LENGTH (FT) = 11300.0
TOTAL BASIN SLOPE (FT/FT) = .000000 CENTROID LENGTH (FT) = 4800.0

TIME OF CONCENTRATION (HRS) = .6894 TIME TO PEAK (HRS) = .4596 LAG TIME (HRS) = .5171

COMPUTE NH HYD ID=27 HYD=EX.OFF.A AREA=1.6375 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS) = .4596
K = .597492HR TP = .459609HR K/TP RATIO = 1.30000 SHAPE CONSTANT, N = 2.756220
UNIT PEAK = 690.0 CPS UNIT VOLUME = 1.000 B = 561.30 PEO = .81000
AREA = 1.637500 SQ MI IA = .000000 INCHES INF = 1.670000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033333

PRINT HYD ID=17 CODE=1

HYDROGRAPH FROM AREA EX.OFF.A

RUNOFF VOLUME = .000000 INCHES PEAK DISCHARGE RATE = .00 CFS AT -.033 HOURS BASIN AREA = 1.6375 SQ. MI.

 betrayed

**************************** BASIS EX. OFF B ******************************

COMPUTE LT TP

LCODE=1 NK=3 ISLOPE=1 LENGTH=18700 FT SLOPE=0.009 K=3
KN=0.03 CENTROID DISTANCE=4800 FT

BASIN LONGER THAN 4000.0 FT AND ALL BASIN LAG FACTORS NOT SPECIFIED
USE K = .0600 AND LK(LK) = .00000

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS: Kn = .0150 TOTAL BASIN LENGTH (FT) = 18700.0
TOTAL BASIN SLOPE (FT/FT) = .023884 CENTROID LENGTH (FT) = 9530.0

TIME OF CONCENTRATION (HRS) = .4695 TIME TO PEAK (HRS) = .3097 LAG TIME (HRS) = .3484

COMPUTE NH HYD ID=18 HYD=EX.OFF.B AREA=1.6678 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS) = .3097
K = .402559HR TP = .309669HR K/TP RATIO = 1.30000 SHAPE CONSTANT, N = 2.756220
UNIT PEAK = 388.83 CPS UNIT VOLUME = 0.9995 B = 261.30 PEO = .81000
AREA = .460789 SQ MI IA = .500000 INCHES INF = 1.670000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033333

PRINT HYD ID=18 CODE=1

HYDROGRAPH FROM AREA EX.OFF.B

RUNOFF VOLUME = .000000 INCHES PEAK DISCHARGE RATE = .00 CFS AT -.033 HOURS BASIN AREA = .4608 SQ. MI.

**************************** BASIS EX. OFF C ******************************

COMPUTE LT TP

LCODE=1 NK=3 ISLOPE=1 LENGTH=4000 FT SLOPE=0.011 K=1
LENGTH=4000 FT SLOPE=0.011 K=1 LENGTH=1000 FT SLOPE=0.011 K=3

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

SHEET FLOW PORTION LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
SHALLOW FLOW PORTION 1500.0 .0300 0.2000
CHANNEL FLOW PORTION 1500.0 .0100 1.0000
TOTAL BASIN 1500.0 .0100 1.0000

TIME OF CONCENTRATION (HRS) = .4591 TIME TO PEAK (HRS) = .3060 LAG TIME (HRS) = .3443

COMPUTE NH HYD ID=35 HYD=EX.OFF.C AREA=1.5125 PER A=60.0 PER B=15.0
PER C=10.0 PER D=15.0 TP=0.0 RAINFALL=1

Page 9
TIME TO PEAK (hrs) = .3060

K = .239650 HR, TP = .306050 HR, K/TP RATIO = .782983, SHAPE CONSTANT, N = 4.587626
UNIT PEAK = 291.04 CPS, UNIT VOLUME = 1.000, A = 292.61, P60 = .81000
AREA = .226875 SQ MI, IA = .20000 INCHES, INF = .04060 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .384210 HR, TP = .306050 HR, K/TP RATIO = 1.287743, SHAPE CONSTANT, N = 2.779197
UNIT PEAK = 2106.0 CPS, UNIT VOLUME = .1099, A = .59230, P60 = .81000
AREA = 1.28585 SQ MI, IA = .59824 INCHES, INF = 1.49705 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD, ID=10, CODE=1

HYDROGRAPH FROM AREA EX.OFF.C

RUNOFF VOLUME = .13372 INCHES = 10.7865 ACRE-FOOT
PEAK DISCHARGE RATE = 137.76 CPS AT 1.700 HOURS, BASIN AREA = 1.525 SQ. MI.

FINISH
NORMAL PROGRAM FINISH, END TIME (MIN:SEC) = 01:40:13
*0*
PROJECT NAME: SANTOLINA

*1*
DATE: NOVEMBER 8, 2012

*2*
INPUT FILE NAME: SEX.0.YNM

*3*
OUPUT FILE NAME: SEX.0.OUT

*4*
PROJECT NUMBER: 20120056

*5*

START
TIME=0.0 HR PUNCH CODE=0

RAINFALL
TYPE=3 RAIN QUANTITY=0.0
RAIN ONE=1.06 IN RAIN SIX=1.25 IN
RAIN DAY=1.51 IN 0=0.03333

=================================================================================

=================================================================================

**5** BULK FACTOR FOR 5 YE STORM IS 1 FOR MESA BASINS AND 4 FOR ESCARPMENT BASINS

SEDIMENT BULK CODE=1 BULK FACTOR=1.04

=================================================================================

**8** BASIN EX.A ****************************

COMPUTE LT TP
L0COD=1 NW=3 ISLOPE=1
LENGTH=400 FT SLOPE=0.06 K=1
LENGTH=1600 FT SLOPE=0.06 K=2
LENGTH=600 FT SLOPE=0.05 K=3

COMPUTE RNM HYD
ID=1 HYD=EX.A AREA=0.5428 PER A=0.0 PER B=50.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

PRINT HYD
ID=1 CODE=1

SEDIMENT BULK CODE=1 BULK FACTOR=1.01

=================================================================================

**8** BASIN EX.B ****************************

COMPUTE LT TP
L0COD=1 NW=3 ISLOPE=1
LENGTH=400 FT SLOPE=0.05 K=1
LENGTH=1600 FT SLOPE=0.05 K=2
LENGTH=6500 FT SLOPE=0.05 K=3
KN=0.03 CENTROID DISTANCE=2100 FT

COMPUTE RNM HYD
ID=2 HYD=EX.B AREA=0.9109 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

PRINT HYD
ID=2 CODE=1

=================================================================================

**8** BASIN EX.C ****************************

COMPUTE LT TP
L0COD=1 NW=3 ISLOPE=1
LENGTH=500 FT SLOPE=0.01 K=1
LENGTH=1600 FT SLOPE=0.01 K=2
LENGTH=4700 FT SLOPE=0.01 K=3
KN=0.03 CENTROID DISTANCE=3500 FT

COMPUTE RNM HYD
ID=3 HYD=EX.C AREA=0.1375 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

PRINT HYD
ID=3 CODE=1

=================================================================================

**8** BASIN EX.D ****************************

COMPUTE LT TP
L0COD=1 NW=3 ISLOPE=1
LENGTH=300 FT SLOPE=0.008 K=1
LENGTH=1600 FT SLOPE=0.008 K=2
LENGTH=4700 FT SLOPE=0.008 K=3
KN=0.03 CENTROID DISTANCE=3500 FT

COMPUTE RNM HYD
ID=4 HYD=EX.D AREA=0.3123 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

PRINT HYD
ID=4 CODE=1

=================================================================================

**8** BASIN EX.E ****************************

COMPUTE LT TP
L0COD=1 NW=3 ISLOPE=1
LENGTH=300 FT SLOPE=0.006 K=1
LENGTH=1600 FT SLOPE=0.006 K=2
LENGTH=4700 FT SLOPE=0.006 K=3
KN=0.03 CENTROID DISTANCE=5400 FT

COMPUTE RNM HYD
ID=5 HYD=EX.E AREA=2.4234 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

PRINT HYD
ID=5 CODE=1

=================================================================================

**8** BASIN EX.F ****************************

COMPUTE LT TP
L0COD=1 NW=3 ISLOPE=1
LENGTH=300 FT SLOPE=0.01 K=1
LENGTH=1600 FT SLOPE=0.01 K=2
LENGTH=4700 FT SLOPE=0.01 K=3
KN=0.03 CENTROID DISTANCE=5400 FT

COMPUTE RNM HYD
ID=6 HYD=EX.F AREA=1.7047 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

PRINT HYD
ID=6 CODE=1
AHMO PANGUAH (AHMO-37) -
RUN DATE (CON/DFN/YS) = 11/26/2012
EVTY TIME (HRR;MIN;SEC) = 09:40:44 USER NO. = AHMO-3-9702C@chamahu-AH
INPUT FILE = SEX-6.HWR
*#
PROJECT NAME: SANTOLINA
*
DATE: NOVEMBER 8, 2012
*
INPUT FILE NAME: SEX-6.HWR
*
OUTPUT FILE NAME: SEX-6.OUT
*
PROJECT NUMBER: 20120256
*
COMMENTS: 5 YEAR-6 HOUR STORM
*
START TIME = 0.0 HOURS
RINFALL = TYPE-1, RAIN QNTY = 0.0
RAIN ONE=0.26 IN
RAIN DLY=1.25 IN
RINF=0.03333

COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.49 HR.
DT = 0.03333 HOURS
END TIME = 5.09940 HOURS
0.0000 0.0010 0.0015 0.0079 0.0039 0.0050 0.0080
0.0071 0.0082 0.0094 0.0105 0.0117 0.0130 0.0142
0.0155 0.0169 0.0182 0.0197 0.0211 0.0227 0.0242
0.0239 0.0276 0.0312 0.0331 0.0351 0.0372 0.0394
0.0418 0.0443 0.0472 0.0501 0.0537 0.0590 0.0700
0.1018 0.1374 0.1859 0.2488 0.3112 0.4375
0.7507 0.7185 0.7195 0.7949 0.8276 0.8552
0.8592 0.9118 0.9163 0.9594 0.9813 1.0017 1.0711
1.0939 1.0570 1.0736 1.0993 1.1043 1.1077 1.1119
1.1141 1.1317 1.1179 1.1256 1.1273 1.1378 1.1352
1.1351 1.1548 1.1370 1.1391 1.1412 1.1435 1.1452
1.1471 1.1549 1.1508 1.1525 1.1543 1.1560 1.1576
1.1593 1.1659 1.1624 1.1640 1.1655 1.1670 1.1694
1.1689 1.1725 1.1740 1.1753 1.1770 1.1789 1.1819
1.1792 1.1805 1.1817 1.1830 1.1842 1.1854 1.1865
1.1797 1.1849 1.1803 1.1841 1.1872 1.1923 1.1944
1.2016 1.2050 1.2074 1.2068 1.2074 1.2398 1.2083
1.2093 1.2102 1.2113 1.2120 1.2119 1.2138 1.2147
1.2135 1.2264 1.2273 1.2281 1.2280 1.2290 1.2290
1.2214 1.2227 1.2235 1.2239 1.2255 1.2262 1.2262
1.2270 1.2278 1.2286 1.2293 1.2305 1.2319 1.2327
1.2323 1.2338 1.2345 1.2352 1.2389 1.2382 1.2382
1.2378 1.2381 1.2398 1.2395 1.2405 1.2408 1.2413
1.2362 1.2429 1.2433 1.2442 1.2448 1.2455 1.2462
1.2468 1.2475 1.2482 1.2487 1.2494 1.2500

*** BASIN EX.A ************

COMPUTE LT TP
LCOB=1  N=3  ISLOPE=1
LENGTH=500 FT  SLOPE=0.05  K=1
LENGTH=1600 FT  SLOPE=0.05  K=2
LENGTH=4000 FT  SLOPE=0.05  K=3

TC AND TP COMPUTED BY UFLAND/LAG TIME PROCEDURE
SFS UFLAND METRO FACTORS
SHEET FLOW PORTION
LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K
400.00 0.00000 1.0000
1600.00 0.00000 2.0000
4000.00 0.00000 3.0000
TOTAL BASIN
2400.00 0.00000 1.8000

TIME OF CONCENTRATION (MHS) = .1656
TIME TO PEAK (MHS) = .1140
LAG TIME (MHS) = .1242

TIME TO PEAK COMPUTED TO BE LESS THAN 0.13333 HOUR MINIMUM VALUE.
REVISED VALUES: TIME OF CONCENTRATION (MHS) = .2000
 TIME TO PEAK (MHS) = .1333
LAG TIME (MHS) = .1500

COMPUTE HYD
ID=1  HYD-EX.A  AREA=0.5438  PER A=0.0  PER B=50.0
PER C=50.0  PER D=0  TP=0.0  RAINFALL=1

TIME TO PEAK (HRS) = .1333

K = 0.192291  TP = 13333308  K/TP RATIO = 1.113924
SHAPE CONSTANT, N = 3.160018
UNIT PEAK = 1000 B  CFS  UNIT VOLUME = 1.00 CFS  PEAK = 1.000
AREA = .543800 SQ MI  IA = -0.0500 INCHES
INF = 1.040000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION INFILTRATION METHOD - DT = .015000

BUCKLING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.04000 AT PEAK FLOW.

PRINT HYD
ID=1  CODE=1

HYDROGRAPH FROM AREA EX.A
RUNOFF VOLUME = .20176 INCHES
PEAK DISCHARGE RATE = 230.08 CFS
AT 1.535 HOURS
BASIN AREA = .5438 SQ. MI.
**SEDIMENT BULK**

**CODE=1**

**BULK FACTOR=1.01**

**-----------------------------------------------------------**

**BASIN EX.B **

**-----------------------------------------------------------**

**COMPUTE LT TP**  
**LCODE=1**  
**N=3**  
**ISLOPE=1**  
**LENGTH=1600 FT**  
**SLOPE=0.005**  
**K=1**  
**LENGTH=1650 FT**  
**SLOPE=0.005**  
**K=2**  
**LENGTH=5500 FT**  
**SLOPE=0.005**  
**K=3**  
**KN=0.03**  
**CENTRED DISTANCE=2100 FT**

**TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

**SHEET FLOW PORTION**  
**LENGTH (FT): 400.0**  
**SLOPE (FT/FT): .005000**  
**COMPONENT K: 1.0000**

**SHALLOW FLOW PORTION**  
**LENGTH: 1600.0 FT**  
**SLOPE: .005000**

**CHANNEL FLOW PORTION**  
**LENGTH: 5500.0 FT**  
**SLOPE: .005000**

**TOTAL BASIN**  
**LENGTH: 7500.0 FT**  
**SLOPE: .005000**

**LAG EQUATION FACTORS:**

**Km=.0000**  
**TOTAL BASIN LENGTH (FT)= 7500.0**  
**TOTAL BASIN SLOPE (FT/FT) = .005000**  
**CENTRED LENGTH (FT)= 2100.0**

**TIME OF CONCENTRATION (HRS)= .6569**  
**TIME TO PEAK (HRS)= .4380**  
**LAG TIME (HRS)= .4927**

**COMPUTE TN HYD**  
**ID=2**  
**HYD=EX.B**  
**AREA=2.9109**  
**PER A=100.0 PER B=0.0**  
**PER C=0.0 PER D=0.0**  
**TPM=0.0**  
**RAINFA=1**

**TIME TO PEAK (HRS)= .4380**

**K = .56091**  
**TP = .4379554**  
**K/TP RATIO = 1.300000**  
**SHAPE CONSTANT, N = 2.756220**

**UNIT PEAK = 1786.8**  
**CPS**  
**UNIT VOLUME = 1.0000**  
**B = 261.30**  
**P60 = 1.0500**

**AREA = .91250000 FT**  
**IA = .65000000 INCHES**  
**INF = 1.67000000 INCHES PER HOUR**

**RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD: DT = .033333**

**BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.0000 AT PEAK FLOW.**

**PRINT HYD**  
**ID=2**  
**CODE=1**

**HYDROGRAPH FROM AREA EX.B**

**RUNOFF VOLUME = .01068 INCHES**  
**PEAK DISCHARGE RATE = 25.55 CFS AT 1.813 HOURS**  
**BASIN AREA = 2.9109 SQ. FT.**

**-----------------------------------------------------------**

**BASIN EX.C **

**-----------------------------------------------------------**

**COMPUTE LT TP**  
**LCODE=1**  
**N=3**  
**ISLOPE=1**  
**LENGTH=1600 FT**  
**SLOPE=0.005**  
**K=1**  
**LENGTH=1650 FT**  
**SLOPE=0.005**  
**K=2**  
**LENGTH=2200 FT**  
**SLOPE=0.005**  
**K=3**  
**KN=0.03**  
**CENTRED DISTANCE=500 FT**

**TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

**SHEET FLOW PORTION**  
**LENGTH (FT): 400.0**  
**SLOPE (FT/FT): .010000**  
**COMPONENT K: 1.0000**

**SHALLOW FLOW PORTION**  
**LENGTH: 1600.0 FT**  
**SLOPE: .010000**

**CHANNEL FLOW PORTION**  
**LENGTH: 2200.0 FT**  
**SLOPE: .010000**

**TOTAL BASIN**  
**LENGTH: 4200.0 FT**  
**SLOPE: .010000**

**LAG EQUATION FACTORS:**

**Km=.0000**  
**TOTAL BASIN LENGTH (FT)= 4200.0**  
**TOTAL BASIN SLOPE (FT/FT) = .010000**  
**CENTRED LENGTH (FT)= 500.0**

**TIME OF CONCENTRATION (HRS)= .5102**  
**TIME TO PEAK (HRS)= .3401**  
**LAG TIME (HRS)= .3826**

**COMPUTE TN HYD**  
**ID=3**  
**HYD=EX.C**  
**AREA=1.3750**  
**PER A=100.0 PER B=0.0**  
**PER C=0.0 PER D=0.0**  
**TPM=0.0**  
**RAINFA=1**

**TIME TO PEAK (HRS)= .3401**

**K = .42126**  
**TP = .34012**  
**K/TP RATIO = 1.300000**  
**SHAPE CONSTANT, N = 2.756220**

**UNIT PEAK = 2056.4**  
**CPS**  
**UNIT VOLUME = 1.0000**  
**B = 261.30**  
**P60 = 1.0500**

**AREA = 1.37500000 SQ. FT**  
**IA = .65000000 INCHES**  
**INF = 1.67000000 INCHES PER HOUR**

**RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD: DT = .033333**

**BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.0000 AT PEAK FLOW.**

**PRINT HYD**  
**ID=3**  
**CODE=1**

**HYDROGRAPH FROM AREA EX.C**

**RUNOFF VOLUME = .01068 INCHES**

**PEAK DISCHARGE RATE = 11.28 CFS AT 1.733 HOURS**

**BASIN AREA = 1.3750 SQ. FT.**

**-----------------------------------------------------------**

**BASIN EX.D **

**-----------------------------------------------------------**

**COMPUTE LT TP**  
**LCODE=1**  
**N=3**  
**ISLOPE=1**  
**LENGTH=400 FT**  
**SLOPE=0.008**  
**K=1**  
**LENGTH=1600 FT**  
**SLOPE=0.008**  
**K=2**

**Page 2**
LENGTH=4700 FT  SLOPE=0.008 K=3
EN=0.05  CENTERED DISTANCE=5000 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

SHEET FLOW POSITION
SHALLOW FLOW POSITION
CHANNEL FLOW POSITION
TOTAL BASIN

LAG EQUATION FACTORS:

Km = 0.300
TOTAL BASIN LENGTH (FT) = 6700.0
TOTAL BASIN SLOPE (FT/FT) = 0.0008000
CENTERED LENGTH (FT) = 5000.0

TIME OF CONCENTRATION (HRS) = 6025
TIME TO PEAK (HRS) = 4016
LAG TIME (HRS) = 4518

COMPUTE NH HYD

ID=4 HYD=EX.D AREA = 0.3313 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS) = 4016

K = 5.2213
TP = 401630
K/TP RATIO = 1.300000 SHAPE CONSTANT, N = 2.758220
UNIT PEAK = 315.66 CFS UNIT VOLUME = 899999 B = 261.30 P0 = 1.20
AREA = 5511300 SQ MI IA = 65000 INCHES INF = 1167000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.533333

BURRING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.01000 AT PEAK FLOW.

PRINT HYD

ID=4 CODE=3

HYDROGRAPH FROM AREA EX.D

RUNOFF VOLUME = 0.0168 INCHES = 0.3027 ACRE-FT
PEAK DISCHARGE RATE = 3.60 CFS AT 1.8000 HOURS BASIN AREA = 551130 SQ. MI.

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

******************************************************************************
CHANNEL FLOW PORTION

9200.0
0.010000
0.010000
1.0000

500.0
0.010000
2.6290

LAG EQUATION FACTORS:

K = 0.0300
TOTAL BASIN LENGTH (FT) = 11200.0
TOTAL BASIN SLOPE (FT/FT) = 0.010000
CENTROID LENGTH (FT) = 5400.0

TIME OF CONCENTRATION (HRS) = 0.6997
TIME TO PEAK (HRS) = 0.6665
LAG TIME (HRS) = 0.5248

COMPUTE NR HYD

ID = 6 HYD=EX.G AREA = 3.7047 PER A = 100.0 PER B = 1.00
PER C = 0.0 PER D = 0.0 PER = 0.0

TIME TO PEAK (HRS) = 0.4685
K = 0.606398HR TP = 0.666461HR K/TP RATIO = 1.203000 SHAPE CONSTANT, N = 2.756220
UNIT PEAK = 954.93 CFS UNIT VOLUME = 1.000 B = 131.30 P60 = 1.0000
AREA = 1.707400 SQ MI TA = 0.50000 INCHES INF = 1.67000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.03533

BULKING FACTOR APPLIED TO HYDROGRAPH FACTOR = 1.01000 AT PEAK FLOW,

PRINT HYD

ID = 6 CODE = 1
OUTFLOW HYDROGRAPH REACH = 0.0

RUNOFF VOLUME = 0.01068 INCHES = 0.9712 ACRE- FEET
PEAK DISCHARGE RATE = 10.20 CFS AT 1.867 HOURS BASIN AREA = 3.7047 SQ. MI.

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

*累了的X.kG ******************************************************************************

COMPUTE LT TP

LCD = 1 NO = 0 ISLOPE = 1
LENGTH = 333300 FT SLOPE = 0.02 K = 3
K = 0.03 CENTROID DISTANCE = 6300 FT

TC AND TO COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS:

K = 0.0300
TOTAL BASIN LENGTH (FT) = 11300.0
TOTAL BASIN SLOPE (FT/FT) = 0.020000
CENTROID LENGTH (FT) = 6300.0

TIME OF CONCENTRATION (HRS) = 0.6932
TIME TO PEAK (HRS) = 0.4621
LAG TIME (HRS) = 0.5199

COMPUTE NR HYD

ID = 7 HYD=EX.G AREA = 2.2625 PER A = 100.0 PER B = 1.00
PER C = 0.00 PER D = 0.00 PER = 0.0

TIME TO PEAK (HRS) = 0.4621
K = 0.60975HR TP = 0.46711HR K/TP RATIO = 1.303000 SHAPE CONSTANT, N = 2.756220
UNIT PEAK = 2793.3 CFS UNIT VOLUME = 1.000 B = 261.30 P60 = 1.0000
AREA = 2.702600 SQ MI TA = 0.60000 INCHES INF = 1.67000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.03333

BULKING FACTOR APPLIED TO HYDROGRAPH FACTOR = 1.01000 AT PEAK FLOW,

PRINT HYD

ID = 7 CODE = 1

HYDROGRAPH FROM AREA EX.G

RUNOFF VOLUME = 0.01068 INCHES = 1.2889 ACRE- FEET
PEAK DISCHARGE RATE = 13.68 CFS AT 1.867 HOURS BASIN AREA = 2.2625 SQ. MI.

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

*累了的X.hG ******************************************************************************

COMPUTE LT TP

LCD = 1 NO = 0 ISLOPE = 1
LENGTH = 20500 FT SLOPE = 0.017 K = 3
K = 0.03 CENTROID DISTANCE = 6900 FT

TC AND TO COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS:

K = 0.0300
TOTAL BASIN LENGTH (FT) = 20500.0
TOTAL BASIN SLOPE (FT/FT) = 0.017000
CENTROID LENGTH (FT) = 6800.0

TIME OF CONCENTRATION (HRS) = 0.8340
TIME TO PEAK (HRS) = 0.5560
LAG TIME (HRS) = 0.6755

COMPUTE NR HYD

ID = 8 HYD=EX.H AREA = 1.5568 PER A = 100.0 PER B = 0.0
PER C = 0.00 PER D = 0.00 PER = 0.0

TIME TO PEAK (HRS) = 0.5560
K = 0.72279HR TP = 0.555938HR K/TP RATIO = 1.303000 SHAPE CONSTANT, N = 2.756220
UNIT PEAK = 4164.4 CFS UNIT VOLUME = 1.000 B = 263.30 P60 = 1.20000
AREA = 5.56800 SQ MI TA = 0.65000 INCHES INF = 1.67000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.03333

BULKING FACTOR APPLIED TO HYDROGRAPH FACTOR = 1.01000 AT PEAK FLOW,

PRINT HYD

ID = 8 CODE = 1

HYDROGRAPH FROM AREA EX.H
RUNOFF VOLUME = 0.01686 INCHES = 2.6188 ACRE-FEET
PEAK DISCHARGE RATE = 23.07 CFS AT 1.967 HOURS BASIN AREA = 4.9969 SQ. MI.

******************************** BASIN EX.1 ******************************

** COMPUTE LT TP **
CCODE=1 KC=3 ISLOPE=1
LENGTH=600 FT SLOPE=0.021 K=1
LENGTH=600 FT SLOPE=0.021 K=2
LENGTH=5700 FT SLOPE=0.021 K=3
K0=0.03 CENTRED DISTANCE=3000 FT

** TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE **

<table>
<thead>
<tr>
<th>SCS UPLAND METHOD FACTORS</th>
<th>LENGTH (FT)</th>
<th>SLOPE (FT/FT)</th>
<th>COMPOSITE K</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHEET FLOW PORTION</td>
<td>400.0</td>
<td>0.021000</td>
<td>1.00000</td>
</tr>
<tr>
<td>SHALLOW FLOW PORTION</td>
<td>760.0</td>
<td>0.021000</td>
<td>3.00000</td>
</tr>
<tr>
<td>TOTAL BASIN</td>
<td>7700.0</td>
<td>0.021000</td>
<td>2.4839</td>
</tr>
</tbody>
</table>

** LAG EQUATION FACTORS: **
K = 0.0300 TOTAL BASIN LENGTH (FT) = 7700.0
TOTAL BASIN SLOPE (FT/FT) = 0.021000 CENTRED DISTANCE (FT) = 3000.0

** TIME OF CONCENTRATION (HRS)= 0.4445 TIME TO PEAK (HRS)= 0.2963 LAG TIME (HRS)= 0.3334 **

** COMPUTE NH HYD **
ID=9 HYD=EX.1 AREA=1.69969 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

** TIME TO PEAK (HRS)= 0.2963 **

K = 0.8534944 THP = 29934464 K/THP RATIO = 1.300000 SHAPE CONSTANT, N = 2.75623
UNIT PEAK = 1.0603 CFS UNIT VOLUME = 0.0009 SHAPE FACTOR, B = 2.6530 FS N = 1.0603
AREA = 1.699690 SQ MI IA = 65000 INCHES ZNF = 1.67000 INCHES PER HOUR

** Runoff computed by Initial Abstraction/Infiltration Method - BT = 0.53333 **

** BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.01660 AT PEAK FLOW. **

** PRINT HYD **
ID=9 CODE=1

** HYDROGRAPH FROM AREA EX.1 **

RUNOFF VOLUME = 0.01686 INCHES = 0.9667 ACRE-FEET
PEAK DISCHARGE RATE = 35.98 CFS AT 1.700 HOURS BASIN AREA = 1.69969 SQ. MI.

******************************** BASIN EX.3 ******************************

** COMPUTE LT TP **
CCODE=1 KC=2 ISLOPE=1
LENGTH=400 FT SLOPE=0.017 K=1
LENGTH=700 FT SLOPE=0.017 K=2

** TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE **

<table>
<thead>
<tr>
<th>SCS UPLAND METHOD FACTORS</th>
<th>LENGTH (FT)</th>
<th>SLOPE (FT/FT)</th>
<th>COMPOSITE K</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHEET FLOW PORTION</td>
<td>400.0</td>
<td>0.017000</td>
<td>1.00000</td>
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<tr>
<td>SHALLOW FLOW PORTION</td>
<td>700.0</td>
<td>0.017000</td>
<td>3.00000</td>
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<td>CHANNEL FLOW PORTION</td>
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</tr>
<tr>
<td>TOTAL BASIN</td>
<td>1100.0</td>
<td>0.017000</td>
<td>2.4667</td>
</tr>
</tbody>
</table>

** TIME OF CONCENTRATION (HRS)= 0.1590 TIME TO PEAK (HRS)= 0.1065 LAG TIME (HRS)= 0.1198 **

** TIME TO PEAK COMPUTED TO BE LESS THAN 0.133333 HOUR MINIMUM VALUE. **
** REVISED VALUES: TIME OF CONCENTRATION (HRS)= 0.2000 TIME TO PEAK (HRS)= 0.1333 LAG TIME (HRS)= 0.1500 **

** COMPUTE NH HYD **
ID=10 HYD=EX.3 AREA=0.0250 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

** TIME TO PEAK (HRS)= 0.1333 **

K = 1.800000 THP = 1.333333 K/THP RATIO = 1.350000 SHAPE CONSTANT, N = 2.62759
UNIT PEAK = 47.932 CFS UNIT VOLUME = 0.0088 SHAPE FACTOR, B = 2.6530 FS N = 1.0603
AREA = 0.02500 SQ MI IA = 65000 INCHES ZNF = 1.67000 INCHES PER HOUR

** Runoff computed by Initial Abstraction/Infiltration Method - BT = 0.53333 **

** BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.01660 AT PEAK FLOW. **

** PRINT HYD **
ID=10 CODE=1

** HYDROGRAPH FROM AREA EX.3 **

RUNOFF VOLUME = 0.01686 INCHES = 0.0142 ACRE-FEET
PEAK DISCHARGE RATE = 0.51 CFS AT 1.523 HOURS BASIN AREA = 0.0250 SQ. MI.

****************************** BASIN EX.K ******************************

** Sediment Bulk CODE=1 BULK FACTOR=1.04 **
COMPUTE LT TP  LCODE=1  N=0  ISLOPE=1  
LENGTH=400 FT  SLOPE=0.040  K-T  
LENGTH=1600 FT  SLOPE=0.040  K-T  
LENGTH=6000 FT  SLOPE=0.040  K-T  
K=0.03  CENTROID DISTANCE=3400 FT  

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE  

SCS UPLAND METHOD FACTORS  
SHEET FLOW PORTION 400.0 0.00000 1.00000  
SHALLOW FLOW PORTION 0.0 0.00000 0.00000  
CHANNEL FLOW PORTION 0.0 0.00000 0.00000  
TOTAL BASIN 400.0 0.03000 1.00000  

TIME OF CONCENTRATION (hrs)= 0.0652  
TIME TO PEAK (hrs)= 0.0453  
LAG TIME (hrs)= 0.0489  

TIME TO PEAK COMPUTED TO BE LESS THAN 0.133333 HOURS MINIMUM VALUE.  
REVIEWED VALUES:  
TIME OF CONCENTRATION (hrs)= 0.0652  
TIME TO PEAK (hrs)= 0.0453  
LAG TIME (hrs)= 0.0489  

COMPUTE NH HYD  ID=31  INV=61X.K AREA=1.0630  PER A=50.0  PER B=50.0  
PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=-1  

TIME TO PEAK (hrs)= 0.1333  

K = 0.1654141R  TP = 0.1313333R  K/TP RATIO = 1.255361  
SHAPE CONSTANT, N = 2.846376  
UNIT PEAK = 1215.0  CF  
UNIT VOLUME = 0.0094  
B = 299.05  PE0 = 0.1060  
AREA = 1.05520 SQ MI  
IN = 0.7500 INCHES  INF = 1.46000 INCHES PER HOUR  
RUNDOWN COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD  
DT = 0.033333  
BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.04000 AT PEAK FLOW.  

PRINT HYD  ID=31  CODE=1  

HYDROGRAPH FROM AREA INV.X.K  
RUNDOWN VOLUME = 0.05743 INCHES  
PEAK DISCHARGE RATE = 121.07 CFPS AT 1.533 HOURS  
BASIN AREA = 1.0630 SQ. MI.  

******************************************************************************  
******BASIN EX.X.k***************  
******************************************************************************  

COMPUTE LT TP  LCODE=1  N=3  ISLOPE=1  
LENGTH=400 FT  SLOPE=0.040  K-T  
LENGTH=1600 FT  SLOPE=0.040  K-T  
LENGTH=6000 FT  SLOPE=0.040  K-T  
K=0.03  CENTROID DISTANCE=3400 FT  

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE  

SCS UPLAND METHOD FACTORS  
SHEET FLOW PORTION 400.0 0.00000 1.00000  
SHALLOW FLOW PORTION 0.0 0.00000 0.00000  
CHANNEL FLOW PORTION 0.0 0.00000 0.00000  
TOTAL BASIN 400.0 0.03000 1.00000  

TIME OF CONCENTRATION (hrs)= 0.1478  
TIME TO PEAK (hrs)= 0.0985  
LAG TIME (hrs)= 0.1108  

TIME TO PEAK COMPUTED TO BE LESS THAN 0.133333 HOURS MINIMUM VALUE.  
REVIEWED VALUES:  
TIME OF CONCENTRATION (hrs)= 0.1478  
TIME TO PEAK (hrs)= 0.0985  
LAG TIME (hrs)= 0.1108  

COMPUTE NH HYD  ID=12  INV=61X.K AREA=0.6219  PER A=50.0  PER B=50.0  
PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=-1  

TIME TO PEAK (hrs)= 0.1333  

K = 0.1654141R  TP = 0.1313333R  K/TP RATIO = 1.255361  
SHAPE CONSTANT, N = 2.846376  
UNIT PEAK = 1254.9  CF  
UNIT VOLUME = 0.0994  
B = 289.05  PE0 = 0.1060  
AREA = 0.62190 SQ MI  
IN = 0.7500 INCHES  INF = 1.46000 INCHES PER HOUR  
RUNDOWN COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD  
DT = 0.033333  
BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.04000 AT PEAK FLOW.  

PRINT HYD  ID=12  CODE=1  

HYDROGRAPH FROM AREA INV.X.K  
RUNDOWN VOLUME = 0.05743 INCHES  
PEAK DISCHARGE RATE = 71.71 CFPS AT 1.533 HOURS  
BASIN AREA = 0.6219 SQ. MI.  

******************************************************************************  
******SEGMENT BULK**************  
*********CODE=1 BULK FACTOR=1.01*********  
******************************************************************************  

COMPUTE LT TP  LCODE=1  N=3  ISLOPE=1  
LENGTH=400 FT  SLOPE=0.040  K-T  
LENGTH=1600 FT  SLOPE=0.040  K-T  
LENGTH=3400 FT  SLOPE=0.040  K-T  
K=0.03  CENTROID DISTANCE=2500 FT  

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE
<table>
<thead>
<tr>
<th>SCS UPLAND METHF FACTORS</th>
<th>LENGTH (FT)</th>
<th>SLOPE (FT/FT)</th>
<th>COMPOSITE K</th>
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<tbody>
<tr>
<td>SHEET FLOW PORTION</td>
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<td>0.015000</td>
<td>1.0000</td>
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<td>SHALLOW FLOW PORTION</td>
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<td>CHANNEL FLOW PORTION</td>
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<td>TOTAL BASIN</td>
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<table>
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<th>TOTAL BASIN LENGTH (FT)</th>
<th>TOTAL BASIN SLOPE (FT/FT)</th>
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<tr>
<td></td>
<td>0.000</td>
<td>5400.0</td>
<td>0.015000</td>
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</tbody>
</table>

| TIME OF CONCENTRATION (HRS)| 0.4414 | TIME TO PEAK (HRS)      | 0.2942 | LAG TIME (HRS) | 0.3310 |

| COMPUTE NH YD | ID=41 HYD=EX.N | AREA=1.1844 | PER A=100.0 | PER B=0.0 | PER C=0.0 | PER D=0.0 | TP=0.0 | RAINFALL=1.0 |

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<th>TIME TO PEAK (HRS)</th>
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<tbody>
<tr>
<td>K</td>
<td>0.3825868</td>
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<td>TP</td>
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<tr>
<td>K/TP RATIO</td>
<td>1.300000</td>
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<tr>
<td>SHAPE CONSTANT, N</td>
<td>2.758220</td>
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<tr>
<td>UNITE PEAK</td>
<td>0.30218</td>
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<tr>
<td>CFS UNIT VOLUME</td>
<td>0.3995</td>
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<tr>
<td>SLOPE</td>
<td>0.28530</td>
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<tr>
<td>P60</td>
<td>1.06003</td>
</tr>
<tr>
<td>AREA</td>
<td>1.1844000 SQ MI</td>
</tr>
<tr>
<td>IA</td>
<td>0.650000 INCHES</td>
</tr>
<tr>
<td>INF</td>
<td>1.670000 INCHES PER HOUR</td>
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<tr>
<td>RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT</td>
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| BULKING FACTOR APPLIED TO HYDROGRAPH | FACTOR | 1.01000 AT PEAK FLOW |

<table>
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<tr>
<th>PRINT HYD</th>
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<table>
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<tr>
<th>HYDROGRAPH FROM AREA EX.N</th>
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<tbody>
<tr>
<td>RUNOFF VOLUME</td>
</tr>
<tr>
<td>PEAK DISCHARGE RATE</td>
</tr>
<tr>
<td>BASIN AREA</td>
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</tbody>
</table>

### SEDIMENT BULK CODE=1 | BULK FACTOR=1.04

### COMPUTE LT TP CODE=1 NW=3 ISLOPE=1
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<th>LENGTH (FT)</th>
<th>SLOPE (FT/FT)</th>
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<tbody>
<tr>
<td>SHEET FLOW PORTION</td>
<td>400.0</td>
<td>0.030000</td>
</tr>
<tr>
<td>SHALLOW FLOW PORTION</td>
<td>1600.0</td>
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<tr>
<td>CHANNEL FLOW PORTION</td>
<td>4000.0</td>
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</tr>
<tr>
<td>TOTAL BASIN</td>
<td>6000.0</td>
<td>0.030000</td>
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</tbody>
</table>

| TIME OF CONCENTRATION (HRS)| 0.2983 | TIME TO PEAK (HRS) | 0.1929 | LAG TIME (HRS) | 0.7242 |

| COMPUTE NH YD | ID=24 HYD=EX.N | AREA=0.6947 | PER A=50.0 | PER B=50.0 | PER C=0.0 | PER D=0.0 | TP=0.0 | RAINFALL=1.0 |

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<tr>
<th>TIME TO PEAK (HRS)</th>
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<tbody>
<tr>
<td>K</td>
<td>0.2494228</td>
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<td>TP</td>
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<td>K/TP RATIO</td>
<td>1.253601</td>
</tr>
<tr>
<td>SHAPE CONSTANT, N</td>
<td>2.846376</td>
</tr>
<tr>
<td>UNITE PEAK</td>
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<tr>
<td>CFS UNIT VOLUME</td>
<td>0.9995</td>
</tr>
<tr>
<td>SLOPE</td>
<td>0.31900</td>
</tr>
<tr>
<td>P60</td>
<td>1.0500</td>
</tr>
<tr>
<td>AREA</td>
<td>0.6947000 SQ MI</td>
</tr>
<tr>
<td>IA</td>
<td>0.575000 INCHES</td>
</tr>
<tr>
<td>INF</td>
<td>1.465000 INCHES PER HOUR</td>
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<td>RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT</td>
<td>0.033333</td>
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</tbody>
</table>

| BULKING FACTOR APPLIED TO HYDROGRAPH | FACTOR | 1.04000 AT PEAK FLOW |

<table>
<thead>
<tr>
<th>PRINT HYD</th>
<th>ID=24 CODE=1</th>
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<table>
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<tr>
<th>HYDROGRAPH FROM AREA EX.N</th>
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<tbody>
<tr>
<td>RUNOFF VOLUME</td>
</tr>
<tr>
<td>PEAK DISCHARGE RATE</td>
</tr>
<tr>
<td>BASIN AREA</td>
</tr>
</tbody>
</table>

### COMPUTE LT TP CODE=1 NW=3 ISLOPE=1
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<th>LENGTH (FT)</th>
<th>SLOPE (FT/FT)</th>
<th>COMPOSITE K</th>
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<tbody>
<tr>
<td>SHEET FLOW PORTION</td>
<td>400.0</td>
<td>0.054000</td>
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<tr>
<td>SHALLOW FLOW PORTION</td>
<td>1600.0</td>
<td>0.054000</td>
</tr>
<tr>
<td>CHANNEL FLOW PORTION</td>
<td>5500.0</td>
<td>0.054000</td>
</tr>
<tr>
<td>TOTAL BASIN</td>
<td>7500.0</td>
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</table>
LAG EQUATION FACTORS:  KN= .0300  TOTAL BASIN LENGTH (FT)= 7500.0
TOTAL BASIN SLOPE (FT/FT)= .054000  CENTROID LENGTH (FT)= 4500.0

TIME OF CONCENTRATION (HRS) = .3649  TIME TO PEAK (HRS) = .2433  LAG TIME (HRS) = .2737

COMPUTE NH HYD  ID=35  HYD=EX.O  AREA=0.5484  PER A=50.0  PER B=50.0
PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=1

TIME TO PEAK (HRS) = .2433

K = .104576INCH  TP = .243368HR  K/TP RATIO = 1.253561  SHAPE CONSTANT, N = 2.846376
UNIT PEAK = 2456.8  CFS INIT VOLUME = .9999  B = 299.05  P60 = 1.0600
AREA = .948400 SQ ME  IA = .573000 INCHES  INF = 1.460000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD = DT = .033333
BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.040000 AT PEAK FLOW.

PRINT HYD  ID=15  CODE=1
HYDROGRAPH FROM AREA EX.O

RUNOFF VOLUME = .05713 INCHES = 2.8806 ACRE- FEET
PEAK DISCHARGE RATE = 59.83 CFS AT 1.633 HOURS  BASIN AREA = .9484 SQ. ME.

%%%%%%%%%%%%%%%%%%%%%%%%%%%%% BASIN EX.P %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%%%%%%%%%%%%%%%%%%%%%%%%%%%%% BASIN EX.P %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

COMPUTE LT TP  LCODE=1  N=3  ISLOPE=1
LENGTH=400 FT  SLOPE=0.04  K=1
LENGTH=800 FT  SLOPE=0.04  K=2
LENGTH=6000 FT  SLOPE=0.04  K=3
RH=0.03  CENTROID DISTANCE=3700 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K
SHEET FLOW PORTION  400.0  .040000  2.0000
SHALLOW FLOW PORTION  800.0  .040000  2.0000
CHANNEL FLOW PORTION  7600.0  .040000  2.0000
TOTAL BASIN  8800.0  .040000  2.5429

LAG EQUATION FACTORS:  KN= .0002  TOTAL BASIN LENGTH (FT)= 9500.0
TOTAL BASIN SLOPE (FT/FT)= .040000  CENTROID LENGTH (FT)= 3700.0

TIME OF CONCENTRATION (HRS) = .4236  TIME TO PEAK (HRS) = .2824  LAG TIME (HRS) = .3177

COMPUTE NH HYD  ID=36  HYD=EX.P  AREA=0.5133  PER A=50.0  PER B=50.0
PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=1

TIME TO PEAK (HRS) = .2824

K = .153983HR  TP = .282387HR  K/TP RATIO = 1.253561  SHAPE CONSTANT, N = 2.846376
UNIT PEAK = 890.32  CFS INIT VOLUME = .9999  B = 299.05  P60 = 1.0600
AREA = .931300 SQ ME  IA = .577500 INCHES  INF = 1.460000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD = DT = .033333
BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.040000 AT PEAK FLOW.

PRINT HYD  ID=16  CODE=1
HYDROGRAPH FROM AREA EX.P

RUNOFF VOLUME = .05713 INCHES = 2.8375 ACRE- FEET
PEAK DISCHARGE RATE = 50.33 CFS AT 1.667 HOURS  BASIN AREA = .9313 SQ. ME.

%%%%%%%%%%%%%%%%%%%%%%%%%%%%% BASIN EX.F %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%%%%%%%%%%%%%%%%%%%%%%%%%%%%% BASIN EX.F %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

COMPUTE LT TP  LCODE=1  N=3  ISLOPE=1
LENGTH=400 FT  SLOPE=0.099  K=1
LENGTH=800 FT  SLOPE=0.099  K=2
LENGTH=9300 FT  SLOPE=0.099  K=3
RH=0.03  CENTROID DISTANCE=4800 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K
SHEET FLOW PORTION  400.0  .009900  1.0000
SHALLOW FLOW PORTION  800.0  .009900  1.0000
CHANNEL FLOW PORTION  9100.0  .009900  3.0000
TOTAL BASIN  11100.0  .009900  2.6279

LAG EQUATION FACTORS:  KN= .0009  TOTAL BASIN LENGTH (FT)= 11800.0
TOTAL BASIN SLOPE (FT/FT)= .009900  CENTROID LENGTH (FT)= 4800.0

TIME OF CONCENTRATION (HRS) = .6894  TIME TO PEAK (HRS) = .4596  LAG TIME (HRS) = .5171

COMPUTE NH HYD  ID=37  HYD=EX.F  AREA=1.6397  PER A=200.0  PER B=0.0
PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=1
TIME TO PEAK (HRS)= .5936
K = .597492H
TP = .459501H
K/TP RATIO = 1.300000 SHAPE CONSTANT, N = 2.756220
UNIT PEAK = 31.80 CPS UNIT VOLUME = 1.000
AREA = 1.637500 SQ MI T = .6000 INCHES INF = 1.670000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABRASION/INFLATION NUMBER METHOD - DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAP. FACTOR = 1.01000 AT PEAK FLOW.

PRINT HYD ID=17 CODE=1
HYDROGRAPH FROM AREA EX.OFF.A

RUNOFF VOLUME = .01068 INCHES = .9329 ACRE-FEET
PEAK DISCHARGE RATE = 9.94 CPS AT 1.067 HOURS BASIN AREA = 1.6375 SQ. MI.

FF

F

BASIN EX. OFF B *****************************************

COMPUTE LT TP LOC=1 H=3 ISLOP=-1
LENGTH=3870.0 FT SLOPE=0.008 K=3
KN=0.03 CENTROID DISTANCE=8000 FT

BASIN LONGER THAN 4000.0 FT AND ALL BASIN LAG FACTORS NOT SPECIFIED
USE Km = .0160 AND Lc/L= .50000

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS: Km = .0160 TOTAL BASIN LENGTH (FT)= 18700.0
TOTAL BASIN SLOPE (FT/FT)= .028314 CENTROID LENGTH (FT)= 9350.0

TIME OF CONCENTRATION (HRS)= .4645 TIME TO PEAK (HRS)= .3007
LAG TIME (HRS)= .3848

COMPUTE NH HYD ID=18 HYD=EX.OFF.B AREA=4.6078 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

TIME TO PEAK (HRS)= .3007
K = .405329H
TP = .305000H
K/TP RATIO = 1.300000 SHAPE CONSTANT, N = 2.756220
UNIT PEAK = 33.68 CPS UNIT VOLUME = .9999
AREA = .607500 SQ MI T = .6000 INCHES INF = 1.670000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABRASION/INFLATION NUMBER METHOD - DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAP. FACTOR = 1.01000 AT PEAK FLOW.

PRINT HYD ID=18 CODE=1
HYDROGRAPH FROM AREA EX.OFF.B

RUNOFF VOLUME = .01068 INCHES = .2625 ACRE-PEET
PEAK DISCHARGE RATE = 4.13 CPS AT 1.700 HOURS BASIN AREA = .4608 SQ. MI.

#********************************************************************
#********************************************************************
#********************************************************************

BASIN EX. OFF C *****************************************

COMPUTE LT TP LOC=1 H=3 ISLOP=-1
LENGTH=400 FT SLOPE=0.011 K=1
LENGTH=3600 FT SLOPE=0.011 K=2
LENGTH=3600 FT SLOPE=0.011 K=3

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS
SHEET FLOW PORTION LENGTH (FT)
SHALLOW FLOW PORTION 400.0 .011000 1.0000
CHANNEL FLOW PORTION 1600.0 .011000 2.0000
TOTAL BASIN 3000.0 .011000 2.0719

TIME OF CONCENTRATION (HRS)= .4591 TIME TO PEAK (HRS)= .3007
LAG TIME (HRS)= .3443

COMPUTE NH HYD ID=19 HYD=EX.OFF.C AREA=1.3255 PER A=60.0 PER B=15.0
PER C=10.0 PER D=15.0 TP=0.0 RAINFALL=-1

TIME TO PEAK (HRS)= .3006
K = .214488H
TP = .306500H
K/TP RATIO = .700063 SHAPE CONSTANT, N = 5.2144875
UNIT PEAK = 318.3 CPS UNIT VOLUME = 1.000
AREA = .2224750 SQ MI T = .1000 INCHES INF = .040000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABRASION/INFLATION NUMBER METHOD - DT = .033333

K = .283374H
TP = .306500H
K/TP RATIO = 1.252001 SHAPE CONSTANT, N = 2.849950
UNIT PEAK = 333.3 CPS UNIT VOLUME = .9999
AREA = 1.283375 SQ MI T = .209.32 INF = .1459700 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABRASION/INFLATION NUMBER METHOD - DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAP. FACTOR = 1.01000 AT PEAK FLOW.

PRINT HYD ID=19 CODE=1
HYDROGRAPH FROM AREA EX.OFF.C
RUNOFF VOLUME = .19418 INCHES = 15.6640 ACRE-FOOT
PEAK DISCHARGE RATE = 254.35 CPS AT 1.700 HOURS BASIN AREA = 1.5125 SQ. MI.

FINISH
NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 09:40:45
**PROJECT NAME: SANTOLINA**

**DATE: NOVEMBER 8, 2012**

**INPUT FILE NAME: SEX.24.HYN**

**OUTPUT FILE NAME: SEX.24.OUT**

**PROJECT NUMBER: 291252**

**COMMENTS: 5 YEAR-24 HOUR STORM**

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

**RAINFALL**

**TYPE=3**

**RAINF AIN QUARTER=0.0**

**RAIN DAY=1.25 IN**

**RAIN START=0.0 IN**

**TIME=1.25 IN**

**DI=0.033333**

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

**COMPUTE BASIN IN SANTOLINA - EXISTING CONDITION**

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

**BULK FACTOR FOR 5 YEAR STORM IS 3 FOR WEA BASINS AND 4 FOR ERSCARP BASINS**

**SEDIMENT BULK**

**CODE=1**

**BULK FACTOR=1.04**

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

**COMPUTE LT TP**

**CODE=1**

**NK=3**

**ISLOPE=1**

**LENGTH=400 FT SLOPE=0.05 K=1**

**LENGTH=1600 FT SLOPE=0.05 K=2**

**LENGTH=4000 FT SLOPE=0.05 K=3**

**COMPUTE NM HYD**

**ID=1 HYD=EX.A AREA=0.5436 PER C=300.0 PER D=0.0**

**TP=0.0 RAINFALL=4**

**PRINT HYD**

**ID=1 CODE=1**

**SEDIMENT BULK**

**CODE=1**

**BULK FACTOR=1.01**

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

**COMPUTE LT TP**

**CODE=1**

**NK=3**

**ISLOPE=1**

**LENGTH=400 FT SLOPE=0.005 K=1**

**LENGTH=1600 FT SLOPE=0.005 K=2**

**LENGTH=4000 FT SLOPE=0.005 K=3**

**K=0.03 CENTRED DISTANCE=2100 FT**

**COMPUTE NM HYD**

**ID=2 HYD=EX.B AREA=2.0609 PER C=100.0 PER D=0.0**

**TP=0.0 RAINFALL=1**

**PRINT HYD**

**ID=2 CODE=1**

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

**COMPUTE LT TP**

**CODE=1**

**NK=3**

**ISLOPE=1**

**LENGTH=400 FT SLOPE=0.01 K=1**

**LENGTH=1600 FT SLOPE=0.01 K=2**

**LENGTH=4000 FT SLOPE=0.01 K=3**

**K=0.03 CENTRED DISTANCE=3500 FT**

**COMPUTE NM HYD**

**ID=3 HYD=EX.C AREA=1.3750 PER C=100.0 PER D=0.0**

**TP=0.0 RAINFALL=1**

**PRINT HYD**

**ID=3 CODE=1**

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

**COMPUTE LT TP**

**CODE=1**

**NK=3**

**ISLOPE=1**

**LENGTH=400 FT SLOPE=0.008 K=1**

**LENGTH=1600 FT SLOPE=0.008 K=2**

**LENGTH=4700 FT SLOPE=0.008 K=3**

**K=0.03 CENTRED DISTANCE=5400 FT**

**COMPUTE NM HYD**

**ID=4 HYD=EX.D AREA=0.5339 PER C=200.0 PER D=0.0**

**TP=0.0 RAINFALL=1**

**PRINT HYD**

**ID=4 CODE=1**

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

**COMPUTE LT TP**

**CODE=1**

**NK=3**

**ISLOPE=1**

**LENGTH=400 FT SLOPE=0.006 K=1**

**LENGTH=1600 FT SLOPE=0.006 K=2**

**LENGTH=9500 FT SLOPE=0.006 K=3**

**K=0.03 CENTRED DISTANCE=5400 FT**

**COMPUTE NM HYD**

**ID=5 HYD=EX.E AREA=0.2054 PER C=200.0 PER D=0.0**

**TP=0.0 RAINFALL=1**

**PRINT HYD**

**ID=5 CODE=1**

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

**COMPUTE LT TP**

**CODE=1**

**NK=3**

**ISLOPE=1**

**LENGTH=400 FT SLOPE=0.001 K=1**

**LENGTH=1600 FT SLOPE=0.001 K=2**

**LENGTH=9260 FT SLOPE=0.001 K=3**

**K=0.03 CENTRED DISTANCE=5400 FT**

**COMPUTE NM HYD**

**ID=6 HYD=EX.F AREA=0.1707 PER C=200.0 PER D=0.0**

**TP=0.0 RAINFALL=1**

**PRINT HYD**

**ID=6 CODE=1**

******************************************************************************
**SEX.24.4.RY**

************************************************************* BASEIN EX.G ***********************************************************

**COMPUTE LT TP**
LCODE=3  NO=3  ISLOPE=1
LENGTH=13300 FT  SLOPE=0.02  K=3
NO=0.03  CENTROID DISTANCE=1000 FT

**COMPUTE NH HYD**
ID=7  HYD=EX.G  AREA=2.2625  PER A=100.0  PER B=0.0
PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=1

**PRINT HYD**
ID=7  CODE=1

************************************************************* BASEIN EX.H ***********************************************************

**COMPUTE LT TP**
LCODE=1  NO=4  ISLOPE=0
LENGTH=26500 FT  SLOPE=0.017  K=3
NO=0.03  CENTROID DISTANCE=3000 FT

**COMPUTE NH HYD**
ID=8  HYD=EX.H  AREA=1.5999  PER A=100.0  PER B=0.0
PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=1

**PRINT HYD**
ID=8  CODE=1

************************************************************* BASEIN EX.I ***********************************************************

**COMPUTE LT TP**
LCODE=3  NO=3  ISLOPE=1
LENGTH=400 FT  SLOPE=0.021  K=1
LENGTH=1200 FT  SLOPE=0.001  K=2
LENGTH=3700 FT  SLOPE=0.001  K=3
NO=0.03  CENTROID DISTANCE=2000 FT

**COMPUTE NH HYD**
ID=9  HYD=EX.I  AREA=1.6929  PER A=100.0  PER B=0.0
PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=1

**PRINT HYD**
ID=9  CODE=1

************************************************************* BASEIN EX.J ***********************************************************

**COMPUTE LT TP**
LCODE=1  NO=2  ISLOPE=1
LENGTH=400 FT  SLOPE=0.017  K=1
LENGTH=700 FT  SLOPE=0.017  K=2

**COMPUTE NH HYD**
ID=10  HYD=EX.J  AREA=0.0250  PER A=100.0  PER B=0.0
PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=1

**PRINT HYD**
ID=10  CODE=1

************************************************************* BASEIN EX.K ***********************************************************

**COMPUTE LT TP**
LCODE=1  NO=0  ISLOPE=1
LENGTH=400 FT  SLOPE=0.029  K=1
LENGTH=1200 FT  SLOPE=0.029  K=2
LENGTH=1600 FT  SLOPE=0.029  K=3
NO=0.03  CENTROID DISTANCE=3400 FT

**COMPUTE NH HYD**
ID=11  HYD=EX.K  AREA=1.0521  PER A=50.0  PER B=50.0
PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=1

**PRINT HYD**
ID=11  CODE=1

************************************************************* BASEIN EX.L ***********************************************************

**COMPUTE LT TP**
LCODE=1  NO=5  ISLOPE=1
LENGTH=400 FT  SLOPE=0.076  K=1
LENGTH=1900 FT  SLOPE=0.076  K=2
LENGTH=2600 FT  SLOPE=0.076  K=3

**COMPUTE NH HYD**
ID=12  HYD=EX.L  AREA=0.6218  PER A=50.0  PER B=50.0
PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=1

**PRINT HYD**
ID=12  CODE=1

************************************************************* BASEIN EX.M ***********************************************************

**COMPUTE LT TP**
LCODE=1  NO=3  ISLOPE=1
LENGTH=400 FT  SLOPE=0.015  K=1
LENGTH=1000 FT  SLOPE=0.015  K=2
LENGTH=1400 FT  SLOPE=0.015  K=3
NO=0.03  CENTROID DISTANCE=2500 FT

**COMPUTE NH HYD**
ID=13  HYD=EX.M  AREA=1.2844  PER A=200.0  PER B=0.0
PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=1

**PRINT HYD**
ID=13  CODE=1

************************************************************* BASEIN EX.N ***********************************************************

**COMPUTE LT TP**
LCODE=1  NO=3  ISLOPE=1
LENGTH=400 FT  SLOPE=0.019  K=1
LENGTH=1600 FT  SLOPE=0.019  K=2
LENGTH=6000 FT  SLOPE=0.019  K=3
NO=0.03  CENTROID DISTANCE=4200 FT

**COMPUTE NH HYD**
ID=14  HYD=EX.N  AREA=0.0047  PER A=50.0  PER B=50.0

Page 2
**SEX_24.HYM**

PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

**PRINT HYD**

ID=14 CODE=1

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

**COMPUTE LT TP**

LCODE=1 NK=3 ISLOPE=-1
LENGTH=450 FT SLOPE=0.054 K=1
LENGTH=1500 FT SLOPE=0.054 K=2
LENGTH=5000 FT SLOPE=0.054 K=3
Kn=0.03 CENTROID DISTANCE=4500 FT

**COMPUTE BM HYD**

Id=15 HYD=EX.0 AREA=0.8434 PER A=50.0 PER B=50.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

**PRINT HYD**

ID=15 CODE=1

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

**COMPUTE LT TP**

LCODE=1 NK=3 ISLOPE=-1
LENGTH=450 FT SLOPE=0.04 K=1
LENGTH=1500 FT SLOPE=0.04 K=2
LENGTH=5000 FT SLOPE=0.04 K=3
Kn=0.03 CENTROID DISTANCE=3700 FT

**COMPUTE BM HYD**

Id=16 HYD=EX.P AREA=0.9313 PER A=50.0 PER B=50.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

**PRINT HYD**

ID=16 CODE=1

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

**SEDIMENT BULK**

CODE=1 BULK FACTOR=1.01

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

**COMPUTE LT TP**

LCODE=1 NK=1 ISLOPE=-1
LENGTH=900 FT SLOPE=0.009 K=1
LENGTH=1600 FT SLOPE=0.009 K=2
LENGTH=9000 FT SLOPE=0.009 K=3
Kn=0.03 CENTROID DISTANCE=4500 FT

**COMPUTE BM HYD**

Id=17 HYD=EX.OFF.A AREA=1.6375 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

**PRINT HYD**

ID=17 CODE=1

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

**COMPUTE LT TP**

LCODE=1 NK=1 ISLOPE=-1
LENGTH=900 FT SLOPE=0.009 K=1
LENGTH=1600 FT SLOPE=0.009 K=2
LENGTH=9000 FT SLOPE=0.009 K=3
Kn=0.03 CENTROID DISTANCE=8000 FT

**COMPUTE BM HYD**

Id=18 HYD=EX.OFF.B AREA=0.6678 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

**PRINT HYD**

ID=18 CODE=1

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

**COMPUTE LT TP**

LCODE=1 NK=1 ISLOPE=-1
LENGTH=900 FT SLOPE=0.011 K=1
LENGTH=1600 FT SLOPE=0.011 K=2
LENGTH=9000 FT SLOPE=0.011 K=3

**COMPUTE BM HYD**

Id=19 HYD=EX.OFF.C AREA=1.5125 PER A=50.0 PER B=35.0
PER C=0.0 PER D=15.0 TP=0.0 RAINFALL=1

**PRINT HYD**

ID=19 CODE=1

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

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

FINISH
### ANYNO PROGRAM (ANYNO.37)

**RUN DATE (DD/M/DD/YE) = 11/26/2012**

**START TIME (HOUR:MIN:SEC) = 08:41:00**

**USER NO. = ANYNO-5-9702:Lebanun-AH**

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### COMPUTED 24-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HRS.

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</tr>
<tr>
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<td>0.0959</td>
</tr>
</tbody>
</table>

**Page 1**
**SEX_21.OUT**

**COMPUTE BASINS IN SANTOLINA - EXISTING CONDITION**

**F**

**BULK FACTOR FOR 5 YR STORM IS 1 FOR MESA BASINS AND 4 FOR ESCARPMENT BASINS**

**SEDIMENT BULK CODE=1 BULK FACTOR=1.04**

**BASIN EX.A**

**COMPUTE LT TP**

<table>
<thead>
<tr>
<th>LCOCDE=1</th>
<th>NK=3</th>
<th>TSLOPE=3</th>
</tr>
</thead>
<tbody>
<tr>
<td>LENGTH=400 FT</td>
<td>SLOPE=0.05</td>
<td>K=1</td>
</tr>
<tr>
<td>LENGTH=1060 FT</td>
<td>SLOPE=0.05</td>
<td>K=2</td>
</tr>
<tr>
<td>LENGTH=400 FT</td>
<td>SLOPE=0.05</td>
<td>K=3</td>
</tr>
</tbody>
</table>

**TC AND TD COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

<table>
<thead>
<tr>
<th>LENGTH (FT)</th>
<th>SLOPE (FT/FT)</th>
<th>COMPOSITE K</th>
</tr>
</thead>
<tbody>
<tr>
<td>400.0</td>
<td>.005000</td>
<td>1.00000</td>
</tr>
<tr>
<td>400.0</td>
<td>.005000</td>
<td>1.00000</td>
</tr>
<tr>
<td>400.0</td>
<td>.005000</td>
<td>1.00000</td>
</tr>
</tbody>
</table>

**TOTAL BASIN**

| 2400.0 | .005000 | 1.80000 |

**TIME OF CONCENTRATION (HRS)= .1658 TIME TO PEAK (HRS)= .1104 LAG TIME (HRS)= .1242**

**TIME TO PEAK COMPUTED TO BE LESS THAN 0.33333 HOURS MINIMUM VALUE.**

**REVISED VALUE: TIME OF CONCENTRATION (HRS)= .2000 TIME TO PEAK (HRS)= .1333 LAG TIME (HRS)= .1500**

**COMPUTE NW HYD**

<table>
<thead>
<tr>
<th>ID=1</th>
<th>HYD=EX.A</th>
<th>AREA=0.5438</th>
<th>PER A=0.0</th>
<th>PER B=50.0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PER C=50.0</td>
<td>PER D=0.0</td>
<td></td>
</tr>
</tbody>
</table>

**TIME TO PEAK (HRS)= .1333**

**K = .239239 | TP = 1833333 | K/TP RATIO = 1.115224 | SHAPE CONSTANT, N = 3,100618**

**UNIT PEAK = 1201.0 | CFS | UNIT VOLUME = 1,000 | B = 234.67 | PEN = 1.0600**

**AREA = 543800 SQ MI | IA = 42500 INCHES | YM = 1.04000 INCHES PER HOUR**

**RUNOFF COMPUTED BY INITIAL ABSTRACTION-INFILTRATION NUMBER METHOD - DT = 0.33533**

**BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.04000 AT PEAK FLOW.**

**PRINT HYD**

**ID=1 | CODE=1**

**HYDROGRAPH FROM AREA EX.A**

**RUNOFF VOLUME = .20176 INCHES = 1.8116 ACRE-FOOT**

**PEAK DISCHARGE RATE = 250.08 CFS AT 1.553 HOURS BASIN AREA = .5438 SQ. MI.**

**-------------**

**SEDIMENT BULK CODE=1 BULK FACTOR=1.01**

**BASIN EX.B**

**COMPUTE LT TP**

<table>
<thead>
<tr>
<th>LCOCDE=1</th>
<th>NK=3</th>
<th>TSLOPE=3</th>
</tr>
</thead>
<tbody>
<tr>
<td>LENGTH=400 FT</td>
<td>SLOPE=0.05</td>
<td>K=1</td>
</tr>
<tr>
<td>LENGTH=1060 FT</td>
<td>SLOPE=0.05</td>
<td>K=2</td>
</tr>
<tr>
<td>LENGTH=5500 FT</td>
<td>SLOPE=0.05</td>
<td>K=3</td>
</tr>
</tbody>
</table>

**Kw=0.03 | CENTROID DISTANCE=2100 FT**

**TC AND TD COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

<table>
<thead>
<tr>
<th>LENGTH (FT)</th>
<th>SLOPE (FT/FT)</th>
<th>COMPOSITE K</th>
</tr>
</thead>
<tbody>
<tr>
<td>400.0</td>
<td>.005000</td>
<td>1.00000</td>
</tr>
<tr>
<td>5500.0</td>
<td>.005000</td>
<td>3.00000</td>
</tr>
</tbody>
</table>

**TOTAL BASIN**

| 7500.0 | .005000 | 2.4725 |

**LAG EQUATION FACTORS: K= .0300 | TOTAL BASIN LENGTH (FT)= 2500.0**

**TOTAL BASIN SLOPE (FT/FT)= .005000 | CENTROID LENGTH (FT)= 2100.0**

**TIME OF CONCENTRATION (HRS)= .6569 TIME TO PEAK (HRS)= .4300 LAG TIME (HRS)= .4927**

**COMPUTE NW HYD**

<table>
<thead>
<tr>
<th>ID=2</th>
<th>HYD=EX.B</th>
<th>AREA=2.0109</th>
<th>PER A=100.0</th>
<th>PER B=0.0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PER C=6.0</td>
<td>PER D=0.0</td>
<td></td>
</tr>
</tbody>
</table>

**TIME TO PEAK (HRS)= .4300**

**K = .565941 | TP = .435355 | K/TP RATIO = 1.360000 | SHAPE CONSTANT, N = 2.756220**

**UNIT PEAK = 1735.8 | CFS | UNIT VOLUME = 1.000 | B = 261.19 | PEN = 1.0600**

**AREA = 2.010900 SQ MI | IA = 4500 INCHES | YM = 1.06000 INCHES PER HOUR**

**RUNOFF COMPUTED BY INITIAL ABSTRACTION-INFILTRATION NUMBER METHOD - DT = 0.33333**

**BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.01000 AT PEAK FLOW.**

**PRINT HYD**

**ID=2 | CODE=3**

**HYDROGRAPH FROM AREA EX.B**

**RUNOFF VOLUME = .01068 INCHES = 1.6583 ACRE-FOOT**

**PEAK DISCHARGE RATE = 18.55 CFS AT 1.833 HOURS BASIN AREA = 2.0109 SQ. MI.**

Page 2
The document contains a series of text blocks related to hydrological calculations and procedures. The text appears to be extracted from a hydrological study or report, detailing specific calculations and procedures for basin management. The content includes equations, variables, and units of measurement, typical of hydrology and water management studies.

The documents are structured in a clear, logical format, with each section dedicated to a different aspect of basin management, such as calculating basin slope, time of concentration, and peak discharge rates. The units used are consistent with hydrological standards, including feet, inches, and cubic feet per second (cfs). The text is dense and technical, requiring a good understanding of hydrological principles to interpret accurately.
TC AND TD COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

Sheet Flow Portion: 1500.0
Shallow Flow Portion: 1500.0
Channel Flow Portion: 1500.0
Total Basin: 4500.0

Total Basin Slope (ft/ft): 0.006000
Total Basin Length (ft): 11500.0

K = 0.006
Total Basin Length (ft): 11500.0

Time of Concentration (hrs): 0.775
Time to Peak (hrs): 0.5150
Lag Time (hrs): 0.5794

Print Hyd: 1
Runoff Volume: 0.00668
Peak Discharge Rate: 33.12 CFS

TC AND TD COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

Sheet Flow Portion: 1500.0
Shallow Flow Portion: 1500.0
Channel Flow Portion: 1500.0
Total Basin: 4500.0

Total Basin Slope (ft/ft): 0.006000
Total Basin Length (ft): 11500.0

K = 0.006
Total Basin Length (ft): 11500.0

Time of Concentration (hrs): 0.687
Time to Peak (hrs): 0.4665
Lag Time (hrs): 0.5248

Print Hyd: 1
Runoff Volume: 0.00681
Peak Discharge Rate: 10.2 CFS

TC AND TD COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

Sheet Flow Portion: 1500.0
Shallow Flow Portion: 1500.0
Channel Flow Portion: 1500.0
Total Basin: 4500.0

Total Basin Slope (ft/ft): 0.006000
Total Basin Length (ft): 11500.0

K = 0.006
Total Basin Length (ft): 11500.0

Time of Concentration (hrs): 0.6932
Time to Peak (hrs): 0.4621
Lag Time (hrs): 0.5189


**.compute nh hyd**

```
3yk.24-cut

K = .600053HR
K/TP RATIO = 1.300000
SHAPE CONSTANT, N = 2.756220
UNIT PEAK = 1279.5 CFS
UNIT VOLUME = 1.000
B = 261.30
P0 = 1.0600
AREA = 2.762500 SQ MI
IA = .65000 INCHES
INF = 1.67000 INCHES PER HRR
RUND OFF COMPARED BY INITIAL ABSTRACTION/INFFILTRATION NUMBER METHOD - DT = 0.013333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.01000 AT PEAK FLOW.
```

**PRINT HYD**

```
ID=7 CODE=1
Hydrograph from area ex.g

Runoff Volume = 60068 INCHES = 2.2869 ACRE-FOOT
Peak Discharge Rate = 22.66 CFS AT 1.867 HOURS
Basin Area = 2.2625 SQ. MI.
```

**.-----------------------------------------------.**

**.-----------------------------------------------.**

**COMPUTE LT TP**

```
LCCODE=1 NR=0 ISLOPE=1
LENGTH=20500 FT
SLOPE=0.012 K=1
K2=0.00 CENTROID DISTANCE=6600 FT
```

**TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

```
LAG EQUATION FACTORS: K = .030000
TOTAL BASIN LENGTH (FT) = 20500.0
CENTROID LENGTH (FT) = 6600.0
```

**TIME OF CONCENTRATION (HRS)= .8540 TIME TO PEAK (HRS) = .5560 LAG TIME (HRS) = .8255**

**compute nh hyd**

```
ID=8 HYD=EX.H HRI=4.5568 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1
```

**TIME TO PEAK (HRS)= .5560**

```
K = .772798HR
K/TP RATIO = 1.559800
SHAPE CONSTANT, N = 2.756220
UNIT PEAK = 2160.4 CFS
UNIT VOLUME = 1.000
B = 261.30
P0 = 1.0600
AREA = 4.556800 SQ MI
IA = .65000 INCHES
INF = 1.67000 INCHES PER HRR
RUND OFF COMPARED BY INITIAL ABSTRACTION/INFFILTRATION NUMBER METHOD - DT = 0.013333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.01000 AT PEAK FLOW.
```

**PRINT HYD**

```
ID=9 CODE=1
Hydrograph from area ex.h

Runoff Volume = 012068 INCHES = 2.2184 ACRE-FOOT
Peak Discharge Rate = 23.07 CFS AT 1.967 HOURS
Basin Area = 4.5969 SQ. MI.
```

**.-----------------------------------------------.**

**.-----------------------------------------------.**

**COMPUTE LT TP**

```
LCCODE=1 NR=3 ISLOPE=1
LENGTH=3000 FT
SLOPE=0.021 K=1
K2=0.03 CENTROID DISTANCE=3000 FT
```

**TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

```
LAG EQUATION FACTORS: K = .010000
TOTAL BASIN LENGTH (FT) = 2700.0
CENTROID LENGTH (FT) = 300.0
```

**TIME OF CONCENTRATION (HRS)= .494 TIME TO PEAK (HRS) = .2969 LAG TIME (HRS) = .3334**

**compute nh hyd**

```
ID=9 HYD=EX.I HRI=1.6968 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1
```

**TIME TO PEAK (HRS)= .2969**

```
K = .585243HR
K/TP RATIO = 1.300000
SHAPE CONSTANT, N = 2.756220
UNIT PEAK = 4498.3 CFS
UNIT VOLUME = .6099
B = 261.30
P0 = 1.0600
AREA = 1.246300 SQ MI
IA = .65000 INCHES
INF = 1.67000 INCHES PER HRR
RUND OFF COMPARED BY INITIAL ABSTRACTION/INFFILTRATION NUMBER METHOD - DT = 0.013333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.01000 AT PEAK FLOW.
```

**PRINT HYD**

```
ID=9 CODE=1
Hydrograph from area ex.i

Runoff Volume = 010068 INCHES = .9667 ACRE-FOOT
```
PEAK DISCHARGE RATE = 15.58 CPS AT 1.700 HOURS  BASIN AREA = 1.6869 SQ. MI.

---

**Basin Ex. J**

**Compute Lt Ty**

```
CODE=1  NS=2  ISLOPE=1
LENGTH=400 FT SLOPE=0.017  K=1
LENGTH=700 FT SLOPE=0.017  K=2
```

**SCS Upland Method Factors**

```
SHEET FLOW PORTION  LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K
400.0  0.017000  1.0000

SHALLOW FLOW PORTION  LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K
70.0  0.017000  2.0000

CHANNEL FLOW PORTION  LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K
110.0  0.017000  1.4667
```

**Time of Concentration (HRS) = 0.1598  Time to Peak (HRS) = 0.1805  Lag Time (HRS) = 0.1198**

**Time to Peak Computed to Be Less Than 0.13333 Hour Minimum Value.**

**Revised Values: Time of Concentration (HRS) = 0.2000  Time to Peak (HRS) = 0.1333  Lag Time (HRS) = 0.1500**

**Compute Nh Hyd**

```
ID=10  HYD-EX.J  AREA=0.0250  PER A=400.0  PER B=0.0  PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=-1
```

**Time to Peak (HRS) = 0.1333**

```
K = 0.18000000  TP = 0.13333333  K/TP RATIO = 1.35000000  SHAPE CONSTANT, N = 2.667659
UNIT PEAK = 47.53  CR0 UNIT VOLUME = 0.9988  N = 1.5350  PDD = 0.00600000
AREA = 0.025000  SQ FT  TP = 0.006000  INF = 0.006000  INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033333
```

**Bulking Factor Applied to Hydrograph Factor = 1.01000 at Peak Flow.**

**Print Hyd**

```
ID=10  CODE=1
```

**Hydrograph from Area Ex. J**

**Runoff Volume = 0.4068 INCHES = 0.0142 ACRE-FEET**

**Peak Discharge Rate = 1.51 CPS AT 1.133 HOURS  BASIN AREA = 0.0250 SQ. MI.**

---

**Basin Ex. K**

**Compute Lt Ty**

```
CODE=1  NS=0  ISLOPE=1
LENGTH=600 FT SLOPE=0.028  K=1
LENGTH=1600 FT SLOPE=0.028  K=2
LENGTH=600 FT SLOPE=0.028  K=3
KN=0.03  CENTERLINE DISTANCE=3400 FT
```

**SCS Upland Method Factors**

```
SHEET FLOW PORTION  LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K
400.0  0.028000  1.0000

SHALLOW FLOW PORTION  LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K
1600.0  0.028000  1.0000

CHANNEL FLOW PORTION  LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K
600.0  0.028000  1.0000
```

**Time of Concentration (HRS) = 0.0652  Time to Peak (HRS) = 0.0435  Lag Time (HRS) = 0.0489**

**Time to Peak Computed to Be Less Than 0.13333 Hour Minimum Value.**

**Revised Values: Time of Concentration (HRS) = 0.2000  Time to Peak (HRS) = 0.1333  Lag Time (HRS) = 0.1500**

**Compute Nh Hyd**

```
ID=11  HYD-EX.K  AREA=0.0531  PER A=50.0  PER B=50.0  PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=-1
```

**Time to Peak (HRS) = 0.1333**

```
K = 0.171433  TP = 0.13333333  K/TP RATIO = 1.253561  SHAPE CONSTANT, N = 2.848376
UNIT PEAK = 2322.0  CPS UNIT VOLUME = 0.9594  N = 1.26965  PDD = 0.00600000
AREA = 0.053100  SQ FT  TN = 0.057000  INCHES  INF = 0.006000  INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033333
```

**Bulking Factor Applied to Hydrograph Factor = 1.04000 at Peak Flow.**

**Print Hyd**

```
ID=11  CODE=1
```

**Hydrograph from Area Ex. K**

**Runoff Volume = 0.05713 INCHES = 0.2068 ACRE-FEET**

**Peak Discharge Rate = 121.47 CPS AT 1.133 HOURS  BASIN AREA = 0.0531 SQ. MI.**

---
**SEX.24.OUT**

**TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

SCS UPLAND METHOD FACTORS

<table>
<thead>
<tr>
<th>Sheet Flow Portion</th>
<th>Length (ft)</th>
<th>Slope (ft/ft)</th>
<th>Composite K</th>
</tr>
</thead>
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<tr>
<td>400.0</td>
<td>.084000</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>3600.0</td>
<td>.076600</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>2800.0</td>
<td>.076600</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>Total Basin</td>
<td>2800.0</td>
<td>.067600</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.9091</td>
<td></td>
</tr>
</tbody>
</table>

Time of Concentration (hrs) = .1478  Time to Peak (hrs) = .0885  Lag Time (hrs) = .1108

Time to Peak Computed to Be Less Than 0.133333 Hour Minimum Value. Revised Values: Time of Concentration (hrs) = .2942 Time to Peak (hrs) = .2942  Lag Time (hrs) = .3310

**COMPUTE NH YD**

ID=33  HYD=EX.M  AREA=1.1844  PER A=.1000  PER B=.09  PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=-2

**TIME TO PEAK (HRS) = .2942**

K = .302510  TP = .2942  K/TP RATIO = 1.300000  SHAPE CONSTANT, H = 2.756220

UNIT PEAK = 1.0051  CFS  UNIT VOL = .9999  B = 261.30  P60 = 1.0000

AREA = 1.1844  SQ MI  IA = .6748  ACRES  INF = 1.6748  INCHES PER HOUR

RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - ET = .033333

RUNOFF FACTOR APPLIED TO HYDROGRAPH  FACTOR = 1.010000 AT PEAK FLOW.

PRINT YD

ID=33  CODE=1

**HYDROGRAPH FROM AREA EX.M**

**SEDIMENT BULK CODE=1  BULK FACTOR=1.04**

**BASIN EX.M ****************************

**COMPUTE LT TP**

<table>
<thead>
<tr>
<th>Sheet Flow Portion</th>
<th>Length (ft)</th>
<th>Slope (ft/ft)</th>
<th>Composite K</th>
</tr>
</thead>
<tbody>
<tr>
<td>400.0</td>
<td>.084000</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>3600.0</td>
<td>.076600</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>2800.0</td>
<td>.076600</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>Total Basin</td>
<td>2800.0</td>
<td>.067600</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.9091</td>
<td></td>
</tr>
</tbody>
</table>

Time of Concentration (hrs) = .1478  Time to Peak (hrs) = .0885  Lag Time (hrs) = .1108

Time to Peak Computed to Be Less Than 0.133333 Hour Minimum Value. Revised Values: Time of Concentration (hrs) = .2942 Time to Peak (hrs) = .2942  Lag Time (hrs) = .3310

**COMPUTE NH YD**

ID=33  HYD=EX.M  AREA=1.1844  PER A=.1000  PER B=.09  PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=-2

**TIME TO PEAK (HRS) = .2942**

K = .302510  TP = .2942  K/TP RATIO = 1.300000  SHAPE CONSTANT, H = 2.756220

UNIT PEAK = 1.0051  CFS  UNIT VOL = .9999  B = 261.30  P60 = 1.0000

AREA = 1.1844  SQ MI  IA = .6748  ACRES  INF = 1.6748  INCHES PER HOUR

RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - ET = .033333

RUNOFF FACTOR APPLIED TO HYDROGRAPH  FACTOR = 1.010000 AT PEAK FLOW.

PRINT YD

ID=33  CODE=1

**HYDROGRAPH FROM AREA EX.M**

**SEDIMENT BULK CODE=1  BULK FACTOR=1.04**

**BASIN EX.M ****************************

**COMPUTE LT TP**

<table>
<thead>
<tr>
<th>Sheet Flow Portion</th>
<th>Length (ft)</th>
<th>Slope (ft/ft)</th>
<th>Composite K</th>
</tr>
</thead>
<tbody>
<tr>
<td>400.0</td>
<td>.076600</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>3600.0</td>
<td>.076600</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>2800.0</td>
<td>.076600</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>Total Basin</td>
<td>2800.0</td>
<td>.076600</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.9091</td>
<td></td>
</tr>
</tbody>
</table>

Time of Concentration (hrs) = .1478  Time to Peak (hrs) = .0885  Lag Time (hrs) = .1108

Time to Peak Computed to Be Less Than 0.133333 Hour Minimum Value. Revised Values: Time of Concentration (hrs) = .2942 Time to Peak (hrs) = .2942  Lag Time (hrs) = .3310

**COMPUTE NH YD**

ID=33  HYD=EX.M  AREA=1.1844  PER A=.1000  PER B=.09  PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=-2

**TIME TO PEAK (HRS) = .2942**

K = .302510  TP = .2942  K/TP RATIO = 1.300000  SHAPE CONSTANT, H = 2.756220

UNIT PEAK = 1.0051  CFS  UNIT VOL = .9999  B = 261.30  P60 = 1.0000

AREA = 1.1844  SQ MI  IA = .6748  ACRES  INF = 1.6748  INCHES PER HOUR

RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - ET = .033333

RUNOFF FACTOR APPLIED TO HYDROGRAPH  FACTOR = 1.010000 AT PEAK FLOW.

PRINT YD

ID=33  CODE=1

**HYDROGRAPH FROM AREA EX.M**

**SEDIMENT BULK CODE=1  BULK FACTOR=1.04**

**BASIN EX.M ****************************

**COMPUTE LT TP**

<table>
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<tr>
<th>Sheet Flow Portion</th>
<th>Length (ft)</th>
<th>Slope (ft/ft)</th>
<th>Composite K</th>
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Time of Concentration (hrs) = .1478  Time to Peak (hrs) = .0885  Lag Time (hrs) = .1108

Time to Peak Computed to Be Less Than 0.133333 Hour Minimum Value. Revised Values: Time of Concentration (hrs) = .2942 Time to Peak (hrs) = .2942  Lag Time (hrs) = .3310

**COMPUTE NH YD**

ID=33  HYD=EX.M  AREA=1.1844  PER A=.1000  PER B=.09  PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=-2

**TIME TO PEAK (HRS) = .2942**

K = .302510  TP = .2942  K/TP RATIO = 1.300000  SHAPE CONSTANT, H = 2.756220

UNIT PEAK = 1.0051  CFS  UNIT VOL = .9999  B = 261.30  P60 = 1.0000

AREA = 1.1844  SQ MI  IA = .6748  ACRES  INF = 1.6748  INCHES PER HOUR

RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - ET = .033333

RUNOFF FACTOR APPLIED TO HYDROGRAPH  FACTOR = 1.010000 AT PEAK FLOW.

PRINT YD

ID=33  CODE=1

**HYDROGRAPH FROM AREA EX.M**
SCS UPLAND METHOD FACTORS

LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K
SHALLOW FLOW PORTION  400.0  .090000  1.0000
SHALLOW FLOW PORTION  1600.0  .090000  1.0000
CHANNEL FLOW PORTION  4000.0  .090000  1.0000
TOTAL BASIN  6000.0  .090000  1.0000

LAG EQUATION FACTORS:  K = .0300  TOTAL BASIN LENGTH (FT) = 6000.0
TOTAL BASIN SLOPE (FT/FT) = .050000  CENTROID LENGTH (FT) = 4000.0

TIME OF CONCENTRATION (HRS) = .2086  TIME TO PEAK (HRS) = .3933  LAG TIME (HRS) = .2242

COMPUTE NH HYD  ID=14  HYD=EX.X  AREA=0.6047  PER A=50.0  PER B=50.0
PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=1

TIME TO PEAK (HRS) = .3933

K = .246829H  TP = .194259H  K/TP RATIO = 1.275356  SHAPE CONSTANT, N = 2.846376
UNIT PEAK = 616.36  CFS  UNIT VOLUME = .9999  B = 249.05  PMG = 1.0650
AREA = .060700 SQ FT  IA = .575000 INCHES  INF = 1.40000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION RUNOFF METHOD - DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAPHS. FACTOR = 1.04000 AT PEAK FLOW.

PRINT HYD  ID=14  CODE=1

HYDROGRAPH FROM AREA EX.X

RUNOFF VOLUME = .05733 INCHES = 1.8424 ACRE- FEET
PEAK DISCHARGE RATE = 46.61 CFS AT 1.0000 HOURS  BASIN AREA = .6047 SQ. FT.

**********************************************************************************************
*************** BASIN EX.P ***************

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

COMPUTE LT TP  LCODE=1  N=3  ISLOPE=1
LENGTH=1900 FT  SLOPE=0.4  K=1
LENGTH=1600 FT  SLOPE=0.4  K=2
LENGTH=9000 FT  SLOPE=0.4  K=3
KN=0.03  CENTROID DISTANCE=3700 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K
SHALLOW FLOW PORTION  400.0  .090000  1.0000
SHALLOW FLOW PORTION  1600.0  .090000  1.0000
CHANNEL FLOW PORTION  4000.0  .090000  1.0000
TOTAL BASIN  6000.0  .090000  1.0000

LAG EQUATION FACTORS:  K = .0300  TOTAL BASIN LENGTH (FT) = 8900.0
TOTAL BASIN SLOPE (FT/FT) = .050000  CENTROID LENGTH (FT) = 4000.0

TIME OF CONCENTRATION (HRS) = .3849  TIME TO PEAK (HRS) = .2433  LAG TIME (HRS) = .2737

COMPUTE NH HYD  ID=15  HYD=EX.P  AREA=0.9404  PER A=50.0  PER B=50.0
PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=1

TIME TO PEAK (HRS) = .2433

K = .304975H  TP = .243975H  K/TP RATIO = 1.253516  SHAPE CONSTANT, N = 2.846376
UNIT PEAK = 59.83  CFS  UNIT VOLUME = .9999  B = 249.05  PMG = 1.0650
AREA = .38400 SQ FT  IA = .57500 INCHES  INF = 1.44000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION RUNOFF METHOD - DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAPHS. FACTOR = 1.04000 AT PEAK FLOW.

PRINT HYD  ID=15  CODE=1

HYDROGRAPH FROM AREA EX.P

RUNOFF VOLUME = .05733 INCHES = 2.8896 ACRE- FEET
PEAK DISCHARGE RATE = 59.83 CFS AT 1.633 HOURS  BASIN AREA = .9404 SQ. FT.
TOTAL BASIN SLOPE (FT/FT)= .040000
CENTROID LENGTH (FT)= 3700.0

TIME OF CONCENTRATION (HRS)= .4236
TIME TO PEAK (HRS)= .2824
LAG TIME (HRS)= .3177

COMPUTE NH HYD ID=16 HYD-EX.F AREA=0.9313 PER A=50.0 PER B=50.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

TIME TO PEAK (HRS)= .2824
K = .5597363HR TP = 2825.82HR K/TP RATIO = 1.255561 SHAPE CONSTANT, N = 2.846376
UNIT PEAK = 891.32 CFS UNIT VOLUME = .9999 H = 289.05 P60 = 1.0600
AREA = .931300 SQ FT IA = .57500 INCHES INF = 1.45000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAPH, FACTOR = 1.04000 AT PEAK FLOW.

PRINT HYD ID=16 CODE=1 HYDROGRAPH FROM AREA EX.F.

RUNOFF VOLUME = .05713 INCHES = 2.8375 ACRE- FEET
PEAK DISCHARGE RATE = 50.35 CFS AT 1.667 HOURS BASIN AREA = .9313 SQ. FT.

# ******************************************************
# SEGMENT BULK CODE=1 BULK FACTOR=1.01
# ******************************************************

COMPUTE LT TP LCOME=1 NC=3 ISLOPE=3
LENGTH=420 FT SLOPE=0.009 K=1
LENGTH=160 FT SLOPE=0.009 K=2
LENGTH=950 FT SLOPE=0.009 K=3
K=0.09 CENTROID DISTANCE=4800 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS
SHEET FLOW PORTION = 0.10900 .000000 1.0000
SHALLOW FLOW PORTION = 0.10900 .000000 2.0000
CHANNEL FLOW PORTION = 0.10900 .000000 3.0000
TOTAL BASIN = 1.1100 .000000 2.6279

LAG EQUATION FACTORS: KTH= .09300 TOTAL BASIN LENGTH (FT)= 1320.0
TOTAL BASIN SLOPE (FT/FT)= .000000 CENTROID LENGTH (FT)= 4800.0

TIME OF CONCENTRATION (HRS)= .6954
TIME TO PEAK (HRS)= .4596 RAINFALL (-1)
LAG TIME (HRS)= .5171

COMPUTE NH HYD ID=17 HYD-EX.OFF.A AREA=1.6375 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

TIME TO PEAK (HRS)= .4596
K = .5597363HR TP = 4595.82HR K/TP RATIO = 1.255561 SHAPE CONSTANT, N = 2.756220
UNIT PEAK = 390.99 CFS UNIT VOLUME = 1.0000 H = 261.30 P60 = 1.0600
AREA = 1.63750 SQ MI IA = .57500 INCHES INF = 1.67000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAPH, FACTOR = 1.03090 AT PEAK FLOW.

PRINT HYD ID=17 CODE=3 HYDROGRAPH FROM AREA EX.OFF.A

RUNOFF VOLUME = .01068 INCHES = .9329 ACRE- FEET
PEAK DISCHARGE RATE = 9.94 CFS AT 1.867 HOURS BASIN AREA = 1.6375 SQ. MI.

# ******************************************************
# SEGMENT BULK CODE=2 BULK FACTOR=2.00
# ******************************************************

COMPUTE LT TP LCOME=1 NC=3 ISLOPE=3
LENGTH=18700 FT SLOPE=0.009 K=3
K=0.60 CENTROID DISTANCE=8000 FT

BASIN LONGER THAN 4000.0 FT AND ALL BASIN FACTORS NOT SPECIFIED
USE K= .01010 AND LCA/L= .70000

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS: KTH= .01010 TOTAL BASIN LENGTH (FT)= 18700.0
TOTAL BASIN SLOPE (FT/FT)= .012894 CENTROID LENGTH (FT)= 9348.0

TIME OF CONCENTRATION (HRS)= .4645
TIME TO PEAK (HRS)= .3097 LAG TIME (HRS)= .3484

COMPUTE NH HYD ID=18 HYD-EX.OFF.B AREA=0.4.6078 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

TIME TO PEAK (HRS)= .3097
K = .405363HR TP = 3096.82HR K/TP RATIO = 1.300000 SHAPE CONSTANT, N = 2.756220
UNIT PEAK = 388.83 CFS UNIT VOLUME = .9999 H = 261.30 P60 = 1.0600
AREA = .460780 SQ FT IA = .05500 INCHES INF = 1.67000 INCHES PER HOUR

Page 9
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .03333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.00100 AT PEAK FLOW.

PRINT HYD
   ID=18  CODE=1

HYDROGRAPH FROM AREA EX.OFF.B

RUNOFF VOLUME = .01668 INCHES = .2625 ACRE-FEET
PEAK DISCHARGE RATE = 4.35 CFS AT 1.700 HOURS  BASIN AREA = .4608 SQ. MI.

K = 4.5891  TIME TO PEAK (HRS) = .3060  LAG TIME (HRS) = .3443

COMPUTE NH HYD
   ID=39  HYD=EX.OFF.C AREA=1.5125  PER A=60.0 PER B=15.0
   PER C=10.0 PER D=35.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS) = .3060

K = .214433ML  TP = .3060500K  K/TP RATIO = .700463  SHAPE CONSTANT, N = 5.214875
UNIT PEAK = 218.30 CFS  UNIT VOLUME = 1.000
AREA = 2.265625 SQ MI  IA = .5000 INCHES  INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .03333

K = .183174ML  TP = .3060500K  K/TP RATIO = 1.252003  SHAPE CONSTANT, N = 2.846550
UNIT PEAK = 1131.3 CFS  UNIT VOLUME = .999
AREA = 1.265625 SQ MI  IA = .5000 INCHES  INF = .145768 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .03333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.00100 AT PEAK FLOW.

PRINT HYD
   ID=19  CODE=1

HYDROGRAPH FROM AREA EX.OFF.C

RUNOFF VOLUME = .22693 INCHES = 18.1375 ACRE-FEET
PEAK DISCHARGE RATE = 254.35 CFS AT 1.700 HOURS  BASIN AREA = 1.5125 SQ. MI.

FINISH

FINAL PROGRAM FINISH  END TIME (HR:MIN:SEC) = 09:41:08
**Project Name:** SANTOLINA
**Date:** November 8, 2012
**Input File Name:** 100EX_6.HYN
**Output File Name:** 100EX_6.OUT
**Project Number:** 2013056
**Comments:** 100 YEAR-6 HR STORM

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

**COMPUTE BASINS IN SANTOLINA - EXISTING CONDITION**

**SEDIMENT BULK FACTOR FOR 100 VR STORM IS 2.5 FOR NESA BASINS AND 1.0 FOR ESCARPMENT BASIN**

**SEDIMENT BULK CODE=1, BULK FACTOR=1.30**

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</table>
*5*************************************************************************BASIN EX.G*************************************************************************

COMPUTE LT TP
LCONF=1 NC=6 ISLOPE=1
LENGTH=13300 FT SLOPE=0.02 K=3
K=0.03 CENTROID DISTANCE=6300 FT

COMPUTE RN HYD
T=7 HYD-EX.G AREA=2.2625 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

PRINT HYD
ID=7 CODE=1

*5*************************************************************************BASIN EX.H*************************************************************************

COMPUTE LT TP
LCONF=1 NC=6 ISLOPE=1
LENGTH=32500 FT SLOPE=0.017 K=3
K=0.03 CENTROID DISTANCE=6600 FT

COMPUTE RN HYD
T=8 HYD-EX.H AREA=4.5968 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

PRINT HYD
ID=8 CODE=1

*5*************************************************************************BASIN EX.I*************************************************************************

COMPUTE LT TP
LCONF=1 NC=2 ISLOPE=1
LENGTH=400 FT SLOPE=0.023 K=3
LENGTH=1600 FT SLOPE=0.023 K=2
LENGTH=3700 FT SLOPE=0.023 K=2
K=0.03 CENTROID DISTANCE=3000 FT

COMPUTE RN HYD
T=9 HYD-EX.I AREA=1.6969 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

PRINT HYD
ID=9 CODE=1

*5*************************************************************************BASIN EX.J*************************************************************************

COMPUTE LT TP
LCONF=1 NC=2 ISLOPE=1
LENGTH=400 FT SLOPE=0.017 K=3
LENGTH=700 FT SLOPE=0.017 K=2

COMPUTE RN HYD
T=10 HYD-EX.J AREA=0.0250 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

PRINT HYD
ID=10 CODE=1

*5*************************************************************************SEDIMENT BULK*************************************************************************

CODE=1 BULK FACTOR=1.10

*5*************************************************************************BASIN EX.K*************************************************************************

COMPUTE LT TP
LCONF=1 NC=0 ISLOPE=1
LENGTH=400 FT SLOPE=0.029 K=3
LENGTH=1600 FT SLOPE=0.029 K=2
LENGTH=6500 FT SLOPE=0.029 K=3
K=0.03 CENTROID DISTANCE=3400 FT

COMPUTE RN HYD
T=11 HYD-EX.K AREA=1.0331 PER A=50.0 PER B=50.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

PRINT HYD
ID=11 CODE=1

*5*************************************************************************BASIN EX.L*************************************************************************

COMPUTE LT TP
LCONF=1 NC=3 ISLOPE=1
LENGTH=400 FT SLOPE=0.076 K=3
LENGTH=1600 FT SLOPE=0.076 K=2
LENGTH=300 FT SLOPE=0.076 K=3

COMPUTE RN HYD
T=12 HYD-EX.L AREA=0.6218 PER A=50.0 PER B=50.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

PRINT HYD
ID=12 CODE=1

*5*************************************************************************SEDIMENT BULK*************************************************************************

CODE=1 BULK FACTOR=1.025

*5*************************************************************************BASIN EX.M*************************************************************************

COMPUTE LT TP
LCONF=1 NC=3 ISLOPE=1
LENGTH=1000 FT SLOPE=0.015 K=3
LENGTH=3600 FT SLOPE=0.015 K=2
LENGTH=3400 FT SLOPE=0.015 K=3
K=0.03 CENTROID DISTANCE=2500 FT

COMPUTE RN HYD
T=13 HYD-EX.M AREA=1.3944 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

PRINT HYD
ID=13 CODE=1

*5*************************************************************************SEDIMENT BULK*************************************************************************

CODE=1 BULK FACTOR=1.10

*5*************************************************************************BASIN EX.N*************************************************************************

COMPUTE LT TP
LCONF=1 NC=3 ISLOPE=1
LENGTH=1000 FT SLOPE=0.019 K=3
LENGTH=3800 FT SLOPE=0.019 K=2
LENGTH=6000 FT SLOPE=0.019 K=3
K=0.03 CENTROID DISTANCE=4500 FT

COMPUTE RN HYD
T=14 HYD-EX.N AREA=0.0947 PER A=50.0 PER B=50.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

PRINT HYD
ID=14 CODE=1
**Sediment Bulk**

**CODE=C**

**BAK=1.055**

**(BASEN EX.B)***************

**COMPUTE LT TP**

**LCODE=1**

**N=3**

**ISLOPE=1**

**LENGTH=400 FT**

**SLOPE=0.095 K=1**

**LENGTH=1600 FT**

**SLOPE=0.095 K=2**

**LENGTH=2500 FT**

**SLOPE=0.095 K=3**

**K=0.93**

**CENTROID DISTANCE=2100 FT**

**TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

**SHEET FLOW PORTION**

**LENGTH (FT) SLOPE (FT/FT) COMPOSITE K**

| **400.0** | **0.01000** | **1.0000** |
| **1600.0** | **0.01000** | **1.0000** |
| **2200.0** | **0.01000** | **1.0000** |

**TOTAL BASIN**

**7500.0**

**0.01000**

**2.5725**

**LAG EQUATION FACTORS: K=0.0300 TOTAL BASIN LENGTH (FT)=7500.0 TOTAL BASIN SLOPE (FT/FT)=0.00000 CENTROID LENGTH (FT)=2100.0**

**TIME OF CONCENTRATION (HRS)=.5650 TIME TO PEAK (HRS)=.4380 LAG TIME (HRS)=.4927**

**COMPUTE NH HYD ID=2 HYD=EX.B AREA=2.5199 PER A=100.0 PER B=0.0 PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1**

**TIME TO PEAK (HRS)=.4380**

**K = .439506HR TP = .437959HR K/TP RATIO = 1.003540 SHAPE CONSTANT, N = 3.517728 UNIT PEAK = 2373.7 CPS UNIT VOLUME = 1.000 B = 472.53 A0 = 1.8700 AREA = 2.036594 SQ ML IA = .655000 INCHES INF = 1.670000 INCHES PER HOUR RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333**

**BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.**

**PRINT HYD ID=2 CODE=1**

**HYDROGRAPH FROM AREA EX.B**

**RUNOFF VOLUME = .45020 INCHES = 69.8924 ACRE-FOOT PEAK DISCHARGE RATE = 952.72 CPS AT 1.853 HOURS BASIN AREA = 2.5199 SQ. MI.**

**BASEN EX.C***************

**COMPUTE LT TP**

**LCODE=1**

**N=3**

**ISLOPE=1**

**LENGTH=400 FT**

**SLOPE=0.01 K=1**

**LENGTH=1600 FT**

**SLOPE=0.01 K=2**

**LENGTH=2200 FT**

**SLOPE=0.01 K=3**

**K=0.93**

**CENTROID DISTANCE=500 FT**

**TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

**SHEET FLOW PORTION**

**LENGTH (FT) SLOPE (FT/FT) COMPOSITE K**

| **400.0** | **0.01000** | **1.0000** |
| **1600.0** | **0.01000** | **1.0000** |
| **2200.0** | **0.01000** | **1.0000** |

**TOTAL BASIN**

**4200.0**

**0.01000**

**2.1724**

**LAG EQUATION FACTORS: K=0.0900 TOTAL BASIN LENGTH (FT)=4200.0 TOTAL BASIN SLOPE (FT/FT)=0.01000 CENTROID LENGTH (FT)=500.0**

**TIME OF CONCENTRATION (HRS)=.5102 TIME TO PEAK (HRS)=.3403 LAG TIME (HRS)=.3826**

**COMPUTE NH HYD ID=3 HYD=EX.C AREA=3.1750 PER A=100.0 PER B=0.0 PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1**

**TIME TO PEAK (HRS)=.3401**

**K = .341329HR TP = .34024HR K/TP RATIO = 1.003541 SHAPE CONSTANT, N = 3.517728 UNIT PEAK = 1390.2 CPS UNIT VOLUME = 1.000 B = 321.83 A0 = 1.8700 AREA = 3.175000 SQ ML IA = .650000 INCHES INF = 1.670000 INCHES PER HOUR RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333**

**BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.**

**PRINT HYD ID=3 CODE=1**

**HYDROGRAPH FROM AREA EX.C**

**RUNOFF VOLUME = .45020 INCHES = 33.0145 ACRE-FOOT PEAK DISCHARGE RATE = 575.85 CPS AT 1.733 HOURS BASIN AREA = 3.1750 SQ. MI.**

**BASEN EX.D***************

**COMPUTE LT TP**

**LCODE=1**

**N=3**

**ISLOPE=1**

**LENGTH=400 FT**

**SLOPE=0.008 K=1**

**LENGTH=1600 FT**

**SLOPE=0.008 K=2**

**LENGTH=2700 FT**

**SLOPE=0.008 K=3**

Page 2
TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS
LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
SHEET FLOW PORTION 100.0 .008000 1.0000
SHALLOW FLOW PORTION 1600.0 .008000 2.0000
CHANNEL FLOW PORTION 1000.0 .008000 3.0000
TOTAL BASIN 3600.0 .008000 5.2417

LAG EQUATION FACTORS: K= .0300 TOTAL BASIN LENGTH (FT)= 6700.0
TOTAL BASIN SLOPE (FT/FT)= .008000 CENTERBOID LENGTH (FT)= 3500.0

TIME OF CONCENTRATION (HRS)= .6025 TIME TO PEAK (HRS)= .4016 LAG TIME (HRS)= .4518

COMPUTE RH HYD ID=4 HYD=EX.E AREA=0.5213 PER A=0.00 PER D=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS)= .4016
K = .401061 B = .401539 B/K = 1.003541 SHAPE CONSTANT, N = 3.517728
UNIT PEAK = 425.45 CFS UNIT VOLUME = 1.000 B = 321.62 P50 = 1.8700
AREA = 5313.00 SQ FT IA = .65000 INCHES INF = 1.67000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .03333

PERCIP APPLICATION TO HYDROGRAPHS. FACTOR = 1.02500 AT PEAK FLOW.

PRINT HYD ID=4 CODE=1
HYDROGRAF FROM AREA EX.E

RUNOFF VOLUME = .45020 INCHES = 12.7568 ACRE-FOOT
PEAK DISCHARGE RATE = 189.17 CFS AT 3.800 HOURS BASIN AREA = .5313 SQ. FT.

------------------------------------------------------------------------

## BASIN EX.E
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COMPUTE LT TP
LCODE=1 N=3 ISLOPE=1 LENGTH=1000 FT SLOPE=0.006 K=3
LENGTH=1600 FT SLOPE=0.006 K=2
LENGTH=3000 FT SLOPE=0.006 K=3
KH=0.03 CENTERBOID DISTANCE=5400 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS
LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
SHEET FLOW PORTION 1000.0 .008000 1.0000
SHALLOW FLOW PORTION 1600.0 .008000 2.0000
CHANNEL FLOW PORTION 900.0 .008000 3.0000
TOTAL BASIN 3500.0 .008000 5.2417

LAG EQUATION FACTORS: K= .0300 TOTAL BASIN LENGTH (FT)= 11500.0
TOTAL BASIN SLOPE (FT/FT)= .008000 CENTERBOID LENGTH (FT)= 5400.0

TIME OF CONCENTRATION (HRS)= .7725 TIME TO PEAK (HRS)= .5150 LAG TIME (HRS)= .5794

COMPUTE RH HYD ID=5 HYD=EX.E AREA=2.4234 PER A=100.0 PER D=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS)= .5150
K = .516025 K = .516025 SHAPE CONSTANT, N = 3.517728
UNIT PEAK = 455.30 CFS UNIT VOLUME = 1.000 B = 321.62 P50 = 1.8700
AREA = 2.423400 SQ FT IA = .65000 INCHES INF = 1.67000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .03333

PERCIP APPLICATION TO HYDROGRAPHS. FACTOR = 1.02500 AT PEAK FLOW.

PRINT HYD ID=5 CODE=1
HYDROGRAF FROM AREA EX.E

RUNOFF VOLUME = .45020 INCHES = 58.1871 ACRE-FOOT
PEAK DISCHARGE RATE = 676.61 CFS AT 1.900 HOURS BASIN AREA = 2.4234 SQ. FT.

------------------------------------------------------------------------

## BASIN EX.E
------------------------------------------------------------------------

COMPUTE LT TP
LCODE=1 N=3 ISLOPE=1 LENGTH=400 FT SLOPE=0.01 K=1
LENGTH=1200 FT SLOPE=0.01 K=2
LENGTH=2000 FT SLOPE=0.01 K=3
KH=0.03 CENTERBOID DISTANCE=5400 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS
LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
SHEET FLOW PORTION 400.0 .010000 1.0000
SHALLOW FLOW PORTION 1600.0 .010000 2.0000
CHANNEL FLOW PORTION 900.0 .010000 3.0000
TOTAL BASIN: 11200.0
10DEX.6.OUT: 2.6250

LAG EQUATION FACTORS: Km = .0600 TOTAL BASIN LENGTH (FT) = 11200.0
TOTAL BASIN SLOPE (FT/FT) = .010000 CENTROID LENGTH (FT) = 4540.0

TIME OF CONCENTRATION (HRS) = .6997 TIME TO PEAK (HRS) = .4665 LAG TIME (HRS) = .5248

COMPUTE MNY HYD ID=6 MNY-EX.F AREA=1.7047 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS) = .4665

K = .460113HR TP = .46641HHR K/TP RATIO = 1.00341 SHAPE CONSTANT, N = 3.517728
UNIT PEAK = 1174.6 CFS UNIT VOLUME = 1.000 B = 321.62 PUD = 1.6700
AREA = 2.707420 SQ MI IA = 65000 INCHES INF = 1.67000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAPH FACTOR = 1.02500 AT PEAK FLOW.

PRINT HYD ID=6 CODE=1
OUTFLOW HYDROGRAPH REACH .00
RUNOFF VOLUME = .45020 INCHES = 40.9307 ACRE-FT
PEAK DISCHARGE RATE = 514.34 CFS AT 1.867 HOURS BASIN AREA = 3.7047 SQ. MI.

**============================= BASIN EX.G =============================**

COMPUTE LT TP LCODE=1 MK=0 ISLOPE=1
LENGTH=13300 FT SLOPE=0.02 KB=3
KN=0.03 CENTROID DISTANCE=6300 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS: Km = .0600 TOTAL BASIN LENGTH (FT) = 13300.0
TOTAL BASIN SLOPE (FT/FT) = .020000 CENTROID LENGTH (FT) = 6300.0

TIME OF CONCENTRATION (HRS) = .6997 TIME TO PEAK (HRS) = .4621 LAG TIME (HRS) = .5199

COMPUTE MNY HYD ID=7 MNY-EX.G AREA=2.2625 PER A=100.0 PER B=0.0
PER C=0.0 PER D=6.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS) = .4621

K = .46371HR TP = .46211HR K/TP RATIO = 1.00341 SHAPE CONSTANT, N = 3.517728
UNIT PEAK = 1574.6 CFS UNIT VOLUME = 1.000 B = 321.62 PUD = 1.6700
AREA = 2.765260 SQ MI IA = 65000 INCHES INF = 1.67000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAPH FACTOR = 1.02500 AT PEAK FLOW.

PRINT HYD ID=7 CODE=1
HYDROGRAPH FROM AREA EX.G

RUNOFF VOLUME = .46023 INCHES = 54.3238 ACRE-FT
PEAK DISCHARGE RATE = 701.96 CFS AT 1.633 HOURS BASIN AREA = 2.2625 SQ. MI.

**============================= BASIN EX.H =============================**

COMPUTE LT TP LCODE=3 MK=0 ISLOPE=1
LENGTH=20500 FT SLOPE=0.117 KB=3
KN=0.03 CENTROID DISTANCE=6600 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS: Km = .0600 TOTAL BASIN LENGTH (FT) = 20500.0
TOTAL BASIN SLOPE (FT/FT) = .017000 CENTROID LENGTH (FT) = 8800.0

TIME OF CONCENTRATION (HRS) = .8340 TIME TO PEAK (HRS) = .5560 LAG TIME (HRS) = .6235

COMPUTE MNY HYD ID=8 MNY-EX.H AREA=4.5969 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS) = .5560

K = .557967HR TP = .555959HHR K/TP RATIO = 1.003541 SHAPE CONSTANT, N = 3.517728
UNIT PEAK = 2059.1 CFS UNIT VOLUME = 1.000 B = 321.62 PUD = 1.6700
AREA = 4.596600 SQ HC IA = 65000 INCHES INF = 1.67000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAPH FACTOR = 1.02500 AT PEAK FLOW.

PRINT HYD ID=8 CODE=1
HYDROGRAPH FROM AREA EX.H

RUNOFF VOLUME = .45020 INCHES = 110.3739 ACRE-FT

Page 4
PEAK DISCHARGE RATE = 1180.79 CFS AT 1.933 HOURS  BASIN AREA = 4.5969 SQ. MI.

** handsome name text **

** Basin Ex.1 **

** Compute LT TP 
Lcode=1  N=3  ISLOPE=1 
LENGTH=400 FT  SLOPE=0.021  K=1 
LENGTH=600 FT  SLOPE=0.021  K=2 
LENGTH=550000 FT  SLOPE=0.021  K=3 
KN=0.01  CENTROID DISTANCE=30000 FT 

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

SHEET FLOW PORTION 
LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K
400.0  .021000  1.09000
SHALLOW FLOW PORTION 
700.0  .021000  2.00000
CHANNEL FLOW PORTION 
700.0  .021000  3.00000
TOTAL BASIN 
7700.0  .021000  4.839

LAG EQUATION FACTORS: 
Km = .0100  TOTAL BASIN LENGTH (FT) = 7700.0 
TOTAL BASIN SLOPE (FT/FT) = .032000  CENTROID LENGTH (FT) = 3000.0

TIME OF CONCENTRATION (HRS) = .4445  TIME TO PEAK (HRS) = .2503  LAG TIME (HRS) = .3334

** Compute NI HYD 
ID=9  HYD=EX.1  AREA=1.6669 PER A=1.0  PER B=0.0  PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=1

TIME TO PEAK (HRS) = .2503

K = .289380  TH = .293418  K/TH RATIO = .003541  SHAPE CONSTANT, N = 3.527728

UNIT PEAK = 361.7  CFS  UNIT VOLUME = 1.000  B = 321.6  P60 = 1.8700

AREA = 1.6669  SQ. FT  UA = 6.54000 INCHES  I = 3.67000 INCHES PER HOUR

RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.

PRINT HYD
ID=9  CODE=1

HYDROGRAPH FROM AREA EX.1

RUNOFF VOLUME = .45029 INCHES = 42.7435 ACRE-FT

PEAK DISCHARGE RATE = 808.88 CFS AT 1.700 HOURS  BASIN AREA = 1.6669 SQ. MI.

** Basin Ex.2 **

** Compute LT TP 
Lcode=1  N=2  ISLOPE=1 
LENGTH=400 FT  SLOPE=0.017  K=1 
LENGTH=700 FT  SLOPE=0.017  K=2 

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

SHEET FLOW PORTION 
LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K
400.0  .017000  1.09000
SHALLOW FLOW PORTION 
700.0  .017000  2.00000
CHANNEL FLOW PORTION 
700.0  .017000  3.00000
TOTAL BASIN 
1100.0  .017000  4.839

TIME OF CONCENTRATION (HRS) = .3588  TIME TO PEAK (HRS) = .1065  LAG TIME (HRS) = .1138

TIME TO PEAK COMPUTED TO BE LESS THAN 0.133333 HOUR MINIMUM VALUE.
REVISED VALUES: TIME OF CONCENTRATION (HRS) = .2000  TIME TO PEAK (HRS) = .1333  LAG TIME (HRS) = .1500

** Compute NI HYD 
ID=10  HYD=EX.2  AREA=0.0250  PER A=1.00  PER B=0.0  PER C=0.0  PER D=0.0  TP=0.0  RAINFALL=1

TIME TO PEAK (HRS) = .1333

K = .163724  TH = .133333  K/TH RATIO = 1.227816  SHAPE CONSTANT, N = 2.899764

UNIT PEAK = 51.250  CFS  UNIT VOLUME = .9994  B = 273.54  P60 = 1.8700

AREA = .025000  SQ. FT  UA = 6.52000 INCHES  I = 3.67000 INCHES PER HOUR

RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.

PRINT HYD
ID=10  CODE=1

HYDROGRAPH FROM AREA EX.2

RUNOFF VOLUME = .45029 INCHES = 6.003 ACRE-FT

PEAK DISCHARGE RATE = 21.27 CFS AT 1.533 HOURS  BASIN AREA = .0250 SQ. MI.

** Basin Ex.3 **

** Compute LT TP 
Lcode=1  N=0  ISLOPE=1 
LENGTH=400 FT  SLOPE=0.029  K=1

** End of page 5 **
TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

<table>
<thead>
<tr>
<th>Component</th>
<th>Length (ft)</th>
<th>Slope (ft/ft)</th>
<th>Composite K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheet Flow</td>
<td>400.0</td>
<td>0.020000</td>
<td>1.00000</td>
</tr>
<tr>
<td>Shallow Flow</td>
<td>0.00000</td>
<td>0.00000</td>
<td>0.00000</td>
</tr>
<tr>
<td>Channel Flow</td>
<td>0.00000</td>
<td>0.00000</td>
<td>0.00000</td>
</tr>
<tr>
<td>Total Basin</td>
<td>400.0</td>
<td>0.020000</td>
<td>1.00000</td>
</tr>
</tbody>
</table>

Time of Concentration (hrs) = 0.0352  Time to Peak (hrs) = 0.0435  Lag Time (hrs) = 0.0489

Time to Peak computed to be less than 0.12233 hours minimum value.
Revised values: Time of Concentration (hrs) = 0.2000  Time to Peak (hrs) = 0.1333  Lag Time (hrs) = 0.1500

Compute NH HYD ID = 11 HYD=EX.K AREA=1.0531 PER A=50.0 PER B=50.0
PER C=5.0 PER D=6.0 TP=4.0 RAINFALL=1

Print HYD ID = 11 CODE=1

HYDROGRAPH FROM AREA EX.K

Runoff Volume = 0.50932 inches = 33.6405 acre-feet
Peak Discharge Rate = 1251.32 CFS at 1.533 hours Basin Area = 1.0531 sq. mi.

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

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

BASIN EX.K

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

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

COMPUTE LT TP LC=1 NO=3 ISLOPE=1
LENGTH=600 FT SLOPE=0.076 K=1
LENGTH=1600 FT SLOPE=0.076 K=2
LENGTH=800 FT SLOPE=0.076 K=3

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

<table>
<thead>
<tr>
<th>Component</th>
<th>Length (ft)</th>
<th>Slope (ft/ft)</th>
<th>Composite K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheet Flow</td>
<td>400.0</td>
<td>0.076000</td>
<td>1.00000</td>
</tr>
<tr>
<td>Shallow Flow</td>
<td>1600.0</td>
<td>0.076000</td>
<td>2.00000</td>
</tr>
<tr>
<td>Channel Flow</td>
<td>800.0</td>
<td>0.076000</td>
<td>3.00000</td>
</tr>
<tr>
<td>Total Basin</td>
<td>2800.0</td>
<td>0.076000</td>
<td>3.90001</td>
</tr>
</tbody>
</table>

Time of Concentration (hrs) = 0.1478  Time to Peak (hrs) = 0.0605  Lag Time (hrs) = 0.1108

Time to peak computed to be less than 0.13333 hour minimum value.
Revised values: Time of Concentration (hrs) = 0.2000  Time to Peak (hrs) = 0.1333  Lag Time (hrs) = 0.1500

Compute NH HYD ID = 12 HYD=EX.K AREA=0.6219 PER A=50.0 PER B=50.0
PER C=4.0 PER D=6.0 TP=4.0 RAINFALL=1

Print HYD ID = 12 CODE=1

HYDROGRAPH FROM AREA EX.K

Runoff Volume = 0.50931 inches = 35.8780 acre-feet
Peak Discharge Rate = 781.0284 CFS at 1.533 hours Basin Area = 0.6219 sq. mi.

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

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

SEGMENT RUNOFF=1 N=2 ISLOPE=1
LENGTH=600 FT SLOPE=0.015 K=1
LENGTH=1600 FT SLOPE=0.015 K=2
LENGTH=3400 FT SLOPE=0.015 K=3
K=0.03 CENTRIFED DISTANCE=2500 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

(* End of page 6 *)
SHEET FLOW PORTION 400.0 0.01000 1.0000
SHALLOW FLOW PORTION 360.0 0.01300 2.0000
CHANNEL FLOW PORTION 340.0 0.01300 3.0000
TOTAL BASIN 430.0 0.01300 3.0000

LAG EQUATION FACTORS: \( K = 0.0300 \)
TOTAL BASIN LENGTH (\( ft \)) = 5400.0

TIME OF CONCENTRATION (HRS) = 0.4424
TIME TO PEAK (HRS) = 0.2942
LAG TIME (HRS) = 0.3310

TIME TO PEAK (HRS) = 0.2942

K = 2892845
TP = 2892845
K_TP RATIO = 1.00354
SHAPE CONSTANT, N = 3.517728
UNIT PEAK = 1295.4
CPS UNIT VOLUME = 1.000
\( h = 311.82 \)
\( P_{60} = 1.6809 \)
AREA = 1.18440 SQ MI
\( t_{m} = 59.000 \) INCHES
\( T_{m} = 1.7500 \) INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INfiltrATION NUMBER METHOD - 0.63333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.

PRINT HYD 1D=13 CODE=1

HYDROGRAPH FROM AREA EX.K.N

RUNOFF VOLUME = 45992 INCHES = 39.3937 ACRE-FT
PEAK DISCHARGE RATE = 560.27 CPS AT 1.667 HOURS BASIN AREA = 1.1844 SQ. MI.

---------------------------------------------------------------------------------------------------------------------
SEDIMENT BULK CODE=1 BULK FACTOR=1.10
---------------------------------------------------------------------------------------------------------------------

COMPUTE XT TP LOCED=1 N=3 ISLOPE=1 LENGTH=600 FT SLOPE=0.059 K=1
LENGTH=500 FT SLOPE=0.059 K=2
LENGTH=1000 FT SLOPE=0.059 K=3
K=0.03 CENTROID DISTANCE=4200 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS
SHEET FLOW PORTION LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
400.0 0.03000 0.02000
SHALLOW FLOW PORTION 360.0 0.03000 0.02000
CHANNEL FLOW PORTION 340.0 0.03000 0.02000
TOTAL BASIN 430.0 0.03000 0.02000

LAG EQUATION FACTORS: \( K = 0.0300 \)
TOTAL BASIN SLOPE (\( ft/ft \)) = 6200.0

TIME OF CONCENTRATION (HRS) = 0.9539
TIME TO PEAK (HRS) = 0.1992
LAG TIME (HRS) = 0.3242

TIME TO PEAK (HRS) = 0.3242

K = 1.83040
TP = 1.83040
K_TP RATIO = 0.94805
SHAPE CONSTANT, N = 3.726434
UNIT PEAK = 1051.0
CPS UNIT VOLUME = 1.000
\( t_{m} = 33.50 \)
\( P_{60} = 1.8700 \)
AREA = 0.504700 SQ MI
\( t_{m} = 1.7500 \) INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INfiltrATION NUMBER METHOD - 0.63333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.10000 AT PEAK FLOW.

PRINT HYD 1D=14 CODE=1

HYDROGRAPH FROM AREA EX.K.N

RUNOFF VOLUME = 59932 INCHES = 39.3937 ACRE-FT
PEAK DISCHARGE RATE = 560.27 CPS AT 1.660 HOURS BASIN AREA = 0.6047 SQ. MI.

---------------------------------------------------------------------------------------------------------------------
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COMPUTE XT TP LOCED=1 N=5 ISLOPE=1 LENGTH=600 FT SLOPE=0.054 K=1
LENGTH=1000 FT SLOPE=0.054 K=2
LENGTH=5000 FT SLOPE=0.054 K=3
K=0.03 CENTROID DISTANCE=4300 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS
SHEET FLOW PORTION LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
400.0 0.054000 1.0000
SHALLOW FLOW PORTION 360.0 0.054000 1.0000
CHANNEL FLOW PORTION 340.0 0.054000 1.0000
TOTAL BASIN 7300.0 0.054000 2.4733

LAG EQUATION FACTORS: \( K = 0.0300 \)
TOTAL BASIN SLOPE (\( ft/ft \)) = 7500.0
TOTAL BASIN LENGTH (\( ft \)) = 4300.0

Page 7
TIME OF CONCENTRATION (HRS)= 3.649  TIME TO PEAK (HRS)= .4233  LAG TIME (HRS)= .2737  

COMPUTE NH HYD  ID=15 HYD=EX.0 AREA=.05484 PER A=50.0 PER B=50.0 PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1  

TIME TO PEAK (HRS)= .2433  
K = .230778HR TP = .249269HR K/TP RATIO = .948564  SHAPE CONSTANT, N = 3.726434  
UNIT PEAK = 1311.7 CFS UNIT VOLUME = 1.000  B = 336.50  P60 = 1.0700  
AREA = .948564 SQ MI T = .575500 INCHES INF = 1.066000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION INFILTRATION NUMER METHOD - DT = .033333  

BULKING FACTOR APPLIED TO HYDROG. FACTOR = 1.10000 AT PEAK FLOW.  

PRINT HYD  ID=15 CODE=1  

HYDROG. FROM AREA EX.0  

RUNOFF VOLUME = 55931 INCHES = 30.3440 ACRE- FEET  
PEAK DISCHARGE RATE = 761.92 CFS AT 1.660000 HOURS  
BASIN AREA = .948400 SQ. MI.  

*------------------------------------------------------------------------------------------*  
*----------------------------------------------------------------------BASIN EX.P----------------------------------------------------------------------*  
*------------------------------------------------------------------------------------------*  

COMPUTE LT TP  CODE=1 ME=3 ISLOPE=3  
LENGTH=800 FT SLOPE=0.04 K=1  
LENGTH=1600 FT SLOPE=0.04 K=2  
LENGTH=9000 FT SLOPE=0.04 K=3  

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE  

SCS UPLAND METHOD FACTORS  
SHEET FLOW PORTION 100.0 SLOPE (FT/FT) 1.0000  
SHALLOW FLOW PORTION 100.0 SLOPE (FT/FT) 1.0000  
CHANNEL FLOW PORTION 100.0 SLOPE (FT/FT) 1.0000  
TOTAL BASIN 8900.0 SLOPE (FT/FT) 1.0000  

LAG EQUATION FACTORS:  KE=.0360  TOTAL BASIN LENGTH (FT)= 8900.0  
TOTAL BASIN SLOPE (FT/FT)= .040000  CENTROID LENGTH (FT)= 3700.0  

TIME OF CONCENTRATION (HRS)= .4236  TIME TO PEAK (HRS)= .2824  LAG TIME (HRS)= .3377  

COMPUTE NH HYD  ID=15 HYD=EX.P AREA=.0213 PER A=60.0 PER B=50.0  
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1  

TIME TO PEAK (HRS)= .2824  
K = .267858HR TP = .282828HR K/TP RATIO = .948564  SHAPE CONSTANT, N = 3.726434  
UNIT PEAK = 1309.8 CFS UNIT VOLUME = 1.000  B = 336.50  P60 = 1.0700  
AREA = .931300 SQ MI T = .575000 INCHES INF = 1.460000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION INFILTRATION NUMER METHOD - DT = .033333  

BULKING FACTOR APPLIED TO HYDROG. FACTOR = 1.10000 AT PEAK FLOW.  

PRINT HYD  ID=15 CODE=1  

HYDROG. FROM AREA EX.P  

RUNOFF VOLUME = 55931 INCHES = 29.7674 ACRE- FEET  
PEAK DISCHARGE RATE = 636.40 CFS AT 1.667777 HOURS  
BASIN AREA = .9313 SQ. MI.  

*------------------------------------------------------------------------------------------*  
*----------------------------------------------------------------------BASIN EX.O----------------------------------------------------------------------*  
*------------------------------------------------------------------------------------------*  

COMPUTE LT TP  CODE=1 ME=3 ISLOPE=3  
LENGTH=800 FT SLOPE=0.009 K=1  
LENGTH=1600 FT SLOPE=0.009 K=2  
LENGTH=9000 FT SLOPE=0.009 K=3  

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE  

SCS UPLAND METHOD FACTORS  
SHEET FLOW PORTION 100.0 SLOPE (FT/FT) 1.0000  
SHALLOW FLOW PORTION 100.0 SLOPE (FT/FT) 1.0000  
CHANNEL FLOW PORTION 100.0 SLOPE (FT/FT) 1.0000  
TOTAL BASIN 11300.0 SLOPE (FT/FT) 1.0000  

LAG EQUATION FACTORS:  KE=.0309  TOTAL BASIN LENGTH (FT)= 11300.0  
TOTAL BASIN SLOPE (FT/FT)= .009000  CENTROID LENGTH (FT)= 4860.0  

TIME OF CONCENTRATION (HRS)= .6894  TIME TO PEAK (HRS)= .4596  LAG TIME (HRS)= .5271  

COMPUTE NH HYD  ID=17 HYD=OFF.A AREA=.16375 PER A=100.0 PER B=0.0  
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1  

TIME TO PEAK (HRS)= .4596  
K = .461278HR TP = .459099HR K/TP RATIO = .9903541  SHAPE CONSTANT, N = 3.517778  
UNIT PEAK = 3145.9 CFS UNIT VOLUME = 1.000  B = 321.62  P60 = 1.0700  

Page 8
AREA = 1.637500 SQ MI  IA =  .650000 INCHES  INF =  1.670000 INCHES PER HOUR  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - BT =  .013333

BUILDING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.

RUNOFF VOLUME = .45620 INCHES  PEAK DISCHARGE RATE =  319.98 CFS  AT  1.835 HOURS  BASIN AREA =  1.6375 SQ. MI.

***************************************************************
** B A S I N  E X .  O F F .  B  **
***************************************************************

COMPUTE LT TP LCODE=1 NL=3 ISLOPE=1 LENGTH=8700 FT SLOPE=0.009 KT=1
KRT=0.03 CENTRIDE DISTANCE=800 FT

BASIN LONGER THAN 4000.0 FT AND ALL BASIN LAG FACTORS NOT SPECIFIED
USE KM = .0360 AND LCA=1.0 = .50000

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS:  KM = .0160 TOTAL BASIN LENGTH (FT)= 18700.0
TOTAL BASIN SLOPE (FT/FT)= .021834 CENTRIDE LENGTH (FT)= 9350.0

TIME OF CONCENTRATION (HRS)= .4645  TIME TO PEAK (HRS)= .3907  LAG TIME (HRS)= .3484

COMPUTE NH HYD ID=18 HYD=EX.Off.B AREA=.6.6078 PER A=.100 PER B=.00 PER C=0.0 PER D=.00 TP=.00 RAINFALL=.1

TIME TO PEAK (HRS)= .3907

K =  .3103579F  TP =  .300605H  K/TP RATIO = 1.005481  SHAPE CONSTANT, N =  3.517728  UNIT PEAK =  .478.58  CFS  UNIT VOLUME =  1.000  B =  321.02  P60 = 1.8700
AREA =  .456780 SQ MI  IA =  .650000 INCHES  INF =  1.670000 INCHES PER HOUR  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - BT =  .013333

BUILDING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.

***************************************************************
** B A S I N  E X .  O F F .  C  **
***************************************************************

COMPUTE LT TP LCODE=1 NL=3 ISLOPE=1 LENGTH=400 FT SLOPE=0.011 KT=1
LENGTH=400 FT SLOPE=0.011 KT=2
LENGTH=400 FT SLOPE=0.011 KT=3

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS
SHEET FLOW PORTION  400.0  .011000  1.0000  COMPOSITE K
SHALLOW FLOW PORTION  360.0  .011000  1.0000
CHANNEL FLOW PORTION  360.0  .011000  1.0000
TOTAL BASIN  360.0  .011000  2.6769

TIME OF CONCENTRATION (HRS)= .4591  TIME TO PEAK (HRS)= .3906  LAG TIME (HRS)= .3443

COMPUTE NH HYD ID=15 HYD=EX.Off.C AREA=1.5255 PER A=.00 PER B=.15 PER C=.15 PER D=0.00 TP=.00 RAINFALL=1

TIME TO PEAK (HRS)= .3906

K =  .1753359  TP =  .3030000  K/TP RATIO =  .575817  SHAPE CONSTANT, N =  5.612216  UNIT PEAK =  .377.56  CFS  UNIT VOLUME =  1.000  B =  532.54  P60 = 1.8700
AREA =  .255275 SQ MI  IA =  .62824 INCHES  INF =  1.497000 INCHES PER HOUR  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - BT =  .033333

K =  .293279H  TP =  .3030000  K/TP RATIO =  .958266  SHAPE CONSTANT, N =  3.667406  UNIT PEAK =  1640.0 CFS  UNIT VOLUME =  1.000  B =  331.76  P60 = 1.8700
AREA =  1.28625 SQ MI  IA =  .58824 INCHES  INF =  1.497000 INCHES PER HOUR  RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - BT =  .033333

BUILDING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.

PRINT HYD ID=15 CODE=1 HYDROGRAPH FROM AREA EX.Off.C

RUNOFF VOLUME = .75968 INCHES  PEAK DISCHARGE RATE =  .1143.95 CFS  AT  1.700 HOURS  BASIN AREA =  1.5255 SQ. MI.
**PROJECT NAME:** SANTOLINA

**DATE:** NOVEMBER 8, 2012

**INPUT FILE NAME:** 100EX24.INM

**OUTPUT FILE NAME:** 100EX24.OUT

**PROJECT NUMBER:** 2012025

**CURRENTS:** 500 YEAR-24 HOUR STORM

**SEDIMENT BULK COD=1  BULK FACTOR=1.10**

**EXCISTING CONDITION**

**SEDIMENT BULK CODE=1  BULK FACTOR=1.0**

**COMPUTE LT TP**

**CODE=1  NS=3  ISOLATE=1**

**LENGTH=400 FT  SLOPE=0.05  K=1**

**LENGTH=1600 FT  SLOPE=0.05  K=2**

**LENGTH=400 FT  SLOPE=0.05  K=3**

**COMPUTE NM HYD**

**ID=3  HYD-EX.A  AREA=0.430  PER A=0.0 PER B=0.0**

**PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1**

**PRINT HYD**

**ID=3  CODE=1**

**COMPUTE LT TP**

**CODE=1  NS=3  ISOLATE=1**

**LENGTH=400 FT  SLOPE=0.0  K=1**

**LENGTH=1600 FT  SLOPE=0.0  K=2**

**LENGTH=2500 FT  SLOPE=0.0  K=3**

**KN=0.03  CENTRIGID DISTANCE=2100 FT**

**COMPUTE NM HYD**

**ID=2  HYD-EX.B  AREA=2.130  PER A=100.0 PER B=0.0**

**PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1**

**PRINT HYD**

**ID=2  CODE=1**

**COMPUTE LT TP**

**CODE=1  NS=3  ISOLATE=1**

**LENGTH=400 FT  SLOPE=0.01  K=1**

**LENGTH=1600 FT  SLOPE=0.01  K=2**

**LENGTH=2500 FT  SLOPE=0.01  K=3**

**KN=0.03  CENTRIGID DISTANCE=500 FT**

**COMPUTE NM HYD**

**ID=3  HYD-EX.C  AREA=1.750  PER A=100.0 PER B=0.0**

**PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1**

**PRINT HYD**

**ID=3  CODE=1**

**COMPUTE LT TP**

**CODE=1  NS=3  ISOLATE=1**

**LENGTH=400 FT  SLOPE=0.008  K=1**

**LENGTH=1600 FT  SLOPE=0.008  K=2**

**LENGTH=2500 FT  SLOPE=0.008  K=3**

**KN=0.03  CENTRIGID DISTANCE=1500 FT**

**COMPUTE NM HYD**

**ID=4  HYD-EX.D  AREA=0.513  PER A=100.0 PER B=0.0**

**PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1**

**PRINT HYD**

**ID=4  CODE=1**

**COMPUTE LT TP**

**CODE=1  NS=3  ISOLATE=1**

**LENGTH=400 FT  SLOPE=0.0  K=1**

**LENGTH=1600 FT  SLOPE=0.0  K=2**

**LENGTH=2500 FT  SLOPE=0.0  K=3**

**KN=0.03  CENTRIGID DISTANCE=5400 FT**

**COMPUTE NM HYD**

**ID=5  HYD-EX.E  AREA=4.425  PER A=100.0 PER B=0.0**

**PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1**

**PRINT HYD**

**ID=5  CODE=1**

**COMPUTE LT TP**

**CODE=1  NS=3  ISOLATE=1**

**LENGTH=400 FT  SLOPE=0.01  K=1**

**LENGTH=1600 FT  SLOPE=0.01  K=2**

**LENGTH=2500 FT  SLOPE=0.01  K=3**

**KN=0.03  CENTRIGID DISTANCE=5400 FT**

**COMPUTE NM HYD**

**ID=6  HYD-EX.F  AREA=1.7047  PER A=100.0 PER B=0.0**

**PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1**

**PRINT HYD**

**ID=6  CODE=1**
COMPUTE LT TP
LID=1  NK=3  ISLOPE=-1
LENGTH=400 FT  SLOPE=0.04  K=1
LENGTH=1600 FT  SLOPE=0.04  K=2
LENGTH=5500 FT  SLOPE=0.04  K=3
K=0.03  CENTROID DISTANCE=4500 FT

COMPUTE MN HYD
ID=25 HYD=EX.0 AREA=0.9486 PER A=50.0 PER B=50.0
PER C=0.0 PER D=0.0  TP=0.0  RAINFALL=-1

PRINT HYD
ID=25  CODE=1

COMPUTE LT TP
LID=1  NK=3  ISLOPE=-1
LENGTH=400 FT  SLOPE=0.04  K=1
LENGTH=1600 FT  SLOPE=0.04  K=2
LENGTH=5500 FT  SLOPE=0.04  K=3
K=0.03  CENTROID DISTANCE=5700 FT

COMPUTE MN HYD
ID=16 HYD=EX.P AREA=0.5833 PER A=50.0 PER B=50.0
PER C=0.0 PER D=0.0  TP=0.0  RAINFALL=-1

PRINT HYD
ID=16  CODE=1

SKIDMEN BULK
COG=1  BULK FACTOR=1.025

COMPUTE LT TP
LID=1  NK=3  ISLOPE=-1
LENGTH=400 FT  SLOPE=0.009  K=3
LENGTH=1600 FT  SLOPE=0.009  K=3
LENGTH=2000 FT  SLOPE=0.009  K=3
K=0.03  CENTROID DISTANCE=6800 FT

COMPUTE MN HYD
ID=17 HYD=EX.OFF.A AREA=1.6375 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0  TP=0.0  RAINFALL=-1

PRINT HYD
ID=17  CODE=1

COMPUTE LT TP
LID=1  NK=3  ISLOPE=-1
LENGTH=4000 FT  SLOPE=0.009  K=3
LENGTH=20000 FT  SLOPE=0.009  K=3
K=0.03  CENTROID DISTANCE=8000 FT

COMPUTE MN HYD
ID=18 HYD=EX.OFF.B AREA=2.6075 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0  TP=0.0  RAINFALL=-1

PRINT HYD
ID=18  CODE=1

COMPUTE LT TP
LID=1  NK=3  ISLOPE=-1
LENGTH=1600 FT  SLOPE=0.011  K=3
LENGTH=2000 FT  SLOPE=0.011  K=3
LENGTH=4000 FT  SLOPE=0.011  K=3
K=0.03  CENTROID DISTANCE=4500 FT

COMPUTE MN HYD
ID=19 HYD=EX.OFF.C AREA=1.5125 PER A=60.0 PER B=35.0
PER C=30.0 PER D=15.0  TP=0.0  RAINFALL=-1

PRINT HYD
ID=19  CODE=1

FINISH
COMPUTED 24-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.

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**S** COMPUTE BASINS IN SANTOLINA - EXISTING CONDITION

**S** SEDIMENT BULK FACTOR FOR 100 YR STORM IS 2.5 FOR MESA BASINS AND 10 FOR ES BASIN. FACTOR = 3.10

**S** BASIN EX.A

COMPUTE LT TP

LC=1 NK=3 ISLOPE=-1
LENGTH=400 FT SLOPE=0.05 K=1
LENGTH=600 FT SLOPE=0.05 K=2
LENGTH=800 FT SLOPE=0.05 K=3

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
SHEET FLOW PORTION 400.0 0.05 0.00
SHEEP FLOW PORTION 1600.0 0.05 1.00
TOTAL BASIN 2400.0 0.05 1.00

TIME OF CONCENTRATION (HRS)= .1656 TIME TO PEAK (HRS)= .1104 LAG TIME (HRS)= .1242

TIME TO PEAK COMPUTED TO BE LESS THAN 0.13333 HOURS MINIMUM VALUE.

REVISED VALUES: TIME OF CONCENTRATION (HRS)= .2000 TIME TO PEAK (HRS)= .1333 LAG TIME (HRS)= .1500

COMPUTE NH HYD ID=1 HYD=EX.A AREA=0.5438 PER A=0.0 PER B=0.0 PER C=0.0 PER D=0 PER=0.0 RAINFALL=1

TIME TO PEAK (HRS)= .1333

K = .1118511 TR = .13333HR K/TR RATIO = .838611 SHAPE CONSTANT, N = 4.250346
UNIT PEAK = 3333.2 CFS UNIT VOLUME = 1.500 B = 11.52 P = 1.80709
AREA = .543800 SQ MI IA = .42500 INCHES INF = 1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.10000 AT PEAK.

PRINT HYD ID=1 CODE=1

HYDROGRAPH FROM AREA EX.A

RUNOFF VOLUME = .89725 INCHES = 26.0225 ACRE- FEET
PEAK DISCHARGE RATE = 966.27 CFS AT 1.500 HOURS BASIN AREA = .5438 SQ. MI.

**S** SEDIMENT BULK FACTOR CODE=1 BULK FACTOR = 1.025

**S** BASIN EX.B

COMPUTE LT TP

LC=1 NK=3 ISLOPE=-1
LENGTH=400 FT SLOPE=0.005 K=1
LENGTH=600 FT SLOPE=0.005 K=2
LENGTH=800 FT SLOPE=0.005 K=3
KH=0.03 CENTERED DISTANCE=2100 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
SHEET FLOW PORTION 400.0 0.005 0.00
SHEEP FLOW PORTION 1600.0 0.005 1.00
TOTAL BASIN 2400.0 0.005 1.00

LAG EQUATION FACTORS: KN = .0030 TOTAL BASIN LENGTH (FT)= 7500.0

TOTAL BASIN SLOPE (FT/FT)= .000000 CENTERED LENGTH (FT)= 2100.0

TIME OF CONCENTRATION (HRS)= .6568 TIME TO PEAK (HRS)= .4300 LAG TIME (HRS)= .4927

COMPUTE NH HYD ID=2 HYD=EX.B AREA=2.9109 PER A=0.00 PER B=0.00 PER C=0.00 PER D=0.00 TP=0.00 RAINFALL=1

TIME TO PEAK (HRS)= .4300

K = .4395588 TR = .4375558 K/TR RATIO = 1.003541 SHAPE CONSTANT, N = 3.517728
UNIT PEAK = 2137.7 CFS UNIT VOLUME = 1.000 IA = 321.62 P = 1.87009 AREA = .921000 SQ MI IA = .060000 INCHES INF = 1.06000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK.

PRINT HYD ID=2 CODE=1

HYDROGRAPH FROM AREA EX.B

RUNOFF VOLUME = .45000 INCHES = 69.8922 ACRE- FEET
PEAK DISCHARGE RATE = 966.27 CFS AT 1.833 HOURS BASIN AREA = 2.9109 SQ. MI.
# 100EX.24.OUT

**BASEIN EX.C ****************************

**BASEIN EX.D ****************************

**BASEIN EX.E ****************************
TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

<table>
<thead>
<tr>
<th>LENGTH (FT)</th>
<th>SLOPE (FT/FT)</th>
<th>COMPOSITE K</th>
</tr>
</thead>
<tbody>
<tr>
<td>400.0</td>
<td>.000000</td>
<td>1.0000</td>
</tr>
<tr>
<td>1000.0</td>
<td>.000000</td>
<td>2.0000</td>
</tr>
<tr>
<td>2000.0</td>
<td>.000000</td>
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</table>

TOTAL BASIN = 11500.0
TOTAL BASIN SLOPE (FT/FT) = .000000
TOTAL BASIN LENGTH (FT) = 11500.0
CENTROID LENGTH (FT) = 5000.0

LAG EQUATION FACTORS:

<table>
<thead>
<tr>
<th>K</th>
<th>TOTAL BASIN LENGTH (FT)</th>
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<tbody>
<tr>
<td>.0300</td>
<td>11500.0</td>
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</table>

TIME OF CONCENTRATION (HRS) = .7725
TIME TO PEAK (HRS) = .5150
LAG TIME (HRS) = .5794

COMPUTE NH HYD

ID=5 HYD=EX.E AREA=2.4234 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS) = .5150

K = 1.512682
H = 1.512682 H/TP RATIO = 1.0000 SCAPE CONSTANT, N = 3.527728
UNIT PEAK = 3133.3 CFS UNIT VOLUME = 1.000
H = 321.62 P = 1.8700
AREA = 2.423400 SQ FT IA = 0.6000 INCHES INF = 1.67000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033333

RUNOFF VOLUME = 15020 INCHES = 40,930.77 ACRE-FOOT
PEAK DISCHARGE RATE = 876.65 CFS AT 1.500 HOURS BASIN AREA = 2.4234 SQ. FT.

#g

#g----------------------------------------------------------BASIN EX.E

COMPUTE LT TP

LENGTH=4, IS=3 ISlope=1
LENGTH=1000 FT SLOPE=0.01 K=1
LENGTH=1000 FT SLOPE=0.01 K=2
LENGTH=1000 FT SLOPE=0.01 K=3
KN=0.03 CENTROID DISTANCE=5400 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

<table>
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<tr>
<th>LENGTH (FT)</th>
<th>SLOPE (FT/FT)</th>
<th>COMPOSITE K</th>
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<tr>
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<tr>
<td>2000.0</td>
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</table>

TOTAL BASIN = 11200.0
TOTAL BASIN SLOPE (FT/FT) = .000000
TOTAL BASIN LENGTH (FT) = 11200.0
CENTROID LENGTH (FT) = 5000.0

TIME OF CONCENTRATION (HRS) = .6977
TIME TO PEAK (HRS) = .4656
LAG TIME (HRS) = .5248

COMPUTE NH HYD

ID=6 HYD=EX.F AREA=3.7047 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS) = .4656

K = 1.618313
H = 1.512682 H/TP RATIO = 1.0000 SCAPE CONSTANT, N = 3.527728
UNIT PEAK = 3175.4 CFS UNIT VOLUME = 1.000
H = 321.62 P = 1.8700
AREA = 1.79700 SQ FT IA = 0.6000 INCHES INF = 1.67000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033333

RUNOFF VOLUME = 15020 INCHES = 40,930.77 ACRE-FOOT
PEAK DISCHARGE RATE = 876.65 CFS AT 1.500 HOURS BASIN AREA = 2.4234 SQ. FT.

#g

#g----------------------------------------------------------BASIN EX.G

COMPUTE LT TP

LENGTH=1, IS=0 ISlope=1
LENGTH=1500 FT SLOPE=0.02 K=3
KN=0.01 CENTROID DISTANCE=6300 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS:

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TIME OF CONCENTRATION (HRS) = .6932
TIME TO PEAK (HRS) = .4621
LAG TIME (HRS) = .5299

COMPUTE NH HYD

ID=7 HYD=EX.G AREA=2.2625 PER A=100.0 PER B=0.0
PER C=0.0 PER D=0.0
**TIME TO PEAK (hrs):** 0.4621

\[ K = 0.4621, TP = 0.4621818 \]

**RANGE:**

- **K:** 0.4621
- **TP:** 0.4621818
- **K/TP:** 1.000541
- **SHAPE CONSTANT, N:** 3.517728
- **UNIT PEAK:** 1.58756
- **UNIT VOLUME:** 1.000
- **AREA:** 2.625500
- **IA:** 0.600
- **INCHES:** 1.690
- **INCHES PER HOUR:** 1.6700

**FLOW:**

- **RUNOFF:** 0.4520
- **INCHES:** 4.323
- **ACRE-FOOT:** 701.96
- **DISCHARGE:** 1.833
- **HOUR:** 2.265
- **AREA:** 2.265
- **SQ. MI:**

---

**BASIN EX. B**

**K:** 0.557965

**TP:** 0.555998

**K/TP:** 1.000541

**SHAPE CONSTANT, N:** 3.517728

**UNIT PEAK:** 1.58756

**UNIT VOLUME:** 1.000

**AREA:** 2.625500

**IA:** 0.600

**INCHES:** 1.690

**INCHES PER HOUR:** 1.6700

**FLOW:**

- **RUNOFF:** 0.4520
- **INCHES:** 4.323
- **ACRE-FOOT:** 701.96
- **DISCHARGE:** 1.833
- **HOUR:** 2.265
- **AREA:** 2.265
- **SQ. MI:**

---

**BASIN EX. C**

**K:** 0.557965

**TP:** 0.555998

**K/TP:** 1.000541

**SHAPE CONSTANT, N:** 3.517728

**UNIT PEAK:** 1.58756

**UNIT VOLUME:** 1.000

**AREA:** 2.625500

**IA:** 0.600

**INCHES:** 1.690

**INCHES PER HOUR:** 1.6700

**FLOW:**

- **RUNOFF:** 0.4520
- **INCHES:** 4.323
- **ACRE-FOOT:** 701.96
- **DISCHARGE:** 1.833
- **HOUR:** 2.265
- **AREA:** 2.265
- **SQ. MI:**

---

**BASIN EX. D**

**K:** 0.557965

**TP:** 0.555998

**K/TP:** 1.000541

**SHAPE CONSTANT, N:** 3.517728

**UNIT PEAK:** 1.58756

**UNIT VOLUME:** 1.000

**AREA:** 2.625500

**IA:** 0.600

**INCHES:** 1.690

**INCHES PER HOUR:** 1.6700

**FLOW:**

- **RUNOFF:** 0.4520
- **INCHES:** 4.323
- **ACRE-FOOT:** 701.96
- **DISCHARGE:** 1.833
- **HOUR:** 2.265
- **AREA:** 2.265
- **SQ. MI:**

---

**BASIN EX. E**

**K:** 0.557965

**TP:** 0.555998

**K/TP:** 1.000541

**SHAPE CONSTANT, N:** 3.517728

**UNIT PEAK:** 1.58756

**UNIT VOLUME:** 1.000

**AREA:** 2.625500

**IA:** 0.600

**INCHES:** 1.690

**INCHES PER HOUR:** 1.6700

**FLOW:**

- **RUNOFF:** 0.4520
- **INCHES:** 4.323
- **ACRE-FOOT:** 701.96
- **DISCHARGE:** 1.833
- **HOUR:** 2.265
- **AREA:** 2.265
- **SQ. MI:**

---

**BASIN EX. F**

**K:** 0.557965

**TP:** 0.555998

**K/TP:** 1.000541

**SHAPE CONSTANT, N:** 3.517728

**UNIT PEAK:** 1.58756

**UNIT VOLUME:** 1.000

**AREA:** 2.625500

**IA:** 0.600

**INCHES:** 1.690

**INCHES PER HOUR:** 1.6700

**FLOW:**

- **RUNOFF:** 0.4520
- **INCHES:** 4.323
- **ACRE-FOOT:** 701.96
- **DISCHARGE:** 1.833
- **HOUR:** 2.265
- **AREA:** 2.265
- **SQ. MI:**

---

**BASIN EX. G**

**K:** 0.557965

**TP:** 0.555998

**K/TP:** 1.000541

**SHAPE CONSTANT, N:** 3.517728

**UNIT PEAK:** 1.58756

**UNIT VOLUME:** 1.000

**AREA:** 2.625500

**IA:** 0.600

**INCHES:** 1.690

**INCHES PER HOUR:** 1.6700

**FLOW:**

- **RUNOFF:** 0.4520
- **INCHES:** 4.323
- **ACRE-FOOT:** 701.96
- **DISCHARGE:** 1.833
- **HOUR:** 2.265
- **AREA:** 2.265
- **SQ. MI:**

---

**BASIN EX. H**

**K:** 0.557965

**TP:** 0.555998

**K/TP:** 1.000541

**SHAPE CONSTANT, N:** 3.517728

**UNIT PEAK:** 1.58756

**UNIT VOLUME:** 1.000

**AREA:** 2.625500

**IA:** 0.600

**INCHES:** 1.690

**INCHES PER HOUR:** 1.6700

**FLOW:**

- **RUNOFF:** 0.4520
- **INCHES:** 4.323
- **ACRE-FOOT:** 701.96
- **DISCHARGE:** 1.833
- **HOUR:** 2.265
- **AREA:** 2.265
- **SQ. MI:**

---

**BASIN EX. I**

**K:** 0.557965

**TP:** 0.555998

**K/TP:** 1.000541

**SHAPE CONSTANT, N:** 3.517728

**UNIT PEAK:** 1.58756

**UNIT VOLUME:** 1.000

**AREA:** 2.625500

**IA:** 0.600

**INCHES:** 1.690

**INCHES PER HOUR:** 1.6700

**FLOW:**

- **RUNOFF:** 0.4520
- **INCHES:** 4.323
- **ACRE-FOOT:** 701.96
- **DISCHARGE:** 1.833
- **HOUR:** 2.265
- **AREA:** 2.265
- **SQ. MI:**

---

**BASIN EX. J**

**K:** 0.557965

**TP:** 0.555998

**K/TP:** 1.000541

**SHAPE CONSTANT, N:** 3.517728

**UNIT PEAK:** 1.58756

**UNIT VOLUME:** 1.000

**AREA:** 2.625500

**IA:** 0.600

**INCHES:** 1.690

**INCHES PER HOUR:** 1.6700

**FLOW:**

- **RUNOFF:** 0.4520
- **INCHES:** 4.323
- **ACRE-FOOT:** 701.96
- **DISCHARGE:** 1.833
- **HOUR:** 2.265
- **AREA:** 2.265
- **SQ. MI:**
**SCS UPLAND METHOD FACTORS**

**LENGTH** (FT)  SLOPE (FT/FT)  COMPOSITE K

SHEET FLOW PORTION  460.0  0.076000  1.0000
SHALLOW FLOW PORTION  160.0  0.076000  1.0000
CHANNEL FLOW PORTION  160.0  0.076000  1.0000
TOTAL BASIN  2600.0  0.076000  1.0000

TIME OF CONCENTRATION (HRS)= 0.1478  TIME TO PEAK (HRS)= 0.085  LAG TIME (HRS)= 0.1168

TIME TO PEAK COMPUTED TO BE LESS THAN 0.13333 HOURS MINIMUM VALUE.

**COMPUTE HYD**  ID=12 HYD-EKX L AREA=0.6219 PER A=50.0 PER B=50.0 PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS)= 0.1333

**K** = 0.126475  **TP** = 0.13333  **K/TP RATIO** = 0.948564  SHAPE CONSTANT, N = 3.726434

UNIT PEAK = 1560.5  CFS  UNIT VOLUME = 1.000  B = 136.60  P60 = 1.8700

AREA = 0.62190  SQ. MI  IA = 0.75600  INCHES  INF = 1.40000  INCHES PER HOUR

RUNOFF COMPUTED BY INITIAL AWFACETION/INFILTRATION NUMBER METHOD - DT = 0.03333

**BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR** = 1.1000 AT PEAK FLOW.

**PRINT HYD**  ID=12 CODE=1

**HYDROGRAPH FROM AREA ЕКX**

RUNOFF VOLUME = 0.5931  INCHES  PEAK DISCHARGE RATE = 708.02  CFS AT 1.533  HOURS BASIN AREA = 0.6219  SQ. MI.

**SCS UPLAND METHOD FACTORS**

**LENGTH** (FT)  SLOPE (FT/FT)  COMPOSITE K

SHEET FLOW PORTION  460.0  0.076000  1.0000
SHALLOW FLOW PORTION  160.0  0.076000  1.0000
CHANNEL FLOW PORTION  5400.0  0.076000  1.0000
TOTAL BASIN  5400.0  0.076000  1.0000

LAG EQUATION FACTORS:  **K** = 0.0300  TOTAL BASIN LENGTH (FT)= 5400.0

TOTAL BASIN SLOPE (FT/FT)= 0.015000  CENTROID LENGTH (FT)= 2500.0

TIME OF CONCENTRATION (HRS)= 0.4414  TIME TO PEAK (HRS)= 0.2942  LAG TIME (HRS)= 0.3310

**COMPUTE HYD**  ID=13 HYD-EKX L AREA=1.1844 PER A=100.0 PER B=0.0 PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS)= 0.2942

**K** = 0.29258  **TP** = 0.29258  **K/TP RATIO** = 1.003541  SHAPE CONSTANT, N = 3.537728

UNIT PEAK = 1294.6  CFS  UNIT VOLUME = 1.000  B = 321.62  P60 = 1.8700

AREA = 1.1844  SQ. MI  IA = 0.6500  INCHES  INF = 1.6700  INCHES PER HOUR

RUNOFF COMPUTED BY INITIAL AWFACETION/INFILTRATION NUMBER METHOD - DT = 0.03333

**BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR** = 1.0250 AT PEAK FLOW.

**PRINT HYD**  ID=13 CODE=1

**HYDROGRAPH FROM AREA ЕКX**

RUNOFF VOLUME = 0.4520  INCHES  PEAK DISCHARGE RATE = 368.88  CFS AT 1.667  HOURS BASIN AREA = 1.1844  SQ. MI.

**SCS UPLAND METHOD FACTORS**

**LENGTH** (FT)  SLOPE (FT/FT)  COMPOSITE K

SHEET FLOW PORTION  460.0  0.076000  1.0000
SHALLOW FLOW PORTION  160.0  0.076000  1.0000
SHALLOW FLOW PORTION = 1600.0
CHANNEL FLOW PORTION = 4000.0
TOTAL BASIN = 6000.0

LAG EQUATION FACTORS:
K = .0100
TOTAL BASIN LENGTH (FT) = 6000.0
CENTROID LENGTH (FT) = 4200.0

TIME OF CONCENTRATION (HRS) = .2899
TIME TO PEAK (HRS) = .1993
LAG TIME (HRS) = .2242

COMPUTE NYD (ID=14 HYD-EX.N) AREA=0.6947 PER A=0.00 PER B=0.00
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1.

TIME TO PEAK (HRS) = .1993
K = .3890684
TP = 1092908
K/TP RATIO = .948564 SHAPE CONSTANT, N = 2.726493
UNIT PEAK = 1022.0
UNIT VOLUME = 1.000
P = 336.50
Q = 1.8700
AREA = 604700 SQ FT
TA = .570000 INCHES
INF = 1.46000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFLITRATION NUMBER METHODOLOGY - DT = .033333
MULTIPLY FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.10000 AT PEAK.

PRINT NYD (ID=14 CODE=1)

HYDROGRAPH FROM AREA EX. N

RUNOFF VOLUME = .59932 INCHES = 19.3282 ACRE-FEET
PEAK DISCHARGE RATE = 561.22 CFS AT 1.6700 HOURS
BASIN AREA = .6047 SQ. MI.

*--------------------------------------------------------------------------*
*----------------------------------------------------------------------*
*----------------------------------------------------------------------*

*----------------------------------------------------------------------*
*----------------------------------------------------------------------*

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

SHALLOW FLOW PORTION = 400.0
CHANNEL FLOW PORTION = 1600.0
TOTAL BASIN = 7500.0

LAG EQUATION FACTORS:
K = .5800
TOTAL BASIN LENGTH (FT) = 7500.0
CENTROID LENGTH (FT) = 4200.0

TIME OF CONCENTRATION (HRS) = .3649
TIME TO PEAK (HRS) = .2433
LAG TIME (HRS) = .2737

COMPUTE NYD (ID=15 HYD-EX.O) AREA=0.5084 PER A=0.00 PER B=0.00
PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=1.

TIME TO PEAK (HRS) = .2433
K = .230738
TP = 2432908
K/TP RATIO = 948564 SHAPE CONSTANT, N = 2.726493
UNIT PEAK = 1331.7
UNIT VOLUME = 1.000
P = 336.50
Q = 1.8700
AREA = .564000 SQ FT
TA = .572000 INCHES
INF = 1.46000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFLITRATION NUMBER METHODOLOGY - DT = .033333
MULTIPLY FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.10000 AT PEAK.

PRINT NYD (ID=15 CODE=1)

HYDROGRAPH FROM AREA EX. O

RUNOFF VOLUME = .59932 INCHES = 30.3140 ACRE-FEET
PEAK DISCHARGE RATE = 741.95 CFS AT 1.673 HOURS
BASIN AREA = .9484 SQ. MI.

*--------------------------------------------------------------------------*
*----------------------------------------------------------------------*
*----------------------------------------------------------------------*

*----------------------------------------------------------------------*
*----------------------------------------------------------------------*

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS
COMPUTE NY WD  ID=16 HYD=EXF.P AREA=0.9333 PER A=50.0 PER B=50.0 PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

TIME TO PEAK (HRS)= .8764
K = .267858 IN  TP = .282382 HR  K TP RATIO = .948564  SHAPE CONSTANT, N = 3.72961
UNIT PEAK = 1000.3 CFS UNIT VOLUME = 1.00  B = 355.50  P0 = 1.8700
AREA = .031320 SQ MI  IA = .575000 INCHES  INF = 1.466660 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333
BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02000 AT PEAK FLOW.

PRINT HYD  ID=16  CODE=1

HYDROGRAPH FROM AREA EX.F.P

RUNOFF VOLUME = .59933 INCHES  29.7674 ACRE-FOOT
PEAK DISCHARGE RATE = 396.40 CFS AT 1.667 HOURS  BASIN AREA = .9333 SQ. MI.

*******************************************************************************
SEDIMENT BULK CODE=1 BULK FACTOR=1.025
*******************************************************************************

************************************************************************ BASEIN EX. OFF A ***************

COMPUTE LT TP  LOAD=1 MIN=3 ISLOPE=1
LENGTH=1600 FT  SLOPE=0.009 K=1
LENGTH=1600 FT  SLOPE=0.009 K=2
LENGTH=1600 FT  SLOPE=0.009 K=3
EA=0.03  CENTROID DISTANCE=4800 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND FACTORS
SHEET FLOW PORTION LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
SMALL FLOW PORTION 3600.0 .009000 3.0000
CHANNEL FLOW PORTION 3600.0 .009000 3.0000
TOTAL BASIN 11300.0 .009000 2.5779

LAG EQUATION FACTORS: K= .0300  TOTAL BASIN LENGTH (FT)= 11300.0
TOTAL BASIN SLOPE (FT/FT)= .050000  CENTROID LENGTH (FT)= 4800.0

TIME OF CONCENTRATION (HRS)= .6094  TIME TO PEAK (HRS)= .4596  LAG TIME (HRS)= .5171

COMPUTE NY WD  ID=17 HYD=EX.FOFF.A AREA=1.6375 PER A=100.0 PER B=0.0 PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

TIME TO PEAK (HRS)= .4596
K = .461238 HR  TP = .459600 HR  K TP RATIO = 1.003541  SHAPE CONSTANT, N = 3.517728
UNIT PEAK = 145.9 CFS UNIT VOLUME = 1.000  B = 311.62  P0 = 1.8700
AREA = 1.6375 SQ MI  IA = .050000 INCHES  INF = 1.67000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333
BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.

PRINT HYD  ID=17  CODE=1

HYDROGRAPH FROM AREA EX.FOFF.A

RUNOFF VOLUME = .45020 INCHES  39.3172 ACRE-FOOT
PEAK DISCHARGE RATE = 523.50 CFS AT 1.833 HOURS  BASIN AREA = 1.6375 SQ. MI.

*******************************************************************************
******************************************************************************* BASEIN EX. OFF B ***************

COMPUTE LT TP  LOAD=1 MIN=3 ISLOPE=1
LENGTH=36700 FT  SLOPE=0.009 K=3
EA=0.03  CENTROID DISTANCE=8000 FT

BASIN LONGER THAN 4000.0 FT AND ALL BASIN LAG FACTORS NOT SPECIFIED
USE N= .0500 AND LCS/L= .50000

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS: K= .0150  TOTAL BASIN LENGTH (FT)= 36700.0
TOTAL BASIN SLOPE (FT/FT)= .02384 CENTROID LENGTH (FT)= 9550.0

TIME OF CONCENTRATION (HRS)= .4045  TIME TO PEAK (HRS)= .3097  LAG TIME (HRS)= .3484

COMPUTE NY WD  ID=18 HYD=EXF.Off.B AREA=4.4678 PER A=100.0 PER B=0.0 PER C=0.0 PER D=0.0 TP=0.0 RAINFALL=-1

TIME TO PEAK (HRS)= .3097
K = .310758 HR  TP = .309616 HR  K TP RATIO = 1.000000  SHAPE CONSTANT, N = 3.517728
UNIT PEAK = 478.55 CFS UNIT VOLUME = 1.000  B = 311.62  P0 = 1.8700
AREA = .930000 SQ MI  IA = .050000 INCHES  INF = 1.67000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333
BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.

PRINT HYD  ID=18  CODE=1
HYPY_Area_EX.C

HYDROGRAPH FROM AREA EX.C

RUNOFF VOLUME = 0.8177 INCHES = 55.9177 ACRE-FEET
PEAK DISCHARGE RATE = 314.93 CFS AT 1.700 HOURS BASIN AREA = 1.5125 SQ. MI.

FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 09:42:02
PROJECT NAME: SANTOLINA
DATE: NOVEMBER 8, 2012
INPUT FILE NAME: 2REV.6.HYM
OUTPUT FILE NAME: 2REV.6.OUT
PROJECT NUMBER: 20120264
COMMENTS: 2 YEAR-6 HOUR STORM

---------------------------------------------------
START
TIME=0.0 HR PUNCH COMM
RAINFALL
TYPE=1 RAINFOOTER:0.0
RAIN INT=0.91 IN RAIN SQFT=0.99 IN
RAIN DAY=3.13 IN OT=0.33333

---------------------------------------------------

COMPUTE BASIN IN SANTOLINA - DEVELOPED CONCESSION

**SENIOR HLP FACTOR PER 2 YR = 1 BULK FACTOR=1

COMPUTE LT TP
    LC=601
    NC=3 ISLOPE=1
    LENGTH=400 FT SLOPE=0.05 K=1
    LENGTH=1600 FT SLOPE=0.05 K=2
    LENGTH=400 FT SLOPE=0.05 K=3

COMPUTE NN HYD
    ID=1 HYD-DEV.A AREA=0.5438 PER A=0.0 PER B=2.0
    PER C=0.0 PER D=6.0 TP=0.0 RAINFALL=1

PRINT HYD
    ID=1 CODE=1

COMPUTE LT TP
    LC=601
    NC=3 ISLOPE=1
    LENGTH=400 FT SLOPE=0.05 K=1
    LENGTH=1600 FT SLOPE=0.05 K=2
    LENGTH=400 FT SLOPE=0.05 K=3
    KN=0.021 CENTROID DISTANCE=2005 FT

COMPUTE NN HYD
    ID=2 HYD-DEV.B AREA=0.5716 PER A=0.0 PER B=19.0
    PER C=19.0 PER D=62.0 TP=0.0 RAINFALL=1

PRINT HYD
    ID=2 CODE=1

COMPUTE LT TP
    LC=601
    NC=3 ISLOPE=1
    LENGTH=400 FT SLOPE=0.01 K=1
    LENGTH=1600 FT SLOPE=0.01 K=2
    LENGTH=3100 FT SLOPE=0.01 K=3
    KN=0.021 CENTROID DISTANCE=3400 FT

COMPUTE NN HYD
    ID=3 HYD-DEV.C AREA=1.5641 PER A=0.0 PER B=26.0
    PER C=26.0 PER D=48.0 TP=0.0 RAINFALL=1

PRINT HYD
    ID=3 CODE=1

COMPUTE LT TP
    LC=601
    NC=3 ISLOPE=1
    LENGTH=400 FT SLOPE=0.008 K=1
    LENGTH=1600 FT SLOPE=0.008 K=2
    LENGTH=4700 FT SLOPE=0.008 K=3
    KN=0.021 CENTROID DISTANCE=5600 FT

COMPUTE NN HYD
    ID=4 HYD-DEV.D AREA=0.5333 PER A=0.0 PER B=16.0
    PER C=16.0 PER D=68.0 TP=0.0 RAINFALL=1

PRINT HYD
    ID=4 CODE=1

COMPUTE LT TP
    LC=601
    NC=3 ISLOPE=1
    LENGTH=400 FT SLOPE=0.005 K=1
    LENGTH=1600 FT SLOPE=0.005 K=2
    LENGTH=400 FT SLOPE=0.005 K=3
    KN=0.021 CENTROID DISTANCE=5600 FT

COMPUTE NN HYD
    ID=5 HYD-DEV.E AREA=2.4528 PER A=0.0 PER B=23.0
    PER C=23.0 PER D=54.0 TP=0.0 RAINFALL=1

PRINT HYD
    ID=5 CODE=1

COMPUTE LT TP
    LC=601
    NC=3 ISLOPE=1
    LENGTH=400 FT SLOPE=0.01 K=1
    LENGTH=1600 FT SLOPE=0.01 K=2
    LENGTH=3100 FT SLOPE=0.01 K=3
    KN=0.021 CENTROID DISTANCE=3415 FT

COMPUTE NN HYD
    ID=6 HYD-DEV.F AREA=1.614 PER A=0.0 PER B=32.0
    PER C=32.0 PER D=36.0 TP=0.0 RAINFALL=1

PRINT HYD
    ID=6 CODE=1
*BEGIN HYM

COMPUTE LT TP
    LENGTH=400 FT  SLOPE=0.011  K=1
    LENGTH=1500 FT SLOPE=0.011  K=2
    LENGTH=1500 FT SLOPE=0.011  K=3

COMPUTE NR HYD
    ID=15 HYD=EX. OFF.C  AREA=0.9109  PER A=30.0  PER B=20.0
    PER C=20.0  PER D=30.0  TP=0.0  RAINFALL=1

PRINT HYD
    ID=15  CODE=1

*END HYM

FINISH
RUNOFF VOLUME = .3642 INCHES = 4.7645 ACRE-FEET
PEAK DISCHARGE RATE = 161.75 CPS AT 1.533 HOURS BASIN AREA = .5438 SQ. MI.

******************************************************************************
******BASEIN_DEV.B***************
******************************************************************************

COMPUTE LT TP
LCCODE=1 NC=3 ISLOPE=1
LENGTH=800 FT SLOPE=0.005 K=3
LENGTH=1600 FT SLOPE=0.005 K=2
LENGTH=2600 FT SLOPE=0.005 K=3
W=0.021 CENTRED DISTANCE=2600 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND FACTORS
SHEET FLOW PORTION 100.0 0.005000 2.00000
SHALLOW FLOW PORTION 100.0 0.005000 2.00000
TOTAL BASIN 818.00 0.005000 2.00000

LAG EQUATION FACTORS: K= .0210 TOTAL BASIN LENGTH = 2800.0
TOTAL BASIN SLOPE (FT/FT) = .000000 CENTRED LENGTH = 2800.0

TIME OF CONCENTRATION (HRS) = .5659 TIME TO PEAK (HRS) = .3773 AT 1.53 HOURS
LAG TIME (HRS) = .4244

COMPUTE NH HYD ID=2 HYD=DEV.B AREA=2.8781 PER A=0.0 PER B=38.0
PER C=23.0 PER D=67.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS) = .3773

K = .954/5993 TP = .377/1794 K/TP RATIO = .712/793 SHAPE CONSTANT, N = 4.98/746
UNIT PEAK = 1.6570 CPS UNIT VOLUME = 1.000 INCHES
AREA = 1.794/42 SQ MI 1A = 1.30000 INCHES INF = .060000 INCHES PER HOUR
RINF = .984/0000 UNIT ABSTRACTION/INFILTRATION NUMBER METHOD = DT = .000/000

K = .973/003 TP = .377/1794 K/TP RATIO = 1.214/793 SHAPE CONSTANT, N = 2.857/743
UNIT PEAK = 1.2974 CF UNIT VOLUME = 1.000 INCHES
AREA = 1.050/78 SQ MI 1A = 4.62500 INCHES INF = 1.040000 INCHES PER HOUR
RINF = .984/0000 UNIT ABSTRACTION/INFILTRATION NUMBER METHOD = DT = .000/000

PRINT HYD
ID=2 CODE=1

HYDROGRAPH FROM AREA DEV.B

RUNOFF VOLUME = .47831 INCHES = 72.5732 ACRE-FEET
PEAK DISCHARGE RATE = 937.71 CPS AT 1.800 HOURS BASIN AREA = 2.8781 SQ. MI.

******************************************************************************
******BASEIN_DEV.C***************
******************************************************************************

COMPUTE LT TP
LCCODE=1 NC=3 ISLOPE=1
LENGTH=800 FT SLOPE=0.010 K=1
LENGTH=1400 FT SLOPE=0.010 K=2
LENGTH=1100 FT SLOPE=0.010 K=3
W=0.021 CENTRED DISTANCE=1400 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND FACTORS
SHEET FLOW PORTION 120.0 0.010000 1.00000
SHALLOW FLOW PORTION 310.0 0.010000 1.00000
TOTAL BASIN 510.00 0.010000 2.2836

LAG EQUATION FACTORS: K = .0210 TOTAL BASIN LENGTH = 1400.0
TOTAL BASIN SLOPE (FT/FT) = .001000 CENTRED LENGTH = 1400.0

TIME OF CONCENTRATION (HRS) = .4780 TIME TO PEAK (HRS) = .3187 AT 1.80 HOURS
LAG TIME (HRS) = .3585

COMPUTE NH HYD ID=3 HYD=DEV.C AREA=1.5641 PER A=0.0 PER B=26.0
PER C=26.0 PER D=80.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS) = .3187

K = .945/349 TP = .318/594 K/TP RATIO = .782/939 SHAPE CONSTANT, N = 4.58/762
UNIT PEAK = 2.94.0 CF UNIT VOLUME = 1.000 INF = .382/61 CPD = .810/00
AREA = .795/08 SQ MI 1A = 1.00000 INCHES INF = .046000 INCHES PER HOUR
RINF = .984/0000 UNIT ABSTRACTION/INFILTRATION NUMBER METHOD = DT = .000/000

K = .979/728 TP = .318/594 K/TP RATIO = 1.247/939 SHAPE CONSTANT, N = 2.85/743
UNIT PEAK = 689.06 CF UNIT VOLUME = 1.000 INF = 1.040000 INCHES PER HOUR
AREA = .913/38 SQ MI 1A = 4.62500 INCHES INF = .060000 INCHES PER HOUR
RINF = .984/0000 UNIT ABSTRACTION/INFILTRATION NUMBER METHOD = DT = .000/000

PRINT HYD
ID=3 CODE=1

HYDROGRAPH FROM AREA DEV.C

RUNOFF VOLUME = .37809 INCHES = 31.5396 ACRE-FEET
PEAK DISCHARGE RATE = 481.25 CPS AT 1.733 HOURS BASIN AREA = 1.5641 SQ. MI.

Page 2
**BASIN DEV.D**

**COMPUTE LT TP**
- **LCODE=1**
- **MS=3**
- **ISLOPE=1**
- **LENGTH=900 FT**
- **SLOPE=0.036 K=1**
- **LENGTH=1500 FT**
- **SLOPE=0.036 K=2**
- **LENGTH=7500 FT**
- **SLOPE=0.008 K=3**
- **KRN=0.021**
- **CENTROID DISTANCE=5400 FT**

**TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**
- **SHEET FLOW PORTION**
  - **LENGTH (FT)**
  - **SLOPE (FT/FT)**
  - **COMPOSITE K**
- **SHALLOW FLOW PORTION**
  - **1000.0**
  - **0.00000**
  - **2.00000**
- **CHANNEL FLOW PORTION**
  - **4500.0**
  - **0.00000**
  - **2.00000**
- **TOTAL BASIN**
  - **6000.0**
  - **0.00000**
  - **2.4427**

**LAG EQUATION FACTORS**
- **Km=0.0210**
- **TOTAL BASIN LENGTH (FT)=6700.0**
- **TOTAL BASIN SLOPE (FT/FT)=0.000000**
- **CENTROID LENGTH (FT)=3100.0**

**TIME OF CONCENTRATION (HRS)=0.3491**
**TIME TO PEAK (HRS)=0.3491**
**LAG TIME (HRS)=0.3928**

**COMPUTE NHYD ID=4 HYD-DEV.D AREA=0.5313 PER A=0.0 PER B=16.0**
**PER C=16.0 PER D=68.0 TP=0.0 RAINFALL=1**

**TIME TO PEAK (HRS)=0.3491**

**K = 0.723255HR TP = 0.349169R K/TP RATIO = 0.782903 SHAPE CONSTANT, N = 2.587625**
**UNIT PEAK = 7106.29 CPS UNIT VOLUME = 1.000 B = 902.16 P60 = 0.81000**
**AREA = 1.31248 SQ HR IA = 0.00000 INCHES INF = 0.04000 INCHES PER HOUR**
**RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.03333**

**K = 0.415098HR TP = 0.349169R K/TP RATIO = 1.247903 SHAPE CONSTANT, N = 2.857743**
**UNIT PEAK = 131.69 CPS UNIT VOLUME = 0.999 B = 270.01 P60 = 0.81000**
**AREA = 0.20015 SQ HR IA = 0.00000 INCHES INF = 1.04000 INCHES PER HOUR**
**RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.03333**

**PRINT HYD ID=4 CODE=1**
**HYDROGRAPH FROM AREA DEV.D**

**RUNOFF VOLUME = 0.5120 INCHES = 14.5423 ACRES-FT**
**PEAK DISCHARGE RATE = 208.29 CPS AT 1.767 HOURS BASIN AREA = 0.5313 SQ. HR.**

---

**BASIN DEV.E**

**COMPUTE LT TP**
- **LCODE=1**
- **MS=3**
- **ISLOPE=3**
- **LENGTH=900 FT**
- **SLOPE=0.006 K=1**
- **LENGTH=1500 FT**
- **SLOPE=0.006 K=2**
- **LENGTH=7500 FT**
- **SLOPE=0.006 K=3**
- **KRN=0.021**
- **CENTROID DISTANCE=5400 FT**

**TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**
- **SHEET FLOW PORTION**
  - **LENGTH (FT)**
  - **SLOPE (FT/FT)**
  - **COMPOSITE K**
- **SHALLOW FLOW PORTION**
  - **1000.0**
  - **0.00000**
  - **2.00000**
- **CHANNEL FLOW PORTION**
  - **9500.0**
  - **0.00000**
  - **2.00000**
- **TOTAL BASIN**
  - **11500.0**
  - **0.00000**
  - **2.6359**

**LAG EQUATION FACTORS**
- **Km=0.0210**
- **TOTAL BASIN LENGTH (FT)=11500.0**
- **TOTAL BASIN SLOPE (FT/FT)=0.000000**
- **CENTROID LENGTH (FT)=5400.0**

**TIME OF CONCENTRATION (HRS)=0.5330**
**TIME TO PEAK (HRS)=0.5373**
**LAG TIME (HRS)=0.4322**

**COMPUTE NHYD ID=5 HYD-DEV.E AREA=0.4322 PER A=0.0 PER B=23.0**
**PER C=23.0 PER D=64.0 TP=0.0 RAINFALL=1**

**TIME TO PEAK (HRS)=0.3873**

**K = 0.287615HR TP = 0.367258 R K/TP RATIO = 0.762993 SHAPE CONSTANT, N = 4.587625**
**UNIT PEAK = 4400.1 CPS UNIT VOLUME = 1.000 B = 392.61 P60 = 0.81000**
**AREA = 1.313732 SQ HR IA = 0.00000 INCHES INF = 0.04000 INCHES PER HOUR**
**RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.03333**

**K = 0.458429HR TP = 0.367258 R K/TP RATIO = 1.247993 SHAPE CONSTANT, N = 2.857743**
**UNIT PEAK = 252.63 CPS UNIT VOLUME = 1.000 B = 270.01 P60 = 0.81000**
**AREA = 1.195086 SQ HR IA = 0.00000 INCHES INF = 1.04000 INCHES PER HOUR**
**RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.03333**

**PRINT HYD ID=5 CODE=1**
**HYDROGRAPH FROM AREA DEV.E**

**RUNOFF VOLUME = 0.41866 INCHES = 54.3237 ACRES-FT**
**PEAK DISCHARGE RATE = 751.97 CPS AT 1.800 HOURS BASIN AREA = 2.6328 SQ. HR.**

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Page 3
**----------------------- BASIN DEV.F -----------------------**

**COMPUTE LT TP**  
LCOED=1  H=0  ISLOPE=1  
LENGTH=3000 FT  SLOPE=0.01  K=3  
LENGTH=13000 FT  SLOPE=0.01  K=3  
KN=0.011  CENTROID DISTANCE=5450 FT  

**TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCE UPLAND METHOD FACTORS**  
SHEET FLOW PORTION  
LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K  
400.0  0.01000  1.0000  
1400.0  0.01000  1.0000  
2000.0  0.01000  1.0000  
TOTAL BASIN  
12000.0  0.01000  2.6250  

**LAG EQUATION FACTORS**  
K= 0.010  TOTAL BASIN LENGTH (FT)= 12000.0  
TOTAL BASIN SLOPE (FT/FT)= 0.01000  CENTROID LENGTH (FT)= 5450.0  

**TIME OF CONCENTRATION (HRS)= 0.309  TIME TO PEAK (HRS)= 0.316  LAG TIME (HRS)= 0.379**  

**COMPUTE NH HYD**  
ID=6 HYD-DEV.F  AREA=1.6141 PER A=0.0 PER B=32.0  
PER C=32.0 PER D=32.0 TP=0.0 RAINFALL=1  

**TIME TO PEAK (HRS)= 0.339**  

**K = 0.763025HR  TP = 0.33923HR  K/TP RATIO = 0.782993  SHAPE CONSTANT, N = 4.587621  
UNIT PEAK = 0.875.3 CFS  UNIT VOLUME = 1.000  B = 192.06  PD= 0.81000  
AREA = 0.5000 INCHES PER SQ FT  INF = 0.04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INIFILTRATION NUMBER METHOD = DT = 0.033333**  

**K = 0.418289HR  TP = 0.33923HR  K/TP RATIO = 1.247993  SHAPE CONSTANT, N = 2.857743  
UNIT PEAK = 0.875.3 CFS  UNIT VOLUME = 1.000  B = 270.01  PD= 0.81000  
AREA = 0.5000 INCHES PER SQ FT  INF = 0.04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INIFILTRATION NUMBER METHOD = DT = 0.033333**  

**PRINT HYD**  
ID=6 CODE=1  
OUTFLOW HYDROGRAPH REACH = 0.00  
RUNOFF VOLUME = 2.96590 INCHES = 25.5598 ACRE-FEET  
PEAK DISCHARGE RATE = 375.05 CFS AT 1.730 HOURS BASIN AREA = 1.6141 SQ. MI.  

**----------------------- BASIN DEV.G -----------------------**

**COMPUTE LT TP**  
LCOED=1  H=0  ISLOPE=1  
LENGTH=13000 FT  SLOPE=0.021  K=3  
KN=0.011  CENTROID DISTANCE=6300 FT  

**TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**LAG EQUATION FACTORS**  
K= 0.0210  TOTAL BASIN LENGTH (FT)= 13000.0  
TOTAL BASIN SLOPE (FT/FT)= 0.02100  CENTROID LENGTH (FT)= 6300.0  

**TIME OF CONCENTRATION (HRS)= 0.4813  TIME TO PEAK (HRS)= 0.3209  LAG TIME (HRS)= 0.3610**  

**COMPUTE NH HYD**  
ID=7 HYD-DEV.G  AREA=3.0719 PER A=0.0 PER B=21.0  
PER C=21.0 PER D=58.0 TP=0.0 RAINFALL=1  

**TIME TO PEAK (HRS)= 0.3209**  

**K = 0.253256HR  TP = 0.32089HR  K/TP RATIO = 0.782993  SHAPE CONSTANT, N = 4.587621  
UNIT PEAK = 2179.9 CFS  UNIT VOLUME = 1.000  B = 192.06  PD= 0.81000  
AREA = 1.781702 SQ FT  INF = 0.04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INIFILTRATION NUMBER METHOD = DT = 0.033333**  

**K = 0.400467HR  TP = 0.32089HR  K/TP RATIO = 1.247993  SHAPE CONSTANT, N = 2.857743  
UNIT PEAK = 2179.9 CFS  UNIT VOLUME = 1.000  B = 270.01  PD= 0.81000  
AREA = 1.203936 SQ FT  INF = 0.04000 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INIFILTRATION NUMBER METHOD = DT = 0.033333**  

**PRINT HYD**  
ID=7 CODE=1  
HYDROGRAPH FROM AREA DEV.G  
RUNOFF VOLUME = 44575 INCHES = 73.0284 ACRE-PEET  
PEAK DISCHARGE RATE = 1108.35 CFS AT 1.730 HOURS BASIN AREA = 3.0719 SQ. MI.  

**----------------------- BASIN DEV.H -----------------------**
TC AND Tp COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS: K = .0210 TOTAL BASIN LENGTH (FT) = 1340.0
TOTAL BASIN SLOPE (FT/FT) = .020000 CENTROID LENGTH (FT) = 540.0
TIME OF CONCENTRATION (HRS) = .4623 TIME TO PEAK (HRS) = .3082 LAG TIME (HRS) = .3467
COMPUTE HYD ID=8 HYD-DEV.H AREA=2.2125 PER A=0.0 PER B=28.0 PER C=28.0 PER D=44.0 TP=0.0 RAINFALL=1
TIME TO PEAK (HRS) = .3082
K = .2413411 H = TP = 3081994 K/TP RATIO = .792993 SHAPE CONSTANT, N = 4.58766
UNIT PEAK = 340.1 CF5 UNIT VOLUME = 1.000 B = 0.97 1.000
AREA = 373300 SQ FT IA = .30000 INCHES INF = .04800 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = .03333
K = .3846311 TP = 3081994 K/TP RATIO = 1.24793 SHAPE CONSTANT, N = 2.857743
UNIT PEAK = 3081994 CF5 UNIT VOLUME = 1.000 B = 2.9770 1.000
AREA = 1.25000 SQ FT IA = .42500 INCHES INF = .048000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = .03333
PRINT HYD ID=8 CODE=1
HYDROGRAPH FROM AREA DEV.H
RUNOFF VOLUME = .35108 INCHES PEAK DISCHARGE RATE = 645.81 CF5 AT 1.700 HOURS BASIN AREA = 2.2125 SQ FT.

#******************************************************************************#
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#******************************************************************************#
TIME OF CONCENTRATION (HRS) = .1478  TIME TO PEAK (HRS) = .0985  LAG TIME (HRS) = .1108

TIME TO PEAK COMPUTED TO BE LESS THAN 0.133333 HOURS MINIMUM VALUE.
REVISED VALUES: TIME OF CONCENTRATION (HRS) = .2000  TIME TO PEAK (HRS) = .1333  LAG TIME (HRS) = .1500

COMPUTE NH HYD  ID=10  HYD=DEV. J  AREA=0.6219  PER=A.00  PER B=18.0
PER C=0.0 PER D=53.0  TP=0.0  RAINFAIL=1

TIME TO PEAK (hrs) = .1333
K = .304399HR  TP = 1.333333HR  K/TP RATIO = .78293  SHAPE CONSTANT, N = 4.587626
UNIT PEAK = 270.55  CFS  UNIT VOLUME = 1.000  B = 192.61  PVD = .81000
AREA = 2.28604 SQ MI  IA = 10000 INCHES  INF = .010000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .035333

K = .1917/HR  TP = 1.155555HR  K/TP RATIO = 1.235921  SHAPE CONSTANT, N = 2.683641
UNIT PEAK = 196.59  CFS  UNIT VOLUME = .9996  B = 277.14  PVD = .81000
AREA = 2.90231 SQ MI  IA = 90745 INCHES  INF = .92685 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .035333

PRINT HYD  ID=10  CODE=1

HYDROGRAPH FROM AREA DEV. J

RUNOFF VOLUME = .41878 INCHES  = 13.000 ACRE-FeET
PEAK DISCHARGE RATE = 367.86 CFS AT 1.500 HOURS  BASIN AREA = .6219 SQ. MI.

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*************************************************
TIME TO PEAK (hrs) = 0.1575

K = 0.1311298, R = 1.565746, K/RATIO = 0.782993, SHAPE CONSTANT, N = 4.587626
UNIT PEAK = 0.567444, UNIT VOLUME = 1.000, B = 3.622, PRED = 81006
AREA = 1250000, INCHES^2, IMPS = 0.000000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = 0.03333

K = 0.2011089, TP = 1.565746, K/TP RATIO = 1.200881, SHAPE CONSTANT, N = 2.959216
UNIT PEAK = 0.872.99, UNIT VOLUME = 0.9999, B = 2.986, PRED = 81006
AREA = 1254560, INCHES^2, IMPS = 0.000476 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = 0.03333

PRINT H Y D
ID=32, CODE=1
HYDROGRAPH FROM AREA DEV.1

RUNOFF VOLUME = 2000.65 INCHES
PEAK DISCHARGE RATE = 185.04 CFS AT 1.567 HOURS
BASIN AREA = 19172 SQ. FT.

------------------------------------------------------------

**BASEIN DEV.1**

**SCS UPLAND METHOD FACTORS**

<table>
<thead>
<tr>
<th>SCS UPLAND METHOD FACTORS</th>
<th>LENGTH (FT)</th>
<th>SLOPE (FT/FT)</th>
<th>COMPOSITE K</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHEET FLOW PORTION</td>
<td>4600.0</td>
<td>0.050000</td>
<td>1.00000</td>
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<tr>
<td>SHALLOW FLOW PORTION</td>
<td>1600.0</td>
<td>0.050000</td>
<td>2.00000</td>
</tr>
<tr>
<td>CHANNEL FLOW PORTION</td>
<td>5500.0</td>
<td>0.050000</td>
<td>3.00000</td>
</tr>
<tr>
<td>TOTAL BASIN</td>
<td>7500.0</td>
<td>0.050000</td>
<td>4.25563</td>
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<table>
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<th>EQUATION FACTORS: Km</th>
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<th>TOTAL BASIN LENGTH (FT)</th>
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<tr>
<td>TOTAL BASIN SLOPE (FT/FT)</td>
<td>0.050000</td>
<td>CENTROID LENGTH (FT)</td>
<td>43000.0</td>
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TIME OF CONCENTRATION (HRS) = 0.2388, TIME TO PEAK (HRS) = 0.3925, LAG TIME (HRS) = 0.2386

PRINT H Y D
ID=33, CODE=1
HYDROGRAPH FROM AREA DEV.1

RUNOFF VOLUME = 25032 INCHES
PEAK DISCHARGE RATE = 235.11 CFS AT 1.567 HOURS
BASIN AREA = 29484 SQ. FT.

------------------------------------------------------------

**BASEIN DEV.1**

**SCS UPLAND METHOD FACTORS**

<table>
<thead>
<tr>
<th>SCS UPLAND METHOD FACTORS</th>
<th>LENGTH (FT)</th>
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<td>5500.0</td>
<td>0.050000</td>
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<tr>
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<td>7500.0</td>
<td>0.050000</td>
<td>4.25563</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>EQUATION FACTORS: Km</th>
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<th>TOTAL BASIN LENGTH (FT)</th>
<th>88000.0</th>
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</thead>
<tbody>
<tr>
<td>TOTAL BASIN SLOPE (FT/FT)</td>
<td>0.041300</td>
<td>CENTROID LENGTH (FT)</td>
<td>3750.0</td>
</tr>
</tbody>
</table>

TIME OF CONCENTRATION (HRS) = 0.3198, TIME TO PEAK (HRS) = 0.2132, LAG TIME (HRS) = 0.2399

PRINT H Y D
ID=34, CODE=1
HYDROGRAPH FROM AREA DEV.1

RUNOFF VOLUME = 2000.65 INCHES
PEAK DISCHARGE RATE = 185.04 CFS AT 1.567 HOURS
BASIN AREA = 19172 SQ. FT.

------------------------------------------------------------

**BASEIN DEV.1**

**SCS UPLAND METHOD FACTORS**

<table>
<thead>
<tr>
<th>SCS UPLAND METHOD FACTORS</th>
<th>LENGTH (FT)</th>
<th>SLOPE (FT/FT)</th>
<th>COMPOSITE K</th>
</tr>
</thead>
<tbody>
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<td>SHEET FLOW PORTION</td>
<td>4600.0</td>
<td>0.050000</td>
<td>1.00000</td>
</tr>
<tr>
<td>SHALLOW FLOW PORTION</td>
<td>1600.0</td>
<td>0.050000</td>
<td>2.00000</td>
</tr>
<tr>
<td>CHANNEL FLOW PORTION</td>
<td>5500.0</td>
<td>0.050000</td>
<td>3.00000</td>
</tr>
<tr>
<td>TOTAL BASIN</td>
<td>7500.0</td>
<td>0.050000</td>
<td>4.25563</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>EQUATION FACTORS: Km</th>
<th>0.0030</th>
<th>TOTAL BASIN LENGTH (FT)</th>
<th>88000.0</th>
</tr>
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<tbody>
<tr>
<td>TOTAL BASIN SLOPE (FT/FT)</td>
<td>0.041300</td>
<td>CENTROID LENGTH (FT)</td>
<td>3750.0</td>
</tr>
</tbody>
</table>

TIME OF CONCENTRATION (HRS) = 0.3198, TIME TO PEAK (HRS) = 0.2132, LAG TIME (HRS) = 0.2399

PRINT H Y D
ID=34, CODE=1
HYDROGRAPH FROM AREA DEV.1

RUNOFF VOLUME = 2000.65 INCHES
PEAK DISCHARGE RATE = 185.04 CFS AT 1.567 HOURS
BASIN AREA = 19172 SQ. FT.
K = .166343HR TP = .213211HR K/TP RATIO = .782883 SHAPE CONSTANT, N = 4.587621
UNIT PEAK = 411.57 CFS UNIT VOLUME = 1.000 B = 192.61 PE0 = .31000
AREA = .223512 SQ MI IA = .10000 INCHES INF = .00006 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INfiltration NUMBER METHOD - DT = .03333

K = .2950834HR TP = .213211HR K/TP RATIO = 1.215147 SHAPE CONSTANT, N = 2.927456
UNIT PEAK = 205.74 CFS UNIT VOLUME = 1.000 B = 272.65 PE0 = .31000
AREA = .707598 SQ MI IA = .37762 INCHES INF = .00757 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INfiltration NUMBER METHOD - DT = .03333

PRINT HYD
    ID=14   CODE=1

HYDROGRAPH FROM AREA D1.V.N

RUNOFF VOLUME = .24723 INCHES = 12.2829 ACRE-FEET
PEAK DISCHARGE RATE = 257.09 CFS AT 1.6600 HOURS BASIN AREA = .9113 SQ. MI.

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCE UPLAND METHOD FACTORS

SHEET FLOW PORTION LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
SHALLOW FLOW PORTION 1600.0 .015000 2.0000
CHANNEL FLOW PORTION 1600.0 .015000 2.0000
TOTAL BASIN 3600.0 .015000 2.0000

TIME OF CONCENTRATION (Hrs) = .4591 TIME TO PEAK (Hrs) = .3960 LAG TIME (Hrs) = .3443

HYDROGRAPH FROM AREA EX.OFF.C

RUNOFF VOLUME = .21897 INCHES = 10.6178 ACRE-FEET
PEAK DISCHARGE RATE = 167.51 CFS AT 1.7000 HOURS BASIN AREA = .8100 SQ. MI.

FINISH
NORMAL PROGRAM FINISH   END TIME (HMH:MM:SS) = 08:18:15.
COMPUTE LT TP
LCODE=1 NK=0 ISLOPE=-1
LENGTH=3300 FT SLOPE=0.021 K=3
KN=0.021 CENTROID DISTANCE=6300 FT

COMPUTE NH HYD
IND7Helpers:HYD-DEV.G AREA=3.0719 PER A=0.0 PER B=21.0
PER C=21.0 PER D=58.0 TR=0.0 RAINFALL=1

PRINT HYD
IND7 CODE=1

*===============================================================================
** Basis Dev. G **
*===============================================================================

COMPUTE LT TP
LCODE=1 NK=0 ISLOPE=-1
LENGTH=4300 FT SLOPE=0.021 K=3
KN=0.021 CENTROID DISTANCE=6300 FT

COMPUTE NH HYD
IND8Helpers:HYD-DEV.H AREA=2.2325 PER A=0.0 PER B=28.0
PER C=28.0 PER D=44.0 TR=0.0 RAINFALL=1

PRINT HYD
IND8 CODE=1

*===============================================================================
** Basis Dev. H **
*===============================================================================

COMPUTE LT TP
LCODE=1 NK=0 ISLOPE=-1
LENGTH=4300 FT SLOPE=0.021 K=3
KN=0.021 CENTROID DISTANCE=6300 FT

COMPUTE NH HYD
IND9Helpers:HYD-DEV.I AREA=1.0257 PER A=0.0 PER B=0.0
PER C=68.0 PER D=23.0 TR=0.0 RAINFALL=1

PRINT HYD
IND9 CODE=1

*===============================================================================
** Basis Dev. I **
*===============================================================================

COMPUTE LT TP
LCODE=1 NK=0 ISLOPE=-1
LENGTH=4300 FT SLOPE=0.026 K=1
LENGTH=1600 FT SLOPE=0.026 K=2
LENGTH=400 FT SLOPE=0.026 K=3
KN=0.021 CENTROID DISTANCE=6300 FT

COMPUTE NH HYD
IND10Helpers:HYD-DEV.J AREA=0.6219 PER A=0.0 PER B=18.0
PER C=19.0 PER D=53.0 TR=0.0 RAINFALL=1

PRINT HYD
IND10 CODE=1

*===============================================================================
** Basis Dev. J **
*===============================================================================

COMPUTE LT TP
LCODE=3 NK=0 ISLOPE=-1
LENGTH=1600 FT SLOPE=0.017 K=3
KN=0.021 CENTROID DISTANCE=6300 FT

COMPUTE NH HYD
IND11Helpers:HYD-DEV.K AREA=4.4122 PER A=0.0 PER B=28.0
PER C=28.0 PER D=44.0 TR=0.0 RAINFALL=1

PRINT HYD
IND11 CODE=1

*===============================================================================
** Basis Dev. K **
*===============================================================================

COMPUTE LT TP
LCODE=1 NK=0 ISLOPE=-1
LENGTH=400 FT SLOPE=0.06 K=1
LENGTH=1600 FT SLOPE=0.06 K=2
LENGTH=4000 FT SLOPE=0.06 K=3
KN=0.021 CENTROID DISTANCE=6300 FT

COMPUTE NH HYD
IND12Helpers:HYD-DEV.L AREA=0.6122 PER A=0.0 PER B=1.0
PER C=1.0 PER D=13.0 TR=0.0 RAINFALL=1

PRINT HYD
IND12 CODE=1

*===============================================================================
** Basis Dev. L **
*===============================================================================

COMPUTE LT TP
LCODE=3 NK=0 ISLOPE=-1
LENGTH=400 FT SLOPE=0.054 K=3
LENGTH=1600 FT SLOPE=0.054 K=3
LENGTH=4000 FT SLOPE=0.054 K=3
KN=0.021 CENTROID DISTANCE=6300 FT

COMPUTE NH HYD
IND13Helpers:HYD-DEV.M AREA=0.9464 PER A=0.0 PER B=12.0
PER C=12.0 PER D=24.0 TR=0.0 RAINFALL=1

PRINT HYD
IND13 CODE=1

*===============================================================================
** Basis Dev. M **
*===============================================================================

COMPUTE LT TP
LCODE=1 NK=0 ISLOPE=-1
LENGTH=4300 FT SLOPE=0.041 K=3
LENGTH=1600 FT SLOPE=0.041 K=3
LENGTH=4000 FT SLOPE=0.041 K=3
KN=0.021 CENTROID DISTANCE=3750 FT

COMPUTE NH HYD
IND14Helpers:HYD-DEV.N AREA=0.9313 PER A=0.0 PER B=14.0
PER C=14.0 PER D=26.0 TR=0.0 RAINFALL=1

PRINT HYD
IND14 CODE=1
COMPUTE LT TP
  LCODE=1 SNE=1 ISLOPE=1
  LENGTH=400 FT SLOPE=0.011 K=1
  LENGTH=1600 FT SLOPE=0.011 K=2
  LENGTH=1600 FT SLOPE=0.011 K=3

COMPUTE NM HYD
  ID=15 HYD=EX.OFF.C AREA=10.3109 PER A=30.0 PER B=20.0
  PER C=10.0 PER D=30.0 TP=0.0 RAINFALL=3

PRINT HYD
  ID=15 CODE=3

**END**
20D.24.OUT

ANHYRO PROGRAM (ANHYRO.37) -
- version: 1997.02c
RUN DATE (M/D/Y) = 12/28/2012
START TIME (H/M/S/SEC) = 08:19:38
USER NUM. = ANHYR-S-57002-24/02/08/12
INPUT FILE = Z00524.3HM

*2 PROJECT NAME: SANTOLINA
*2 DATE: NOVEMBER 8, 2012
*2 INPUT FILE NAME: Z00524.3HM
*2 OUTPUT FILE NAME: Z00524.3HM
*2 PROJECT NUM: 20120236
*2 CONTENTS: 7 YEAR-24 HOUR STORM

START
TIME-0.0 HR PUNCH CODE-0
RAINFALL TYPE-2 RAIN QUANTITY-0.0
RAIN QNT-0.811 IN RAIN STD-0.95 IN
RAIN EAV-1.15 IN DT=0.03333

COMPUTED 24-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS Z - PEAK AT 1.40 HR.
DT = 0.03333 HOURS END TIME = 39.66470 HOURS

<table>
<thead>
<tr>
<th>Time</th>
<th>Rainfall</th>
<th>Time</th>
<th>Rainfall</th>
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<td>0.020</td>
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1.0110 1.0116 1.0122 1.0128 1.0134 1.0140 1.0146
1.0142 1.0148 1.0155 1.0162 1.0169 1.0176 1.0183
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1.1154 1.1161 1.1168 1.1175 1.1182 1.1189 1.1196

Page 1
**COMPUTE BASINS IN SHANTALINA - DEVELOPED CONDITION**

**SESSS BULK FACTOR FOR 2 YR = 0**

**SEDIMENT BULK CODE=1 BULK FACTOR=1**

**COMPUTE LT TP**

LCCODE=1 HCC=3 ISSLOPE=3 LENGTH=600 FT SLOPE=0.05 K=1 LENGTH=1600 FT SLOPE=0.05 K=2 LENGTH=400 FT SLOPE=0.05 K=3

**TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

<table>
<thead>
<tr>
<th>Sheet Flow Portion</th>
<th>Length (ft)</th>
<th>Slope (ft/ft)</th>
<th>Composite K</th>
</tr>
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**Time of Concentration (hrs)= .1656 TIME TO PEAK (hrs)= .1104 LAG TIME (hrs)= .1242**

**TIME TO PEAK COMPUTED TO BE LESS THAN 0.13333 HOUR MINIMUM VALUE.**

**REVISED VALUES: TIME OF CONCENTRATION (hrs)= .1200 TIME TO PEAK (hrs)= .1333 LAG TIME (hrs)= .1500**

**COMPUTE HYD ID=1 HYD-DEV.A AREA=0.5438 PER A=0.0 PER B=1.0 PER C=0.0 PER D=7.0 T=0.0 RAINFALL=-1**

**TIME TO PEAK (hrs)= .1333**

**K = .1042096 TP = .133333HR K/TP RATIO = .789293 SHAPE CONSTANT, N = 4.587626 UNIT PEAK = 312.09 CFS UNIT VOLUME = 1.000 AREA = .030505 SQ MI IA = 40000 INCHES INF = .04000 INCHES PER HOUR RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333**

**K = .1596348 TP = .133333HR K/TP RATIO = 1.197105 SHAPE CONSTANT, N = 2.697777 UNIT PEAK = 1055.3 CFS UNIT VOLUME = .9988 B = 279.36 P50 = .810000 AREA = .050734 SQ MI IA = 35103 INCHES INF = .83452 INCHES PER HOUR RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333**

**PRINT HYD ID=1 CODE=1 HYDROGRAPH FROM AREA DEV.A RUNOFF VOLUME = .1779 INCHES = 5.0883 ACRE-FEET PEAK DISCHARGE RATE = 161.76 CFS AT 1.553 HOURS BASIN AREA = .5438 SQ. MI.**

**COMPUTE LT TP**

LCCODE=1 HCC=3 ISSLOPE=1 LENGTH=400 FT SLOPE=0.05 K=1 LENGTH=1200 FT SLOPE=0.05 K=2 LENGTH=600 FT SLOPE=0.05 K=3 KN=0.021 CENTRIFUGAL DISTANCE=1800 FT

**TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

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<tr>
<th>Sheet Flow Portion</th>
<th>Length (ft)</th>
<th>Slope (ft/ft)</th>
<th>Composite K</th>
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**Time of Concentration (hrs)= .5056 TIME TO PEAK (hrs)= .3773 LAG TIME (hrs)= .4744**

**COMPUTE HYD ID=2 HYD-DEV.B AREA=2.8781 PER A=0.0 PER B=19.0 PER C=39.0 PER D=62.0 T=0.0 RAINFALL=-1**

**TIME TO PEAK (hrs)= .3773**

**K = .2956000 TP = .37720HR K/TP RATIO = .782093 SHAPE CONSTANT, N = 4.587626 UNIT PEAK = 157.0 CFS UNIT VOLUME = 1.000 B = 279.36 P50 = .810000 AREA = 1.784152 SQ MI IA = 50000 INCHES INF = .04000 INCHES PER HOUR RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333**

**K = .2708313 TP = .37720HR K/TP RATIO = 1.247903 SHAPE CONSTANT, N = 2.687743 UNIT PEAK = 782.74 CFS UNIT VOLUME = 1.000 B = 279.36 P50 = .810000 AREA = 5.891616 SQ MI IA = 42000 INCHES INF = .04000 INCHES PER HOUR RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333**

**PRINT HYD ID=2 CODE=1**
RUNOFF VOLUME = 0.57222 INCHES = 87.0359 ACRE-FOOT
PEAK DISCHARGE RATE = 297.71 CFS AT 1.800 HOURS BAVIN AREA = 2.8781 SQ. MI.

SCE UPLAND METHOD FACTORS

SCS UPLAND METHOD FACTORS

TC AND TD COMPUTED BY UPLAND/LAG TIME PROCEDURE

COMPUTE LT TP

TC AND TD COMPUTED BY UPLAND/LAG TIME PROCEDURE

COMPUTE NH HYD

HYDROGRAPH FROM AREA DEV.D

RUNDVOLME = 0.45553 INCHES = 37.0994 ACRE-FOOT
PEAK DISCHARGE RATE = 481.75 CFS AT 1.735 HOURS BAVIN AREA = 1.5641 SQ. MI.

K = 0.749934HR TP = 318.039HR K/T RATIO = 0.78293 SHAPE CONSTANT, N = 4.587266
UNIT PEAK = 924.88 CFS UNIT VOLUME = 1.000 B = 397.61 PEO = 83000
AREA = 730708 SQ FT FA = 35000 INCHES INF = 0.06000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFLATION METHOD - DT = 0.33553

K = 0.397726HR TP = 318.039HR K/T RATIO = 1.24793 SHAPE CONSTANT, N = 2.857743
UNIT PEAK = 680.09 CFS UNIT VOLUME = 1.000 B = 379.01 PEO = 83000
AREA = 813320 SQ FT FA = 42500 INCHES INF = 1.00000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFLATION METHOD - DT = 0.33553

PRINT HYD

HYDROGRAPH FROM AREA DEV.D

RUNDVOLME = 0.45553 INCHES = 37.0994 ACRE-FOOT
PEAK DISCHARGE RATE = 481.75 CFS AT 1.735 HOURS BAVIN AREA = 1.5641 SQ. MI.
**DEVICES**

**RUNOFF VOLUME** = .62276 INCHES = 17.644 ACRE-FEET
**PEAK DISCHARGE RATE** = 208.59 CFS AT 1.767 HOURS  **BASIN AREA** = 531.3 SQ. MI.

**COMPUTE LT TP**
**LENGTH=400 FT**  **SLOPE=0.006**  **K=1**
**LENGTH=1800 FT**  **SLOPE=0.006**  **K=2**
**LENGTH=8500 FT**  **SLOPE=0.006**  **K=3**
**K=0.021**  **CENTROID DISTANCE=5400 FT**

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

**SCS UPLAND METHOD FACTORS**
**SHEET FLOW PORTION**
**LENGTH (FT)**  **SLOPE (FT/FT)**  **COMPOSITE K**
400.0  .006000  1.0000
1800.0  .006000  2.0000
8500.0  .006000  3.0000

**TOTAL BASIN**
11000.0  .006000  2.6136

**LAG EQUATION FACTORS**
**Km** = .0210  **TOTAL BASIN LENGTH (FT)** = 11500.0
**TOTAL BASIN SLOPE (FT/FT)** = .000000  **CENTROID LENGTH (FT)** = 5400.0

**TIME OF CONCENTRATION (HRS)** = .5510  **TIME TO PEAK (HRS)** = .3673  **LAG TIME (HRS)** = .4132

**COMPUTE NH HYD ID=5 HYD-DEV-E AREA=2.4328 PER A=0.0 PER D=23.0 PER CM=3.0 PER D=54.0 TP=0.0 RAINFALL=1**

**TIME TO PEAK (HRS)** = .3673

K = .287616HR  **TP** = .367328HR  **K/TP RATIO** = .747293  **SHAPE CONSTANT, N = 4.587626**
**UNIT PEAK** = 440.1  **CFS**  **UNIT VOLUME** = 1.000  **B = 193.61**  **P60 = .8100**
**AREA = 1.315172 SQ MI**  **IA = .18000 INCHES PER HOUR**  **INF = .04000 INCHES PER HOUR**
**RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = .03333**

**K = .658423HR  **TP** = .367328HR  **K/TP RATIO** = 1.247933  **SHAPE CONSTANT, N = 2.357743**
**UNIT PEAK** = 622.61  **CFS**  **UNIT VOLUME** = 1.000  **B = 270.01**  **P60 = .8100**
**AREA = 1.315108 SQ MI**  **IA = .2500 INCHES**  **INF = 1.040000 INCHES PER HOUR**
**RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = .03333**

PRINT HYD ID=5 CODE=1

**HYDROGRAPH FROM AREA DEV-E**

**RUNOFF VOLUME** = .50316 INCHES = 65.5691 ACRE-FEET
**PEAK DISCHARGE RATE** = 751.97 CFS AT 1.860 HOURS  **BASIN AREA** = 2.4328 SQ. MI.

**COMPUTE LT TP**
**LENGTH=900 FT**  **SLOPE=0.01**  **K=1**
**LENGTH=1800 FT**  **SLOPE=0.01**  **K=2**
**LENGTH=6800 FT**  **SLOPE=0.01**  **K=3**
**K=0.021**  **CENTROID DISTANCE=5450 FT**

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

**SCS UPLAND METHOD FACTORS**
**SHEET FLOW PORTION**
**LENGTH (FT)**  **SLOPE (FT/FT)**  **COMPOSITE K**
400.0  .010000  1.0000
1800.0  .010000  2.0000
8500.0  .010000  3.0000

**TOTAL BASIN**
11000.0  .010000  2.6150

**LAG EQUATION FACTORS**
**Km** = .0210  **TOTAL BASIN LENGTH (FT)** = 13200.0
**TOTAL BASIN SLOPE (FT/FT)** = .010000  **CENTROID LENGTH (FT)** = 5450.0

**TIME OF CONCENTRATION (HRS)** = .5039  **TIME TO PEAK (HRS)** = .3359  **LAG TIME (HRS)** = .3779

**COMPUTE NH HYD ID=6 HYD-DEV-F AREA=1.6241 PER A=0.0 PER D=37.0 PER C=32.0 PER D=36.0 TP=0.0 RAINFALL=1**

**TIME TO PEAK (HRS)** = .3359

K = .263025HR  **TP** = .335232HR  **K/TP RATIO** = .782933  **SHAPE CONSTANT, N = 4.587621**
**UNIT PEAK** = 679.33  **CFS**  **UNIT VOLUME** = 3.000  **B = 193.61**  **P60 = .8100**
**AREA = .581076 SQ MI**  **IA = .10000 INCHES PER HOUR**  **INF = .04000 INCHES PER HOUR**
**RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = .03333**

K = .415228HR  **TP** = .335232HR  **K/TP RATIO** = 1.247933  **SHAPE CONSTANT, N = 2.357743**
**UNIT PEAK** = 830.33  **CFS**  **UNIT VOLUME** = 1.000  **B = 270.01**  **P60 = .8100**
**AREA = 1.045904 SQ MI**  **IA = .25000 INCHES**  **INF = .104000 INCHES PER HOUR**
**RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = .03333**

PRINT HYD ID=6 CODE=1

OUTFLOW HYDROGRAPH REACH .00

**RUNOFF VOLUME** = .35488 INCHES = 30.5495 ACRE-FEET
PEAK DISCHARGE RATE = 375.05 CFS AT 1.733 HOURS  BASIN AREA = 1.641 SQ. MI.

*-------------------------------------------------------------*
** -----------------------------------**
** COMPUTE LT TP  **
** LCODE=1  HC=0  ISLPE=3  **
** LENGTH=13300 FT  SLOPE=0.021  K=3  **
** CN=0.021  CENTRED DISTANCE=6300 FT  **
**-----------------------------------**

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS:
K= 0.0210  TOTAL BASIN LENGTH (FT)= 13300.0  CENTRED LENGTH (FT)= 6300.0

TIME OF CONCENTRATION (HRS)= 0.4813  TIME TO PEAK (HRS)= 0.3709  LAG TIME (HRS)= 0.3610

COMPUTE NH HYD  ID=7 HYD-DEV.G  AREA=3.0719  PER A=0.0  PER B=21.0  PER C=21.0  PER D=58.0  TP=0.0  RAINFALL=1

TIME TO PEAK (HRS)= 0.3709
K = 0.25125404  TP = 0.3088898  K/TP RATIO = 0.782993  SHAPE CONSTANT, N = 4.587626
UNIT PEAK = 2278.8  CFS  UNIT VOLUME = 1.000  B = 270.01  PFG = 81000
AREA = 1.7679729 SQ Mi  IA = 10000000000.0  INF = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABRSTRATION/INFILTRATION NUMBER METHOD - ET = 0.033333

K = 0.4040672  TP = 0.3088898  K/TP RATIO = 1.2747993  SHAPE CONSTANT, N = 2.857743
UNIT PEAK = 2085.6  CFS  UNIT VOLUME = 1.000  B = 270.01  PFG = 81000
AREA = 1.7501888 SQ Mi  IA = 10000000000.0  INF = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABRSTRATION/INFILTRATION NUMBER METHOD - ET = 0.033333

PRINT HYD  ID=7 CODE=1

HYDROGRAPH FROM AREA DEV.G

RUNOFF VOLUME = 0.5930 INCHES  PEAK DISCHARGE RATE = 1206.35 CFS AT 1.733 HOURS  BASIN AREA = 3.0719 SQ. MI.

*-------------------------------------------------------------*
** -----------------------------------**
** COMPUTE LT TP  **
** LCODE=1  HC=0  ISLPE=3  **
** LENGTH=13400 FT  SLOPE=0.021  K=3  **
** CN=0.021  CENTRED DISTANCE=5400 FT  **
**-----------------------------------**

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS:
K= 0.0210  TOTAL BASIN LENGTH (FT)= 13400.0  CENTRED LENGTH (FT)= 6700.0

TIME OF CONCENTRATION (HRS)= 0.4623  TIME TO PEAK (HRS)= 0.3082  LAG TIME (HRS)= 0.3467

COMPUTE NH HYD  ID=8 HYD-DEV.H  AREA=2.2125  PER A=0.0  PER B=28.0  PER C=28.0  PER D=44.0  TP=0.0  RAINFALL=1

TIME TO PEAK (HRS)= 0.3082
K = 0.24131838  TP = 0.30819987  K/TP RATIO = 0.782993  SHAPE CONSTANT, N = 4.587626
UNIT PEAK = 1240.1  CFS  UNIT VOLUME = 1.000  B = 192.01  PFG = 81000
AREA = 0.73300 SQ Mi  IA = 36000000000.0  INF = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABRSTRATION/INFILTRATION NUMBER METHOD - ET = 0.033333

K = 0.38663538  TP = 0.30819987  K/TP RATIO = 1.247993  SHAPE CONSTANT, N = 2.857743
UNIT PEAK = 1083.5  CFS  UNIT VOLUME = 1.000  B = 270.01  PFG = 81000
AREA = 1.2500000 SQ Mi  IA = 10000000000.0  INF = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABRSTRATION/INFILTRATION NUMBER METHOD - ET = 0.033333

PRINT HYD  ID=8 CODE=1

HYDROGRAPH FROM AREA DEV.H

RUNOFF VOLUME = 47794 TMCFTRC  PEAK DISCHARGE RATE = 665.81 CFS AT 1.700 HOURS  BASIN AREA = 2.2125 SQ. MI.

*-------------------------------------------------------------*
**Sheet Flow Portion**: 400.0
**Small Flow Portion**: 1600.0
**Channel Flow Portion**: 5500.0
**Total Basin**: 8500.0

**Total Basin Length (ft)**: 8500.0
**Centroid Length (ft)**: 3400.0

**Time of Concentration (hrs)**: .3367
**Time to Peak (hrs)**: .2245
**Lag Time (hrs)**: .2526

**Commute Nh Hydra**
- *ID*: 9
- *Area*: 1.0527
- *Per A*: 0.0
- *Per B*: 9.0
- *Per C*: 28.0
- *Per D*: 35.0
- *Rainfall*: 1

**Time to Peak (hrs)**: .2245

**K**: .15757754
**TP**: .2244989
**K/TP Ratio**: .782933
**Shape Constant, N**: 4.587626

**Unit Peak**: 314.16
**Unit Volume**: 1.000
**Area**: .258042
**Units**: 15.000

**Runoff Computed by Initial Abstraction/Infiltration Method - DF**: .033333

**K**: .2712178
**TP**: .2244989
**K/TP Ratio**: 1.0000
**Shape Constant, N**: 2.946229

**Unit Peak**: 97.80
**Unit Volume**: .9999
**Area**: .298230
**Units**: 15.7323

**Runoff Computed by Initial Abstraction/Infiltration Method - DF**: .033333

**Hydrograph from Area Dev.1**

**Runoff Volume**: .286311
**Peak Discharge Rate**: 278.74 CFS at 1.600 hours
**Basin Area**: 1.0237 sq. mi.

**Sdc**

**Basin Dev.1**

**Compute Lt TP**
- *Length*: 400.0 ft
- *Slope*: 0.0670000
- *Composite K*: 1.1000

**Compute Nh Hydra**
- *ID*: 10
- *Area*: 0.6258
- *Per A*: 0.0
- *Per C*: 28.0
- *Per D*: 35.0
- *Rainfall*: 1

**Time to Peak (hrs)**: .3333

**K**: .16345918
**TP**: .13333319
**K/TP Ratio**: .782933
**Shape Constant, N**: 4.587626

**Unit Peak**: 97.80
**Unit Volume**: 1.000
**Area**: .258042

**Runoff Computed by Initial Abstraction/Infiltration Method - DF**: .033333

**K**: .16472618
**TP**: .13333319
**K/TP Ratio**: 1.0000
**Shape Constant, N**: 2.946229

**Unit Peak**: 97.80
**Unit Volume**: .9999
**Area**: .298230

**Runoff Computed by Initial Abstraction/Infiltration Method - DF**: .033333

**Hydrograph from Area Dev.3**

**Runoff Volume**: .509454
**Peak Discharge Rate**: 367.86 CFS
**Basin Area**: 0.6219 sq. mi.

**Sdc**

**Basin Dev.K**

**Compute Lt TP**
- *Length*: 400.0 ft
- *Slope*: 0.01077
- *Km*: .021

**Centroid Distance**: 4800.0 ft

**Tc and Tp Computed by Upland/Lag Time Procedure**

**Lag Equation Factors**: *Km*: .0210
**Total Basin Length (ft)**: 16700.0
**Total Basin Slope (ft/ft)**: .017000

**Time of Concentration (hrs)**: .4912
**Time to Peak (hrs)**: .3275
**Lag Time (hrs)**: .3684
COMPARE HYDRO

ID=11 HYD=DEV.K AREA=4.4172 PER A=0.0 PER B=28.0 PER C=28.0 PER D=44.0 TP=0.0 RAINFALL=1

TIME TO PEAK (Hrs)= .3275
K = .2563948 TP = .3274519 K/TP RATIO = .782893 SHAPE CONSTANT, N = 4.587626
UNIT PEAK = 230.3 CFS UNIT VOLUME = 1.000 B = 289.61 P60 = 81000
AREA = 1.945582 SQ MI TA = 10000 INCHES INF = .045000 INCHES PER HOUR RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .6405898 TP = .3274519 K/TP RATIO = 2.37493 SHAPE CONSTANT, N = 2.857743
UNIT PEAK = 2038.7 CFS UNIT VOLUME = 1.000 B = 270.01 P60 = 81000
AREA = 2.170732 SQ MI TA = 42000 INCHES INF = 1.04000 INCHES PER HOUR RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD

ID=11 CODE=1

HYDROGRAPH FROM AREA DEV.K

RUNOFF VOLUME = .42195 INCHES = 99.4836 ACRE-FEET
PEAK DISCHARGE RATE = 1239.37 CFS AT 1.733 HOURS BASIN AREA = 4.4172 SQ. MI.

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*************************************************************************
TIME TO PEAK (hrs) = 0.1925

K = 0.150742HR TF = 0.0192520HR K/TF RATIO = 0.76293 SHAPE constant, N = 4.587621
UNIT PEAK = 464.18 CFS UNIT VOLUME = 1.00 UA = 526.10 INCHES INH = 0.0050 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION MURPHY METHOD - DT = 0.033333

K = 0.233414HR TF = 0.0192520HR K/TF RATIO = 1.212410 SHAPE constant, N = 2.933480
UNIT PEAK = 1036.66 CFS UNIT VOLUME = 0.9999 UA = 276.13 INCHES INH = 0.0050 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION MURPHY METHOD - DT = 0.033333

PRINT HYD ID=13 CODE=1

HYDROGRAPH FROM AREA DEV.M

RUNOFF VOLUME = 0.28655 INCHES = 14.6457 ACRE-FOOT
PEAK DISCHARGE RATE = 285.21 CFS AT 1.587 HOURS BASIN AREA = 0.9484 SQ. MI.

===============================================
**JASIN DEV.M END**
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COMPUTE LT TP

LDODE=1 NC=3 ISLOPE=-1
LENGTH=100 FT SLOPE=0.041 K=1
LENGTH=200 FT SLOPE=0.041 K=2
LENGTH=600 FT SLOPE=0.041 K=3
XH=0.021 CENTROID DISTANCE=3750 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND FACTORS

SHEET FLOW PORION LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
400.0 .041000 1.0000
SLOPIED FLOW PORION 1600.0 .041000 1.0000
CHANNEL FLOW PORION 6800.0 .041000 1.0000
TOTAL BASIN 8800.0 .041000 1.0000

LAG EQUATION FACTORS: KTH = 0.0105 TOTAL BASIN LENGTH (FT) = 8800.0
TOTAL BASIN SLOPE (FT/FT) = 0.041000 CENTROID LENGTH (FT) = 3750.0

TIME OF CONCENTRATION (HRS) = 0.3198 TIME TO PEAK (HRS) = 0.2112 LAG TIME (HRS) = 0.2399

COMPUTE NH HYD

ID=14 HYD=DEV.M AREA=0.9313 PA=0.0000 PB=124.0 PER C=62.0 PER D=24.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS) = 0.2112

K = 0.166943HR TF = 0.0213211HR K/TF RATIO = 0.782993 SHAPE constant, N = 4.587621
UNIT PEAK = 411.57 CFS UNIT VOLUME = 1.000 UA = 59.61 INCHES INH = 0.0050 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION MURPHY METHOD - DT = 0.033333

K = 0.259033HR TF = 0.0213211HR K/TF RATIO = 1.215147 SHAPE constant, N = 2.927456
UNIT PEAK = 1037.74 CFS UNIT VOLUME = 1.000 UA = 275.43 INCHES INH = 0.0050 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION MURPHY METHOD - DT = 0.033333

PRINT HYD ID=24 CODE=1

HYDROGRAPH FROM AREA DEV.M

RUNOFF VOLUME = 0.2864 INCHES = 14.2272 ACRE-FOOT
PEAK DISCHARGE RATE = 257.09 CFS AT 1.600 HOURS BASIN AREA = 0.9313 SQ. MI.

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**JASIN EX. OFF C END**
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COMPUTE LT TP

LCODE=1 NC=3 ISLOPE=-1
LENGTH=400 FT SLOPE=0.011 K=1
LENGTH=400 FT SLOPE=0.013 K=2
LENGTH=600 FT SLOPE=0.011 K=3

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND FACTORS

SHEET FLOW PORION LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
400.0 .011000 1.0000
SLOPIED FLOW PORION 1600.0 .011000 1.0000
CHANNEL FLOW PORION 1600.0 .011000 1.0000
TOTAL BASIN 3600.0 .011000 1.0000

TIME OF CONCENTRATION (HRS) = 0.4501 TIME TO PEAK (HRS) = 0.3600 LAG TIME (HRS) = 0.3443

COMPUTE NH HYD

ID=35 HYD=EX.OFF.C AREA=0.9109 PA=0.3000 PB=20.0 PER C=20.0 PER D=30.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS) = 0.3060

K = 0.239955HR TF = 0.030605HR K/TF RATIO = 0.782973 SHAPE constant, N = 4.587626
UNIT PEAK = 350.56 CFS UNIT VOLUME = 1.0000 UA = 292.61 INCHES INH = 0.0050 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION MURPHY METHOD - DT = 0.033333
AREA = .273270 SQ MI  T = .10000 INCHES  INF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = .033333

K = .59876961  TP = .36065000  K/TP RATIO = 1.270282  SHAPE CONSTANT, N = 2.812972
UNIT PEAK = 554.61 CFS  UNIT VOLUME = .9999  R = 269.20  P = .83000
AREA = .637630 SQ MI  SA = .52143 INCHES  INF = .1.31000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = .033333

PRINT NVD  ID=15  CODE=1

HYDROGRAPHER FROM AREA EK.OFF.C

RUNOFF VOLUME = .26743 INCHES  = 12.5923 ACRE-FOOT
PEAK DISCHARGE RATE = 165.93 CFS AT 2.700 HOURS  BASIN AREA = .9099 SQ. MI.

FINISH
NORMAL PROGRAM FINISH  END TIME (HR:MIN:SEC) = 08:10:18
SDEV_G.RPM

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

COMPUTE LT TP
L CODE=1 NK=0 ISLOPE=-1
LENGTH=13300 FT SLOPE=0.021 K=3
K=0.023 CENTROID DISTANCE=6500 FT

COMPUTE MN HYD
Y=7 HYD=DEV.G AREA=1.0719 PER A=0.0 PER B=21.0
PER C=21.0 PER D=58.0 TP=6.0 RAINFALL=1

PRINT HYD
ID=7 CODE=1
******************************************************************************

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

COMPUTE LT TP
L CODE=1 NK=0 ISLOPE=-1
LENGTH=13800 FT SLOPE=0.021 K=3
K=0.021 CENTROID DISTANCE=5400 FT

COMPUTE MN HYD
Y=8 HYD=DEV.H AREA=2.2125 PER A=0.0 PER B=28.0
PER C=28.0 PER D=44.0 TP=6.0 RAINFALL=1

PRINT HYD
ID=8 CODE=1
******************************************************************************

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COMPUTE LT TP
L CODE=1 NK=3 ISLOPE=-1
LENGTH=600 FT SLOPE=0.03 K=2
LENGTH=1600 FT SLOPE=0.03 K=2
LENGTH=6500 FT SLOPE=0.03 K=2
K=0.021 CENTROID DISTANCE=3400 FT

COMPUTE MN HYD
Y=9 HYD=DEV.I AREA=0.0287 PER A=0.0 PER B=9.0
PER C=68.0 PER D=23.0 TP=6.0 RAINFALL=1

PRINT HYD
ID=9 CODE=1
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COMPUTE LT TP
L CODE=1 NK=3 ISLOPE=-1
LENGTH=600 FT SLOPE=0.076 K=2
LENGTH=1600 FT SLOPE=0.076 K=2
LENGTH=6500 FT SLOPE=0.076 K=2
K=0.021 CENTROID DISTANCE=3400 FT

COMPUTE MN HYD
Y=10 HYD=DEV.J AREA=0.6219 PER A=0.0 PER B=18.0
PER C=29.0 PER D=53.0 TP=0.0 RAINFALL=1

PRINT HYD
ID=10 CODE=1
******************************************************************************

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

COMPUTE LT TP
L CODE=1 NK=0 ISLOPE=-1
LENGTH=8700 FT SLOPE=0.017 K=3
K=0.021 CENTROID DISTANCE=4800 FT

COMPUTE MN HYD
Y=11 HYD=DEV.K AREA=4.4172 PER A=0.0 PER B=26.0
PER C=26.0 PER D=48.0 TP=0.0 RAINFALL=1

PRINT HYD
ID=11 CODE=1
******************************************************************************

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COMPUTE LT TP
L CODE=1 NK=3 ISLOPE=-1
LENGTH=400 FT SLOPE=0.06 K=3
LENGTH=1600 FT SLOPE=0.06 K=3
LENGTH=4000 FT SLOPE=0.06 K=3
K=0.021 CENTROID DISTANCE=4200 FT

COMPUTE MN HYD
Y=12 HYD=DEV.L AREA=6.8172 PER A=0.0 PER B=4.0
PER C=41.0 PER D=15.0 TP=0.0 RAINFALL=1

PRINT HYD
ID=12 CODE=1
******************************************************************************

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

COMPUTE LT TP
L CODE=1 NK=3 ISLOPE=-1
LENGTH=400 FT SLOPE=0.054 K=3
LENGTH=1600 FT SLOPE=0.054 K=3
LENGTH=5500 FT SLOPE=0.054 K=3
K=0.021 CENTROID DISTANCE=4550 FT

COMPUTE MN HYD
Y=13 HYD=DEV.M AREA=0.9484 PER A=0.0 PER B=32.0
PER C=32.0 PER D=24.0 TP=0.0 RAINFALL=1

PRINT HYD
ID=13 CODE=1
******************************************************************************

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COMPUTE LT TP
L CODE=1 NK=3 ISLOPE=-1
LENGTH=400 FT SLOPE=0.041 K=3
LENGTH=1600 FT SLOPE=0.041 K=3
LENGTH=5500 FT SLOPE=0.041 K=3
K=0.021 CENTROID DISTANCE=3750 FT

COMPUTE MN HYD
Y=14 HYD=DEV.N AREA=0.9333 PER A=0.0 PER B=14.0
PER C=62.0 PER D=24.0 TP=0.0 RAINFALL=1

PRINT HYD
ID=14 CODE=1

Page 2
COMPUTE LT TP
LENGTH=400 FT SLOPE=0.011 K=1
LENGTH=1600 FT SLOPE=0.011 K=2
LENGTH=1600 FT SLOPE=0.011 K=3

COMPUTE RH WND
ID=15 HYD=EX.OFF.C AREA=0.8109 PER A=30.0 PER B=20.0
PER C=30.0 PER D=20.0 TP=0.0 RAINFALL=2

PRINT WND
ID=15 CODE=1

FINISH
RUNOFF VOLUME = 3417.9 INCHES = 9,876.59 ACRE-FOOT
PEAK DISCHARGE RATE = 364.64 CFS AT 1.533 HOURS BASIN AREA = .5348 SQ. MI.

*----------------------------------------------------------------------*
*----------------------------------------------------------------------*
** BASIN DEV.B *************

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**----------------------------------------------------------------------**

COMPUTE LT TP
LCODE=1 NK=3 ISLOPE=3
LENGTH=500 FT SLOPE=0.05 K=1
LENGTH=1000 FT SLOPE=0.05 K=2
LENGTH=2000 FT SLOPE=0.05 K=3
K=0.071 CENTRED DISTANCE=2800 FT

TP AND TD COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS
SHEET FLOW PORTION
LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
400.0 .000500 1.0000
SHALLOW FLOW PORTION
500.0 .000500 1.0000
CHANNEL FLOW PORTION
600.0 .000500 1.0000
TOTAL BASIN
820.0 .000500 2.1302

LAG EQUATION FACTORS:
K= .0010 TOTAL BASIN LENGTH (FT)= 8200.0
TOTAL BASIN SLOPE (FT/FT)= .000500 CENTREND LENGTH (FT)= 2800.0

TIME OF CONCENTRATION (HRS)= .5659 TIME TO PEAK (HRS)= .3173 LAG TIME (HRS)= .4244

COMPUTE MN HYD
ID=2 HYD-DEV.B AREA=2.8781 PER A=0.0 PER D=25.0 PER C=30.0 PER D=62.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS)= .3773
K = .26439364 TP = 377270094 K/TP RATIO = .706663 SHAPE CONSTANT, N = 5.214875
UNIT PEAK = 354.21 CFS UNIT VOLUME = 1.0000 S = 284.57 P60 = 1.0600
AREA = 1.036428 SQ MI IA = .10000 INCHES INF = .000000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = .053333

K = .42256049 TP = 377270094 K/TP RATIO = .118724 SHAPE CONSTANT, N = 3.166188
UNIT PEAK = 354.21 CFS UNIT VOLUME = 1.0000 S = 284.57 P60 = 1.0600
AREA = 1.036428 SQ MI IA = .10000 INCHES INF = .000000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = .053333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.01000 AT PEAK FLOW.

PRINT HYD
ID=2 CODE=1

HYDROGRAPH FROM AREA DEV.B

RUNOFF VOLUME = .71220 INCHES = 109.336 ACRE-FOOT
PEAK DISCHARGE RATE = 1347.63 CFS AT 1.800 HOURS BASIN AREA = 2.8781 SQ. MI.

*----------------------------------------------------------------------*
*----------------------------------------------------------------------*
** BASIN DEV.C *************

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**----------------------------------------------------------------------**

COMPUTE LT TP
LCODE=1 NK=3 ISLOPE=3
LENGTH=500 FT SLOPE=0.01 K=1
LENGTH=1000 FT SLOPE=0.01 K=2
LENGTH=2000 FT SLOPE=0.01 K=3
K=0.071 CENTRED DISTANCE=1600 FT

TP AND TD COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS
SHEET FLOW PORTION
LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
400.0 .010000 1.0500
SHALLOW FLOW PORTION
1000.0 .000500 2.0551
CHANNEL FLOW PORTION
300.0 .000500 3.0100
TOTAL BASIN
5100.0 .000500 2.2356

LAG EQUATION FACTORS:
K = .0010 TOTAL BASIN LENGTH (FT)= 5100.0
TOTAL BASIN SLOPE (FT/FT)= .000500 CENTREND LENGTH (FT)= 1600.0

TIME OF CONCENTRATION (HRS)= .4780 TIME TO PEAK (HRS)= .3187 LAG TIME (HRS)= .3838

COMPUTE MN HYD
ID=3 HYD-DEV.C AREA=1.5641 PER A=0.0 PER D=26.0 PER C=26.0 PER D=48.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS)= .3187
K = .32320864 TP = .31860398 K/TP RATIO = .706663 SHAPE CONSTANT, N = 5.214875
UNIT PEAK = 1013.8 CFS UNIT VOLUME = 1.0000 S = 429.38 P60 = 1.0600
AREA = .750767 SQ MI IA = .10000 INCHES INF = .000000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = .053333

K = .55668328 TP = .31803946 K/TP RATIO = 1.313824 SHAPE CONSTANT, N = 3.166188
UNIT PEAK = 752.01 CFS UNIT VOLUME = 1.0000 S = 294.67 P60 = 1.0600
AREA = .833332 SQ MI IA = .425000 INCHES INF = 1.040000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = .053333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.01000 AT PEAK FLOW.

PRINT HYD
ID=3 CODE=1
HYDROGRAPH FROM AREA DEV.C

RUNOFF VOLUME = .59370 INCHES = 49.6026 ACRE- FEET
PEAK DISCHARGE RATE = 793.72 CFS AT 1.700 HOURS BASIN AREA = 1.5641 SQ. MI.

*==========================================================================================================*

**================================================== BASIN DEV.D ==============================================================**

**COMPUTE LT TP**
LCCODE=1 NK=3 ISLOPE=-1
LENGTH=400 FT SLOPE=0.008 K=1
LENGTH=800 FT SLOPE=0.008 K=2
LENGTH=4700 FT SLOPE=0.008 K=3
KN=0.001 CENTERD DISTANCE=3500 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS
SHEET FLOW PORTION
LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
400.0 .00000 1.00000
1600.0 .00000 1.00000
TOTAL BASIN 6700.0 .00000 2.4217

LAG EQUATION FACTORS: KN= .0210 TOTAL BASIN LENGTH (FT)= 6700.0
TOTAL BASIN SLOPE (FT/FT)= .00000 CENTERBD LENGTH (FT)= 3500.0

TIME OF CONCENTRATION (HRS)= .5237 TIME TO PEAK (HRS)= .3941 LAG TIME (HRS)= .3928

COMPUTE NH HYD ID=4 HYD-DEV.D AREA=0.5313 PER A=0.0 PER B=16.0
PER C=26.0 PER D=68.0 TP=0.0 RAINFALL=1

TIME TO PEAK (hrs)= .3941

K = .244613HR TP = .349116HR K/TP RATIO = .700663 SHAPE CONSTANT, N = 5.214875
UNIT PEAK = 644.34 CFS UNIT VOLUME = 1.000 INCHES IA = .429.34 INCHES PER HOUR
AREA = 36284 SQ MI IA = .00000 INCHES PER HOUR RUNOFF COMPUTED BY INTEGRATION & INTEGRATION NUMBER METHOD - DT = .033333

K = .390739HR TP = .349116HR K/TP RATIO = 1.19224 SHAPE CONSTANT, N = 3.160018
UNIT PEAK = 1.000 CFS UNIT VOLUME = 1.000 INCHES IA = 1.000 INCHES PER HOUR
AREA = .170016 SQ MI IA = .00000 INCHES PER HOUR RUNOFF COMPUTED BY INTEGRATION & INTEGRATION NUMBER METHOD - DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.00000 AT PEAK FLOW.

PRINT HYD ID=4 CODE=1

HYDROGRAPH FROM AREA DEV.D

RUNOFF VOLUME = .76277 INCHES = 21.596 ACRE- FEET
PEAK DISCHARGE RATE = 221.92 CFS AT 1.767 HOURS BASIN AREA = .5313 SQ. MI.

*==========================================================================================================*

**================================================== BASIN DEV.D ==============================================================**

**COMPUTE LT TP**
LCCODE=1 NK=3 ISLOPE=-1
LENGTH=400 FT SLOPE=0.006 K=1
LENGTH=800 FT SLOPE=0.006 K=2
LENGTH=9500 FT SLOPE=0.006 K=3
KN=0.001 CENTERD DISTANCE=6400 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS
SHEET FLOW PORTION
LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
400.0 .00000 1.00000
1600.0 .00000 1.00000
TOTAL BASIN 3150.0 .00000 2.6336

LAG EQUATION FACTORS: KN= .0210 TOTAL BASIN LENGTH (FT)= 11500.0
TOTAL BASIN SLOPE (FT/FT)= .00000 CENTERBD LENGTH (FT)= 5400.0

TIME OF CONCENTRATION (HRS)= .5100 TIME TO PEAK (HRS)= .3673 LAG TIME (HRS)= .4132

COMPUTE NH HYD ID=5 HYD-DEV.D AREA=2.4328 PER A=0.0 PER B=23.0
PER C=23.0 PER D=54.0 TP=0.0 RAINFALL=1

TIME TO PEAK (hrs)= .3673

K = .213728HR TP = .36732HR K/TP RATIO = .700663 SHAPE CONSTANT, N = 5.214888
UNIT PEAK = .4554 CFS UNIT VOLUME = 1.000 INCHES IA = .429.34 INCHES PER HOUR
AREA = .115372 SQ MI IA = .00000 INCHES PER HOUR RUNOFF COMPUTED BY INTEGRATION & INTEGRATION NUMBER METHOD - DT = .033333

K = .411122HR TP = .36732HR K/TP RATIO = 1.19224 SHAPE CONSTANT, N = 3.160018
UNIT PEAK = 1.000 CFS UNIT VOLUME = 1.000 INCHES IA = 1.000 INCHES PER HOUR
AREA = 1.119808 SQ MI IA = .00000 INCHES PER HOUR RUNOFF COMPUTED BY INTEGRATION & INTEGRATION NUMBER METHOD - DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.00000 AT PEAK FLOW.
HYDROGRAPH FROM AREA DEV.E

RUNOFF VOLUME = 0.4516 INCHES = 43.7755 ACRE-FEET
PEAK DISCHARGE RATE = 12.1142 CFS AT 1.767 HOURS BASIN AREA = 2.4328 SQ. MI.

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

<table>
<thead>
<tr>
<th>LENGTH (FT)</th>
<th>SLOPE (FT/FT)</th>
<th>COMPOSITE K</th>
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<tbody>
<tr>
<td>400.0</td>
<td>0.000000</td>
<td>1.000000</td>
</tr>
<tr>
<td>100.0</td>
<td>0.000000</td>
<td>2.000000</td>
</tr>
</tbody>
</table>

TOTAL BASIN = 31200.0

LAG EQUATION FACTORS:

Km = 0.021000 TOTAL BASIN LENGTH (FT) = 13300.0
TOTAL BASIN SLOPE (FT/FT) = .021000 CENTROID LENGTH (FT) = 6300.0

TIME OF CONCENTRATION (HRS) = .5208 TIME TO PEAK (HRS) = .3209 LAG TIME (HRS) = .3610

RUNOFF VOLUME = .4516 INCHES = 42.6774 ACRE-FEET
PEAK DISCHARGE RATE = 662.03 CFS AT 1.733 HOURS BASIN AREA = 1.6314 SQ. MI.

OUTFLOW HYDROGRAPH REACH .00

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS:

Km = 0.021000 TOTAL BASIN LENGTH (FT) = 13300.0
TOTAL BASIN SLOPE (FT/FT) = .021000 CENTROID LENGTH (FT) = 6300.0

TIME OF CONCENTRATION (HRS) = .4613 TIME TO PEAK (HRS) = .3209 LAG TIME (HRS) = .3610

RUNOFF VOLUME = .67896 INCHES = 311.2413 ACRE-FEET
PEAK DISCHARGE RATE = 1759.38 CFS AT 1.733 HOURS BASIN AREA = 0.0719 SQ. MI.

#**************************************************************************************************************************
#**************************************************************  BASIN DEV.I  **************************************************************
#**************************************************************************************************************************

COMPUTE LT TP LOC=1, NO=0 ISLOPE=1
LENGTH=13000 FT SLOPE=0.02  K=3
RN=0.001 CENTROID DISTANCE=5400 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS:  K= .0310  TOTAL BASIN LENGTH (FT)= 13400.0
TOTAL BASIN SLOPE (FT/FT)= .000000  CENTROID LENGTH (FT)= 5400.0

TIME OF CONCENTRATION (HRS)= .4623  TIME TO PEAK (HRS)= .3082  LAG TIME (HRS)= .3467

COMPUTE NH HYD ID=8 HYD=DEV.I AREA=2.2125 PER A=0.0 PER B=8.0
PER C=8.0 PER D=4.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS)= .3082

K = .215944HR TP = .308199HR K/TP RATIO = .700663  SHAPE CONSTANT, N = 5.214875
UNIT PEAK = 1358.3  CFS UNIT VOLUME = 1.000  R = .476 36' PER 1.0000
AREA = .073590 SQ MI  IA = .010000 INCHES  INF = .046000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD = DT = .033333

K = .449944HR TP = .308199HR K/TP RATIO = 1.119224  SHAPE CONSTANT, N = 3.380618
UNIT PEAK = 1184.6  CFS UNIT VOLUME = 1.000  R = .294 67' PER 1.0000
AREA = .1293600 SQ MI  IA = .010000 INCHES  INF = .169000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD = DT = .033333

RUNOFF VOLUME = .56239 INCHES = 66.3618 ACRE-FOOT
PEAK DISCHARGE RATE = 1083.94 CFS AT 1.700 HOURS BASIN AREA = 2.2325 SQ. MI.

#**************************************************************************************************************************
#**************************************************************  BASIN DEV.I  **************************************************************
#**************************************************************************************************************************

COMPUTE LT TP LOC=3, NO=3 ISLOPE=1
LENGTH=4000 FT SLOPE=0.03  K=3
LENGTH=5500 FT SLOPE=0.03  K=3
RN=0.001 CENTROID DISTANCE=3400 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS
SHORT FLOW PORTION LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
4000.0 .030000 3.0000
6500.0 .030000 3.0000

LAG EQUATION FACTORS:  K= .0020  TOTAL BASIN LENGTH (FT)= 8500.0
TOTAL BASIN SLOPE (FT/FT)= .030000  CENTROID LENGTH (FT)= 3400.0

TIME OF CONCENTRATION (HRS)= .3507  TIME TO PEAK (HRS)= .2245  LAG TIME (HRS)= .2526

COMPUTE NH HYD ID=9 HYD=DEV.I AREA=1.0287 PER A=0.0 PER B=9.0
PER C=6.8 PER D=23.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS)= .2245

K = .15723HR TP = .22449HR K/TP RATIO = .700663  SHAPE CONSTANT, N = 5.214875
UNIT PEAK = 452.98  CFS UNIT VOLUME = 1.000  R = 429.93 PER 1.0000
AREA = .25831 SQ MI  IA = .100000 INCHES  INF = .046000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD = DT = .033333

K = .23613HR TP = .22449HR K/TP RATIO = 1.001874  SHAPE CONSTANT, N = 5.396614
UNIT PEAK = 1093.8  CFS UNIT VOLUME = 1.000  R = 309.71 PER 1.0000
AREA = .782860 SQ MI  IA = .36533 INCHES  INF = .87659 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD = DT = .033333

RUNOFF VOLUME = .44360 INCHES = 24.3859 ACRE-FOOT
PEAK DISCHARGE RATE = 531.37 CFS AT 1.600 HOURS BASIN AREA = 1.0297 SQ. MI.

#**************************************************************************************************************************
#**************************************************************  HYDROGRAPH FROM AREA DEV.I  **************************************************************
#**************************************************************************************************************************

HYDROGRAPH FROM AREA DEV.I

RUNOFF VOLUME = .44360 INCHES = 24.3859 ACRE-FOOT
PEAK DISCHARGE RATE = 531.37 CFS AT 1.600 HOURS BASIN AREA = 1.0297 SQ. MI.
**Dev. Out**

**Basin Dev. 3**

**Compute LT TP**

<table>
<thead>
<tr>
<th>Lcode=1</th>
<th>k=3</th>
<th>lsope=3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length=500 ft</td>
<td>SLOPE=0.076 k=1</td>
<td></td>
</tr>
<tr>
<td>Length=1600 ft</td>
<td>SLOPE=0.076 k=2</td>
<td></td>
</tr>
<tr>
<td>Length=800 ft</td>
<td>SLOPE=0.076 k=3</td>
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</tr>
</tbody>
</table>

**TC and TP Computed by Upland/Lag Time Procedure**

**SCS Upland Method Factors**

<table>
<thead>
<tr>
<th>Length (ft)</th>
<th>Slope (ft/ft)</th>
<th>Composite k</th>
</tr>
</thead>
<tbody>
<tr>
<td>400.0</td>
<td>0.07600</td>
<td>1.0000</td>
</tr>
<tr>
<td>1600.0</td>
<td>0.07600</td>
<td>2.0000</td>
</tr>
<tr>
<td>800.0</td>
<td>0.07600</td>
<td>1.0000</td>
</tr>
<tr>
<td>TOTAL BASIN</td>
<td>2800.0</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

**Time of Concentration (Hrs)=** 0.1478 **Time to Peak (Hrs)=** 0.0085 **Lag Time (Hrs)=** 0.1108

**Time to Peak Computed to Be Less Than 0.3333 Hour Minimum Value.**

**Revised Values: Time of Concentration (Hrs)=** 0.0000 **Time to Peak (Hrs)=** 0.3333 **Lag Time (Hrs)=** 0.3500

**Compute NH HYD**

<table>
<thead>
<tr>
<th>ID=18</th>
<th>HYO=DEV.3</th>
<th>AREA=0.6219</th>
<th>PER A=0.0</th>
<th>PER B=1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PER C=0.0</td>
<td>PER D=51.0</td>
<td>TP=6.0</td>
<td>RAIND=1</td>
</tr>
</tbody>
</table>

**Time to Peak (Hrs)=** 0.3333

**K =** 0.09342H  **T =** 3.3333H  **K/T Ratio =** 0.709663  **SHAPE CONSTANT, N = 5.214875

**UNIT PEAK =** 1001.4  **CFS UNIT VOLUME = 1.000**  **B =** 413.38  **PEO = 1.0600**

**AREA =** 2990.0  **SQ FT**  **ZA =** 10000 INCHES  **INF =** 0.0000 INCHES PER HOUR

**RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION RUNOFF METHOD =** 0.003333

**K =** 0.16487H  **T =** 3.3333H  **K/T Ratio =** 1.098652  **SHAPE CONSTANT, N = 3.217296

**UNIT PEAK =** 055.60  **CFS UNIT VOLUME = 1.000**  **B =** 293.08  **PEO = 0.6600**

**AREA =** 29229.0  **SQ FT**  **ZA =** 40745 INCHES  **INF =** 0.99000 INCHES PER HOUR

**RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION RUNOFF METHOD =** 0.003333

**BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR =** 1.00000 AT PEAK FLOW.

**Print HYD**

<table>
<thead>
<tr>
<th>ID=10</th>
<th>CODE=1</th>
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</thead>
</table>

**HYDROGRAPH FROM AREA DEV.3**

**RUNOFF VOLUME =** 0.6461 INCHES  **21.4565 ACRE-FOOT**

**PEAK DISCHARGE RATE =** 597.40 CFS AT 1.560 HOURS  **BASIN AREA =** 0.6219 SQ. MI.

**Basin Dev. K**

**Compute LT TP**

<table>
<thead>
<tr>
<th>Lcode=1</th>
<th>k=3</th>
<th>lsope=1</th>
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</thead>
<tbody>
<tr>
<td>Length=16700 ft</td>
<td>SLOPE=0.017 k=3</td>
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</tr>
<tr>
<td>K=0.021</td>
<td>CENTROID DISTANCE=40.0 FT</td>
<td></td>
</tr>
</tbody>
</table>

**TC and TP Computed by Upland/Lag Time Procedure**

**LAG Time Factors:**

<table>
<thead>
<tr>
<th>KN=</th>
<th>0.021</th>
<th>TOTAL BASIN LENGTH (FT)= 16700.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL BASIN SLOPE (FT/FT)= 0.01700</td>
<td>CENTROID LENGTH (FT)= 40.00</td>
<td></td>
</tr>
</tbody>
</table>

**Time of Concentration (Hrs)=** 0.4912 **Time to Peak (Hrs)=** 0.3275 **Lag Time (Hrs)=** 0.3684

**Compute NH HYD**

<table>
<thead>
<tr>
<th>ID=11</th>
<th>HYO=DEV.K</th>
<th>AREA=4.4172</th>
<th>PER A=0.0</th>
<th>PER B=26.0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PER C=26.0</td>
<td>PER D=48.0</td>
<td>TP=0.0</td>
<td>RAIND=1</td>
</tr>
</tbody>
</table>

**Time to Peak (Hrs)=** 0.3275

**K =** 0.22943H  **T =** 3.27453H  **K/T Ratio =** 0.700663  **SHAPE CONSTANT, N = 5.214875

**UNIT PEAK =** 2788.2  **CFS UNIT VOLUME = 1.000**  **B =** 429.38  **PEO = 1.0600**

**AREA =** 21202.4  **SQ FT**  **ZA =** 10000 INCHES  **INF =** 0.0000 INCHES PER HOUR

**RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION RUNOFF METHOD =** 0.003333

**K =** 0.25643H  **T =** 3.27453H  **K/T Ratio =** 1.119224  **SHAPE CONSTANT, N = 3.216068

**UNIT PEAK =** 2067.0  **CFS UNIT VOLUME = 1.000**  **B =** 284.67  **PEO = 1.0600**

**AREA =** 22564.4  **SQ FT**  **ZA =** 42500 INCHES  **INF =** 1.00000 INCHES PER HOUR

**RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION RUNOFF METHOD =** 0.003333

**BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR =** 1.00000 AT PEAK FLOW.

**Print HYD**

<table>
<thead>
<tr>
<th>ID=11</th>
<th>CODE=1</th>
</tr>
</thead>
</table>

**HYDROGRAPH FROM AREA DEV.K**

**RUNOFF VOLUME =** 0.5971 INCHES  **140.3377 ACRE-FOOT**

**PEAK DISCHARGE RATE =** 1203.87 CFS AT 1.773 HOURS  **BASIN AREA =** 4.4172 SQ. MI.

**Basin Dev. L**

**Compute LT TP**

<table>
<thead>
<tr>
<th>Lcode=1</th>
<th>k=3</th>
<th>lsope=1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length=400 FT</td>
<td>SLOPE=0.02 k=1</td>
<td></td>
</tr>
<tr>
<td>Length=1600 FT</td>
<td>SLOPE=0.02 k=2</td>
<td></td>
</tr>
<tr>
<td>Length=800 FT</td>
<td>SLOPE=0.02 k=3</td>
<td></td>
</tr>
<tr>
<td>KN=0.021</td>
<td>CENTROID DISTANCE=4200 FT</td>
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</tbody>
</table>
TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

<table>
<thead>
<tr>
<th>SHEET FLOW PORTION</th>
<th>LENGTH (FT)</th>
<th>SLOPE (FT/FT)</th>
<th>COMPOSITE K</th>
</tr>
</thead>
<tbody>
<tr>
<td>400.0</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>SHALLOW FLOW PORTION</td>
<td>3000.0</td>
<td></td>
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</tr>
<tr>
<td>CHANNEL FLOW PORTION</td>
<td>4000.0</td>
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<tr>
<td>TOTAL BASIN</td>
<td>6000.0</td>
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</table>

LAG EQUATION FACTORS:

<table>
<thead>
<tr>
<th>Km</th>
<th>Total Basin Length (FT)</th>
<th>Centroid Length (FT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.021</td>
<td>6000.0</td>
<td>4200.0</td>
</tr>
</tbody>
</table>

TIME OF CONCENTRATION (HRS)= 0.2886  TIME TO PEAK (HRS)= 0.3925  LAG TIME (HRS)= 0.2166

COMPUTE N4 HYD

PER A=0.0  PER B=0.0  PER C=0.1  PER D=0.1

ID=32  CD=3

DOUBLE VOLUME = 0.9579 INCHES = 13.0282 ACRE-FEET PEAK DISCHARGE RATE = 368.75 CFS AT 1.567 HOURS BASIN AREA = 0.6172 SQ. MI.

**BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR = 1.0000 AT PEAK FLOW.**
TC AND Tp COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K

SHEET FLOW PORTION  400.0  0.01000  1.0000
SHALLOW FLOW PORTION  400.0  0.01000  1.0000
CHANNEL FLOW PORTION  400.0  0.01000  1.0000
TOTAL BASIN  400.0  0.01000  1.0000

LAG EQUATION FACTORS:

K_1 = .0010  TOTAL BASIN LENGTH (FT) = 8800.0
TOTAL BASIN SLOPE (FT/FT) = .041000  CENTROID LENGTH (FT) = 13750.0

TIME OF CONCENTRATION (HRS) = .3198  TIME TO PEAK (HRS) = .3132  LAG TIME (HRS) = .2409

COMPUTE AN HYD   ID=14  HYD=450.4X  AREA=.9313  PER A=0.0  PER B=12.0  PER C=12.0  PER D=24.0  TP=0.0  RAINFALL=1

TIME TO PEAK (HRS) = .2132
K = .049339  TP = .213311  H/T RATIO = .070063  SHAPE CONSTANT, N = 3.214875
UNIT PEAK = 150.32  CFS  UNIT VOLUME = 1.000
AREA = 722532 SQ FT  IA = .000000000000INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFECTION NUMBER METHOD - ET = .033333

K = .027679  TP = .213111  H/T RATIO = 1.063709  SHAPE CONSTANT, N = 3.319874
UNIT PEAK = 321.39  CFS  UNIT VOLUME = 1.000
AREA = .707788 SQ NI  IA = .376300000000INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFECTION NUMBER METHOD - ET = .033333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.0000 AT PEAK FLOW.

PRINT HYD   ID=14  CORE=1

HYDROGRAPH FROM AREA DEV N

RUNOFF VOLUME = .46043 INCHES = 21.8758 ACRES-FEET
PEAK DISCHARGE RATE = 495.41 CFS AT 1.600 HOURS  BASIN AREA = .9313 SQ. MI.

*---------------------------------------------------------------------------*
<p>|================================================================================|</p>
<table>
<thead>
<tr>
<th>**************************** BASIS EX. OFF C ****************************</th>
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</thead>
<tbody>
<tr>
<td>COMPUTE LT TP   ID=14  NO=3  ISLOPE=-1</td>
</tr>
<tr>
<td>LENGTH=100 FT  SLOPE=0.0001  K=1</td>
</tr>
<tr>
<td>LENGTH=1600 FT  SLOPE=0.0011  K=3</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>

TC AND Tp COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K

SHEET FLOW PORTION  400.0  0.011000  2.0000
SHALLOW FLOW PORTION  1600.0  0.011000  2.0000
CHANNEL FLOW PORTION  1600.0  0.011000  2.0000
TOTAL BASIN  1600.0  0.011000  2.0000

TIME OF CONCENTRATION (HRS) = .4501  TIME TO PEAK (HRS) = .3060  LAG TIME (HRS) = .5443

COMPUTE AN HYD   ID=15  HYD=EX.OFF.C  AREA=.9109  PER A=0.0  PER B=20.0  PER C=20.0  PER D=20.0  TP=0.0  RAINFALL=1

TIME TO PEAK (HRS) = .3060
K = .234438  TP = .306565  H/T RATIO = .570063  SHAPE CONSTANT, N = 5.214875
UNIT PEAK = 383.39  CFS  UNIT VOLUME = 1.000
AREA = 2714270 SQ FT  IA = .000000000000INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFECTION NUMBER METHOD - ET = .033333

K = .366248  TP = .306565  H/T RATIO = 1.19669  SHAPE CONSTANT, N = 2.963703
UNIT PEAK = 581.82  CFS  UNIT VOLUME = 1.000
AREA = .037029 SQ NI  IA = .324330000000INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFECTION NUMBER METHOD - ET = .033333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.0000 AT PEAK FLOW.

PRINT HYD   ID=15  CORE=1

HYDROGRAPH FROM AREA EX.OFF.C

RUNOFF VOLUME = .37754 INCHES = 15.3414 ACRES-FEET
PEAK DISCHARGE RATE = 295.53 CFS AT 1.700 HOURS  BASIN AREA = .9109 SQ. MI.

*---------------------------------------------------------------------------*
|================================================================================|
|================================================================================|
|================================================================================|

FINISH
NORMAL PROGRAM FINISH  END TIME (HR:MIN:SEC) = 08:19:52
**#*#** PROJECT NAME: SANTOLINA
**#*#** DATE: NOVEMBER 2012
**#*#** INPUT FILE NAME: SDEV.24.HP
**#*#** OUTPUT FILE NAME: SDEV.24.OUT
**#*#** PROJECT NUMBER: 20122026
**#*#** COMMENTS: 5 YEAR-24 HR STORM

-------------------------------

**START**
**TIME=0.0 HR PUNCH CODE=0
**RAIN RAIN QTR=0.0
**BAIN DRY=1.00 IN BAIN SITY=1.75 IN
**BAIN DRY=3.31 IN RIVQ=0.033333

**#*#**-----------------------------------------------------------------------
**#*#** COMPARE BASINS IN SANTOLINA - DEVELOPED CONDITION
**#*#**-----------------------------------------------------------------------
**#*#** SEGMENT BULK FACTOR FOR 5 YR - 1
**#*#** SEDIMENT BULK CODE=1 BULK FACTOR=1.01

**#*#**----------------------------------------------------------------------
**#*#** BASIN DEV.A
**#*#**----------------------------------------------------------------------
**#*#** COMPUTE LT TP
**#*#** LOC=5 X=3 ISLOPE=1
**#*#** LENGTH=600 FT SLOPE=0.05 K=3
**#*#** LENGTH=1600 FT SLOPE=0.06 K=3
**#*#** LENGTH=600 FT SLOPE=0.05 K=3

**#*#** COMPUTE MH HYD
**#*#** I=0 HYD-DEV.A AREA=0.5438 PER A=0.8 PER B=1.0
**#*#** PER C=0.0 PER D=7.0 TP=0.0 RAINFALL=1

**#*#**----------------------------------------------------------------------
**#*#** BASIN DEV.B
**#*#**----------------------------------------------------------------------
**#*#** COMPUTE LT TP
**#*#** LOC=3 X=3 ISLOPE=1
**#*#** LENGTH=600 FT SLOPE=0.05 K=1
**#*#** LENGTH=1600 FT SLOPE=0.05 K=2
**#*#** LENGTH=600 FT SLOPE=0.05 K=3
**#*#** RH=0.021 CENTROID DISTANCE=2800 FT

**#*#** COMPUTE MH HYD
**#*#** I=3 HYD-DEV.B AREA=0.3761 PER A=0.0 PER B=19.0
**#*#** PER C=0.0 PER D=82.0 TP=0.0 RAINFALL=1

**#*#**----------------------------------------------------------------------
**#*#** BASIN DEV.C
**#*#**----------------------------------------------------------------------
**#*#** COMPUTE LT TP
**#*#** LOC=3 X=3 ISLOPE=1
**#*#** LENGTH=600 FT SLOPE=0.01 K=1
**#*#** LENGTH=1600 FT SLOPE=0.01 K=2
**#*#** LENGTH=1600 FT SLOPE=0.01 K=3
**#*#** RH=0.021 CENTROID DISTANCE=1600 FT

**#*#** COMPUTE MH HYD
**#*#** I=3 HYD-DEV.C AREA=0.5841 PER A=0.0 PER B=26.0
**#*#** PER C=0.0 PER D=48.0 TP=0.0 RAINFALL=1

**#*#**----------------------------------------------------------------------
**#*#** BASIN DEV.D
**#*#**----------------------------------------------------------------------
**#*#** COMPUTE LT TP
**#*#** LOC=3 X=3 ISLOPE=1
**#*#** LENGTH=400 FT SLOPE=0.008 K=1
**#*#** LENGTH=1600 FT SLOPE=0.008 K=2
**#*#** LENGTH=4000 FT SLOPE=0.008 K=3
**#*#** RH=0.021 CENTROID DISTANCE=3500 FT

**#*#** COMPUTE MH HYD
**#*#** I=4 HYD-DEV.D AREA=0.5313 PER A=0.0 PER B=16.0
**#*#** PER C=0.0 PER D=68.0 TP=0.0 RAINFALL=1

**#*#**----------------------------------------------------------------------
**#*#** BASIN DEV.E
**#*#**----------------------------------------------------------------------
**#*#** COMPUTE LT TP
**#*#** LOC=3 X=3 ISLOPE=1
**#*#** LENGTH=400 FT SLOPE=0.006 K=1
**#*#** LENGTH=1600 FT SLOPE=0.006 K=2
**#*#** LENGTH=4000 FT SLOPE=0.006 K=3
**#*#** RH=0.021 CENTROID DISTANCE=5400 FT

**#*#** COMPUTE MH HYD
**#*#** I=5 HYD-DEV.E AREA=0.4338 PER A=0.0 PER B=23.0
**#*#** PER C=0.0 PER D=54.0 TP=0.0 RAINFALL=1

**#*#**----------------------------------------------------------------------
**#*#** BASIN DEV.F
**#*#**----------------------------------------------------------------------
**#*#** COMPUTE LT TP
**#*#** LOC=3 X=3 ISLOPE=1
**#*#** LENGTH=400 FT SLOPE=0.01 K=1
**#*#** LENGTH=1600 FT SLOPE=0.01 K=2
**#*#** LENGTH=4000 FT SLOPE=0.01 K=3
**#*#** RH=0.021 CENTROID DISTANCE=5400 FT

**#*#** COMPUTE MH HYD
**#*#** I=6 HYD-DEV.F AREA=0.6141 PER A=0.0 PER B=32.0
**#*#** PER C=0.0 PER D=36.0 TP=0.0 RAINFALL=1

**#*#**----------------------------------------------------------------------

**Page 1**
#SOEV.24.HYM

********************************************************** BASIN DEV.G **********************************************************

COMPUTE LT TP
LCODE=1  NK=0  ISLOPE=1
LENGTH=13360 FT  SLOPE=0.021  K=3
XH=0.021  CENTROID DISTANCE=6390 FT

COMPUTE NN HYD
ID=7 HYD=DEV.G  AREA=5.0719 PER A=0.0 PER B=21.0
PER C=21.0 PER D=50.0 TP=0.0 RAINFALL=-1

PRINT HYD
ID=7 CODE=1
********************************************************** BASIN DEV.H **********************************************************

COMPUTE LT TP
LCODE=1  NK=0  ISLOPE=1
LENGTH=13400 FT  SLOPE=0.02 K=3
XH=0.021  CENTROID DISTANCE=5400 FT

COMPUTE NN HYD
ID=8 HYD=DEV.H  AREA=2.2125 PER A=0.0 PER B=28.0
PER C=23.0 PER D=40.0 TP=0.0 RAINFALL=-1

PRINT HYD
ID=8 CODE=1
********************************************************** BASIN DEV.I **********************************************************

COMPUTE LT TP
LCODE=1  NK=3  ISLOPE=-1
LENGTH=400 FT  SLOPE=0.03  K=1
LENGTH=1800 FT SLOPE=0.03  K=2
LENGTH=9000 FT SLOPE=0.03  K=3
XH=0.021  CENTROID DISTANCE=3400 FT

COMPUTE NN HYD
ID=9 HYD=DEV.I  AREA=1.027 PER A=0.0 PER B=9.0
PER C=69.0 PER D=43.0 TP=0.0 RAINFALL=-1

PRINT HYD
ID=9 CODE=1
********************************************************** BASIN DEV.J **********************************************************

COMPUTE LT TP
LCODE=1  NK=3  ISLOPE=1
LENGTH=400 FT  SLOPE=0.076  K=2
LENGTH=800 FT SLOPE=0.076  K=3

COMPUTE NN HYD
ID=10 HYD=DEV.J  AREA=0.6219 PER A=0.0 PER B=18.0
PER C=29.0 PER D=53.0 TP=0.0 RAINFALL=-1

PRINT HYD
ID=10 CODE=1
********************************************************** BASIN DEV.K **********************************************************

COMPUTE LT TP
LCODE=1  NK=0  ISLOPE=1
LENGTH=16700 FT  SLOPE=0.037  K=3
XH=0.021  CENTROID DISTANCE=4800 FT

COMPUTE NN HYD
ID=11 HYD=DEV.K  AREA=4.4127 PER A=0.0 PER B=26.0
PER C=26.0 PER D=48.0 TP=0.0 RAINFALL=-1

PRINT HYD
ID=11 CODE=1
********************************************************** BASIN DEV.L **********************************************************

COMPUTE LT TP
LCODE=1  NK=3  ISLOPE=1
LENGTH=400 FT  SLOPE=0.06  K=3
LENGTH=8000 FT SLOPE=0.06  K=3
LENGTH=10000 FT SLOPE=0.06  K=3
XH=0.021  CENTROID DISTANCE=6390 FT

COMPUTE NN HYD
ID=12 HYD=DEV.L  AREA=0.6217 PER A=0.0 PER B=4.0
PER C=81.0 PER D=15.0 TP=0.0 RAINFALL=-1

PRINT HYD
ID=12 CODE=1
********************************************************** BASIN DEV.M **********************************************************

COMPUTE LT TP
LCODE=1  NK=3  ISLOPE=1
LENGTH=400 FT  SLOPE=0.054  K=2
LENGTH=8000 FT SLOPE=0.054  K=2
LENGTH=5500 FT SLOPE=0.054  K=3
XH=0.021  CENTROID DISTANCE=4550 FT

COMPUTE NN HYD
ID=13 HYD=DEV.M  AREA=0.9484 PER A=0.0 PER B=12.0
PER C=64.0 PER D=24.0 TP=0.0 RAINFALL=-1

PRINT HYD
ID=13 CODE=1
********************************************************** BASIN DEV.N **********************************************************

COMPUTE LT TP
LCODE=1  NK=3  ISLOPE=1
LENGTH=400 FT  SLOPE=0.041  K=2
LENGTH=8000 FT SLOPE=0.041  K=2
LENGTH=6800 FT SLOPE=0.041  K=3
XH=0.021  CENTROID DISTANCE=3750 FT

COMPUTE NN HYD
ID=14 HYD=DEV.N  AREA=0.9313 PER A=0.0 PER B=14.0
PER C=82.0 PER D=24.0 TP=0.0 RAINFALL=-1

PRINT HYD
ID=14 CODE=1

Page 2
**SORV 24 RH**

```
COMPUTE LT TP
LCOE=1 HE=1 ISLOPE=-1
LENGTH=400 FT SLOPE=0.011 K=1
LENGTH=800 FT SLOPE=0.011 K=2
LENGTH=1600 FT SLOPE=0.011 K=3

COMPUTE RM HYD
R=15 HYD=EX. OFF. C. AREA=0.9109 PER A=30.0 PER B=20.0
PER C=20.0 PER D=30.0 TP=0.0 RAINFALL=-1

PRINT HYD
P=15 CODE=1
```

**FINISH**
CRCV_24.OUT

COMPUTE BASIS IN SANTOLINA - DEVELOPED CONDITION

**S**  BULK FACTOR FOR 5 YR = 1.01
  RLF FACTOR = 1.61

**BASIN DEVS.**

**COMPUTE LT TP**
LCCODE = 1 N=3 ISLOPE = 3
LENGTH = 400 FT SLOPE = 0.0065 K = 1
LENGTH = 1600 FT SLOPE = 0.0065 K = 2
LENGTH = 6200 FT SLOPE = 0.0065 K = 3

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

**SCS UPLAND METHOD FACTORS**
SHEET FLOW PORTION
LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
400.0 0.0065 .950000 1.0000
SHALLOW FLOW PORTION
1600.0 .050000 2.0000
CHANNEL FLOW PORTION
400.0 .050000 3.0000
TOTAL BASIN
2400.0 .050000 1.8000

TIME OF CONCENTRATION (HRS) = .1656  TIME TO PEAK (HRS) = .1004  LAG TIME (HRS) = .1242

TIME TO PEAK COMPUTED TO BE LESS THAN 0.1333 HOURS MINIMUM VALUE.

**COMPUTE NH HYD**
ID = 1 HYD-DEV A AREA = 0.5438 PER A = 0.0 PER B = 1.0
PER D = 0.0 PER D = 0.0 TP = 0.0 RAINFALL = 0.0

TIME TO PEAK (HRS) = 0.1333

K = 0.13342783 TP = 0.133333 H/RATIO = 0.70063 SHAPED CONSTANT, N = 5.214875
UNIT PEAK = 0.722509 CFS UNIT VOLUME = 1.0000 IT = 429.44 PP = 1.0600
AREA = 0.050734 SQ FT IA = 35163 INCHES INF = .83452 INCHES PER HOUR
RUNDOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD FORM = 0.03333

K = 0.13377206 TP = 0.133333 H/RATIO = 0.105326 SHAPED CONSTANT, N = 3.416536
UNIT PEAK = 0.722509 CFS UNIT VOLUME = 1.0000 I A = 429.44 PP = 1.0600
AREA = 0.050734 SQ FT IA = 35163 INCHES INF = .83452 INCHES PER HOUR
RUNDOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD FORM = 0.03333

RUNOFF VOLUME = 0.35093 INCHES = 10.4000 ACRE-FOOT
PEAK DISCHARGE RATE = 354.64 CFS AT 1.533 HOURS  BASIN AREA = 0.5438 SQ FT.

**HYDROGRAPH FROM AREA DEV. A**

RUNOFF VOLUME = 0.35093 INCHES = 10.4000 ACRE-FOOT
PEAK DISCHARGE RATE = 354.64 CFS AT 1.533 HOURS  BASIN AREA = 0.5438 SQ FT.

**COMPUTE LT TP**
LCCODE = 1 N=3 ISLOPE = 3
LENGTH = 400 FT SLOPE = 0.0065 K = 1
LENGTH = 1600 FT SLOPE = 0.0065 K = 2
LENGTH = 6200 FT SLOPE = 0.0065 K = 3

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

**SCS UPLAND METHOD FACTORS**
SHEET FLOW PORTION
LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
400.0 0.0065 .950000 1.0000
SHALLOW FLOW PORTION
1600.0 .050000 2.0000
CHANNEL FLOW PORTION
400.0 .050000 3.0000
TOTAL BASIN
2400.0 .050000 1.8000

LAG EQUATION FACTORS:
K = .137974 TP = .137536 H/RATIO = .70063 SHAPED CONSTANT, N = 5.214875
UNIT PEAK = 0.2100 CFS UNIT VOLUME = 1.0000 IT = 429.44 PP = 1.0600
AREA = 1.76422 SQ FT IA = 10000 INCHES INF = .004000 INCHES PER HOUR
RUNDOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD FORM = 0.03333

K = .0722509 TP = .777778 H/RATIO = 1.11924 SHAPED CONSTANT, N = 3.106618
UNIT PEAK = 0.5421 CFS UNIT VOLUME = 1.0000 IT = 429.44 PP = 1.0600
AREA = 1.063678 SQ FT IA = 42500 INCHES INF = 1.0000 INCHES PER HOUR
RUNDOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD FORM = 0.03333

**END OF DOCUMENT**
BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.01400 AT PEAK FLOW.

PRINT HYD ID=2 CODE=1

HYDROGRAPH FROM AREA DEVI.H

RUNOFF VOLUME = 84324 INCHES = 225,434 AC. - FEET
PEAK DISCHARGE RATE = 1247.61 CPS AT 1.860 HOURS BASIN AREA = 2.8781 SQ. MI.

COMPUTE LT TP
LCONF=1 K=3 ISLOPE=-1
LENGTH=990 FT SLOPE=0.01 K=2
LENGTH=1500 FT SLOPE=0.01 K=2
LENGTH=3100 FT SLOPE=0.01 K=3
KN=0.021 CENTRED DISTANCE=1400 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS
SHEET FLOW PORTION = 400.0 .010000 2.0000
SMALL FLOW PORTION = 1600.0 .010000 2.0000
CHANNEL FLOW PORTION = 3100.0 .010000 3.0000
TOTAL BASIN = 5100.0 .010000 2.7836

LAG EQUATION FACTORS: KN = 0.0100 TOTAL BASIN LENGTH (FT) = 5100.0
TOTAL BASIN SLOPE (FT/FT) = 0.010000 CENTRED LENGTH (FT) = 1400.0

TIME OF CONCENTRATION (HRS) = 0.4200 TIME TO PEAK (HRS) = 3.387 LAG TIME (HRS) = 0.3585

COMPUTE NH HYD ID=3 HYD-DEV.C AREA=1.5641 PER A=0.0 PER B=0.6 PER C=0.0 PER D=45.0 TP=0.0 RAINFALL=-1

TIME TO PEAK (HRS) = 3.387

K = 0.2232968 TP = 0.131893HR K/TP RATIO = 0.70663 SHAPE CONSTANT, N = 5.214875
UNIT PEAK = 0.0135 CPS UNIT VOLUME = 1.000 B = 429.36 PEO = 1.0000
AREA = 0.705668 SQ MI IA = 10000 INCHES INF = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033333

K = 0.356688HR TP = 0.131893HR K/TP RATIO = 1.119224 SHAPE CONSTANT, N = 3.106618
UNIT PEAK = 0.952.01 CPS UNIT VOLUME = 1.000 B = 294.47 PEO = 1.0000
AREA = 0.813532 SQ MI IA = 42500 INCHES INF = 1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.01400 AT PEAK FLOW.

PRINT HYD ID=3 CODE=1

HYDROGRAPH FROM AREA DEVI.C

RUNOFF VOLUME = 59766 INCHES = 58.1979 AC. - FEET
PEAK DISCHARGE RATE = 783.73 CPS AT 1.700 HOURS BASIN AREA = 1.5641 SQ. MI.

COMPUTE LT TP
LCONF=1 K=3 ISLOPE=-1
LENGTH=480 FT SLOPE=0.008 K=1
LENGTH=600 FT SLOPE=0.008 K=2
LENGTH=700 FT SLOPE=0.008 K=3
KN=0.021 CENTRED DISTANCE=1500 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS
SHEET FLOW PORTION = 400.0 .008800 1.0000
SMALL FLOW PORTION = 1000.0 .008800 2.0000
CHANNEL FLOW PORTION = 4700.0 .008800 3.0000
TOTAL BASIN = 6700.0 .008800 2.4217

LAG EQUATION FACTORS: KN = 0.0031 TOTAL BASIN LENGTH (FT) = 6200.0
TOTAL BASIN SLOPE (FT/FT) = 0.001000 CENTRE LENGTH (FT) = 9500.0

TIME OF CONCENTRATION (HRS) = 0.537 TIME TO PEAK (HRS) = 3.491 LAG TIME (HRS) = 0.3928

COMPUTE NH HYD ID=4 HYD-DEV.D AREA=0.5313 PER A=0.0 PER B=0.6 PER C=0.0 PER D=45.0 TP=0.0 RAINFALL=-1

TIME TO PEAK (HRS) = 3.491

K = 0.244631HR TP = 0.394116HR K/TP RATIO = 0.760563 SHAPE CONSTANT, N = 5.214875
UNIT PEAK = 444.34 CPS UNIT VOLUME = 1.000 B = 429.36 PEO = 1.0000
AREA = 0.36284 SQ MI IA = 10000 INCHES INF = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033333

K = 0.396798HR TP = 0.249116HR K/TP RATIO = 1.110224 SHAPE CONSTANT, N = 3.110224
UNIT PEAK = 174.50 CPS UNIT VOLUME = 0.999 B = 294.47 PEO = 1.0000
AREA = 0.170016 SQ MI IA = 42500 INCHES INF = 1.04000 INCHES PER HOUR

Page 3
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333
BULKING FACTOR APPLIED TO HYDROGRAPHS: FACTOR = 1.01000 AT PEAK FLOW.

**RUNOFF FROM AREA DEV. E**

**SCS UPLAND METHOD FACTORS**

| SHEET FLOW PORTION | 400.0 | .002500 | 1.00000 |
| SHALLOW FLOW PORTION | 1600.0 | .002500 | 1.00000 |
| TOTAL BASIN | 1150.0 | .002500 | 1.00000 |

**LAG EQUATION FACTORS:**

| K | .0255 | TOTAL BASIN LENGTH (FT) | 1150.0 |
| TOTAL BASIN SLOPE (FT/FT) | .002500 | CENTRED DISTANCE | 5400.0 |

**TIME OF CONCENTRATION (HRS):** 5.310  TIME TO PEAK (HRS): 3.673  LAG TIME (HRS): 4.132

**HYDROGRAPHS FROM AREA DEV. E**

**SCS UPLAND METHOD FACTORS**

| SHEET FLOW PORTION | 400.0 | .002500 | 1.00000 |
| SHALLOW FLOW PORTION | 1600.0 | .002500 | 1.00000 |
| TOTAL BASIN | 1150.0 | .002500 | 1.00000 |

**LAG EQUATION FACTORS:**

| K | .0255 | TOTAL BASIN LENGTH (FT) | 1150.0 |
| TOTAL BASIN SLOPE (FT/FT) | .002500 | CENTRED DISTANCE | 5400.0 |

**TIME OF CONCENTRATION (HRS):** 5.310  TIME TO PEAK (HRS): 3.673  LAG TIME (HRS): 4.132

**RUNOFF VOLUME:** 1211.42 CFS AT 1.767 HOURS  PEAK DISCHARGE RATE: 2111.42 CFS AT 1.767 HOURS  BASIN AREA: 2.4328 SQ. MI.
UNIT PEAK = 906.15 CFS  UNIT VOLUME = 1.000
AREA = 1.0345 SQ MI  IA = .42500 INCHES  INF = .16400 INCHES PER HOUR
RINDOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = .03333

RUNOFF FACTOR APPLIED TO HYDROGRAPH FACTOR = 1.01000 AT PEAK FLOW.

PRINT HYD  ID=6  CODE=1

OUTFLOW HYDROGRAPH REACH .09

RUNOFF VOLUME = .57213 INCHES = 45.2494 ACRE-FOOT
PEAK DISCHARGE RATE = 662.58 CFS AT 1.735 HOURS  BASIN AREA = 1.6141 SQ. MI.

EDITORIAL END FOR HYDROGRAPH GENERATION:

BUGS fixed.

COMPUTE LT TP  LC=0  NR=0  ISLOPE=1
LENGTH=2330 FT  SLOPE=0.021  K=3
KN=0.021  CENTROID DISTANCE=6300 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS:  KN= .0210  TOTAL BASIN LENGTH (FT)= 11300.0
TOTAL BASIN SLOPE (FT/FT)= .021000  CENTROID LENGTH (FT)= 6300.0

TIME OF CONCENTRATION (HRS)= .4813  TIME TO PEAK (HRS)= .3209  LAG TIME (HRS)= .3610

COMPUTE NH HYD  ID=7  HYD=DEV.G  AREA=1.1719 PER A=0.0 PER B=21.0
PER C=21.0 PER D=58.0 TP=0.0  RAINFALL=-1

TIME TO PEAK (HRS)= .3209

K = .724858HR  TP = .32088HR  K/TP RATIO = .720868  SHAPE CONSTANT, N = 5.214875
UNIT PEAK = 2381.1 CFS  UNIT VOLUME = 1.000  IA = .42500 INCHES  INF = .16400 INCHES PER HOUR
RINDOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = .03333

K = .152514HR  TP = .32089HR  K/TP RATIO = 1.13224  SHAPE CONSTANT, N = 3.160678
UNIT PEAK = 1130.8 CFS  UNIT VOLUME = 1.000  IA = .42500 INCHES  INF = .16400 INCHES PER HOUR
RINDOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = .03333

RUNOFF FACTOR APPLIED TO HYDROGRAPH FACTOR = 1.01000 AT PEAK FLOW.

PRINT HYD  ID=7  CODE=1

HYDROGRAPH FROM AREA DEV.G

RUNOFF VOLUME = .80216 INCHES = 131.4213 ACRE-FOOT
PEAK DISCHARGE RATE = 1750.35 CFS AT 1.735 HOURS  BASIN AREA = 3.0719 SQ. MI.

EDITORIAL END FOR HYDROGRAPH GENERATION:

BUGS fixed.

COMPUTE LT TP  LC=0  NR=0  ISLOPE=1
LENGTH=13400 FT  SLOPE=0.021  K=3
KN=0.021  CENTROID DISTANCE=5400 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS:  KN= .0210  TOTAL BASIN LENGTH (FT)= 13400.0
TOTAL BASIN SLOPE (FT/FT)= .021000  CENTROID LENGTH (FT)= 5400.0

TIME OF CONCENTRATION (HRS)= .4823  TIME TO PEAK (HRS)= .3082  LAG TIME (HRS)= .3467

COMPUTE NH HYD  ID=8  HYD=DEV.H  AREA=2.2125 PER A=0.0 PER B=28.0
PER C=28.0 PER D=44.0 TP=0.0  RAINFALL=-1

TIME TO PEAK (HRS)= .3082

K = .211544HR  TP = .308199HR  K/TP RATIO = .709663  SHAPE CONSTANT, N = 5.214875
UNIT PEAK = 3356.3 CFS  UNIT VOLUME = 1.000  IA = .42500 INCHES  INF = .16400 INCHES PER HOUR
RINDOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = .03333

K = .268944HR  TP = .308199HR  K/TP RATIO = 1.119224  SHAPE CONSTANT, N = 3.160678
UNIT PEAK = 3356.3 CFS  UNIT VOLUME = 1.000  IA = .42500 INCHES  INF = .16400 INCHES PER HOUR
RINDOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT = .03333

RUNOFF FACTOR APPLIED TO HYDROGRAPH FACTOR = 1.01000 AT PEAK FLOW.

PRINT HYD  ID=8  CODE=1

HYDROGRAPH FROM AREA DEV.H

RUNOFF VOLUME = .65595 INCHES = 77.4018 ACRE-FOOT
PEAK DISCHARGE RATE = 1089.94 CFS AT 1.700 HOURS  BASIN AREA = 2.2125 SQ. MI.
**DEVS.24-OUT**

**RANST DEV.1**

**COMPUTE LT TP**
- **LOC=2**
- **NE=3**
- **ISOPE=1**
- **LENGTH=409 FT**
- **SLOPE=0.03**
- **K=1**
- **LENGTH=1600 FT**
- **SLOPE=0.03**
- **K=2**
- **LENGTH=6500 FT**
- **SLOPE=0.03**
- **K=3**
- **RNM=0.023**
- **CENTRO DISTANCE=3400 FT**

**TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

<table>
<thead>
<tr>
<th>Sheet Flow Portion</th>
<th>Length (Ft)</th>
<th>Slope (Ft/Ft)</th>
<th>Composite K</th>
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<td>0.00000</td>
<td>2.00000</td>
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<tr>
<td>8500.0</td>
<td>0.00000</td>
<td>3.00000</td>
<td></td>
</tr>
</tbody>
</table>

**Total Basin**
- **8500.0**
- **0.30000**
- **3.2548**

**Lag Equation Factors:**

- **K=0.020**
- **Total Basin Length (Ft)=8500.0**
- **Total Basin Slope (Ft/Ft)=0.30000**
- **Centroid Length (Ft)=3400.0**

**Time of Concentration (Hrs)=0.3367**
**Time to Peak (Hrs)=0.2245**
**Lag Time (Hrs)=0.2526**

**Compute NH HYD**
- **ID=9**
- **HYD=DEVS.1**
- **AREA=1.0937**
- **PER A=0.0**
- **PER B=0.0**
- **PER C=6.80 PER D=2.10**
- **TP=0.0**
- **RAINFALL=1**

**TIME TO PEAK (HRS)=0.2245**
- **K = 0.1572944**
- **TP = 0.2244918**
- **K/T P = 0.700683**
- **SHAPE CONSTANT, N = 5.214876**
- **UNIT PEAK = 432.98**
- **UNIT VOLUME = 1.000**
- **AREA = 2358313 SQ FT**
- **IA = 1.00000 INCHES**
- **INF = 0.00000 INCHES PER HOUR**
- **RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD = DT = 0.03333**

**TIME TO PEAK (HRS)=0.1478**
- **K = 0.2361838**
- **TP = 0.2244918**
- **K/T P = 1.051874**
- **SHAPE CONSTANT, N = 3.356681**
- **UNIT PEAK = 1.000**
- **UNIT VOLUME = 1.000**
- **AREA = 3726993 SQ FT**
- **IA = 36735 INCHES**
- **INF = 0.87309 INCHES PER HOUR**
- **RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD = DT = 0.03333**

**RUNOFF VOLUME = 0.92399 INCHES**
- **72.0737 ACRES-PEAK**
- **PEAK DISCHARGE RATE = 553.37 CFS AT 1.660 HOURS**
- **BASIN AREA = 1.0297 SQ MI.**

**DEVS.24-OUT**

**RANST DEV.1**

**COMPUTE LT TP**
- **LOC=1**
- **NE=3**
- **ISOPE=1**
- **LENGTH=400 FT**
- **SLOPE=0.076**
- **K=1**
- **LENGTH=3000 FT**
- **SLOPE=0.076**
- **K=2**
- **LENGTH=6500 FT**
- **SLOPE=0.076**
- **K=3**

**TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

<table>
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<tr>
<th>Sheet Flow Portion</th>
<th>Length (Ft)</th>
<th>Slope (Ft/Ft)</th>
<th>Composite K</th>
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<td>2.60000</td>
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<tr>
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<td>0.076000</td>
<td>3.00000</td>
<td></td>
</tr>
</tbody>
</table>

**Total Basin**
- **2800.0**
- **0.076000**
- **1.90911**

**Time of Concentration (Hrs)=0.1478**
**Time to Peak (Hrs)=0.0885**
**Lag Time (Hrs)=0.1108**

**Time to Peak Computed to Be Less Than 0.13333 Hour Minimum Value.**
**Revised Values:**
- **Time of Concentration (Hrs)=0.2000**
- **Time to Peak (Hrs)=0.1333**
- **Lag Time (Hrs)=0.1500**

**Compute NH HYD**
- **ID=10**
- **HYD=DEVS.1**
- **AREA=0.6218**
- **PER A=0.0**
- **PER B=1.80**
- **PER C=0.29 PER D=5.0**
- **TP=0.0**
- **RAINFALL=1**

**TIME TO PEAK (HRS)=0.1333**
- **K = 0.63422**
- **TP = 0.13333**
- **K/T P = 0.700683**
- **SHAPE CONSTANT, N = 5.214876**
- **UNIT PEAK = 425.80 CFS**
- **UNIT VOLUME = 1.000**
- **AREA = 328607 SQ FT**
- **IA = 10000 INCHES**
- **INF = 0.00000 INCHES PER HOUR**
- **RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD = DT = 0.03333**

**TIME TO PEAK (HRS)=0.1333**
- **K = 0.146087**
- **TP = 0.13333**
- **K/T P = 1.098652**
- **SHAPE CONSTANT, N = 3.217296**
- **UNIT PEAK = 55.69 CFS**
- **UNIT VOLUME = 1.000**
- **AREA = 29226 SQ FT**
- **IA = 705.75 INCHES**
- **INF = 0.99083 INCHES PER HOUR**
- **RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD = DT = 0.03333**

**RUNOFF VOLUME = 0.76153 INCHES**
- **25.2531 ACRE-FEET**
- **PEAK DISCHARGE RATE = 597.40 CFS AT 1.500 HOURS**
- **BASIN AREA = 0.6239 SQ MI.**
COMPUTE LT TP
LENGTH-15700 FT SLOPE=0.017 K=3
K=0.021 CENTROID DISTANCE=4800 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS: 
K=% 0.0230 TOTAL BASIN LENGTH (FT)= 15700
TOTAL BASIN SLOPE (FT/FT)= 0.017000 CENTROID LENGTH (FT)=
4800

TIME OF CONCENTRATION (HRS)= .4012 TIME TO PEAK (HRS)= .3275 LAG TIME (HRS)= .3694

RUNOFF HYD ID=-1 HYD-DEV.L AREA=0.4172 PER A=.0 PER B=.0 PER C=.0 PER D=.0 PER E=.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS)= .3275
K = .79643494 TP = 3274593 K/TP RATIO = .700053 SHAPE CONSTANT, N = 5.214875
UNIT PEAK = 2792.2 CFS UNIT VOLUME = 1.000 D = .4938 P60 = 1.0000
AREA = 2.120856 SQ MI IA = 1.0200 INCHES INF = .000000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFECTION NUMBER METHOD - ET = .033333

K = .39649394 TP = 3274593 K/TP RATIO = 1.119224 SHAPE CONSTANT, N = 3.10063
UNIT PEAK = 2792.2 CFS UNIT VOLUME = 1.000 D = .29457 P60 = 1.0000
AREA = 2.120856 SQ MI IA = .42500 INCHES INF = 1.00000000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFECTION NUMBER METHOD - ET = .033333

RUNOFF FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.03900 AT PEAK FLOW.

HYDROGRAPH FROM AREA DEV.L

RUNOFF VOLUME = .69758 INCHES PEAK DISCHARGE RATE = 2201.87 CFS AT 1.733 HOURS BASIN AREA = 4.4172 SQ.MI.

COMPUTE LT TP
LENGTH=15700 FT SLOPE=0.017 K=3
K=0.021 CENTROID DISTANCE=4800 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS
LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
SHEET FLOW PORTION 4000.0 .000000 2.00000
SHALLOW FLOW PORTION 1600.0 .000000 2.00000
CHANNEL FLOW PORTION 4000.0 .000000 3.00000
TOTAL BASIN 6000.0 .000000 2.00000

LAG EQUATION FACTORS:
K=% 0.0210 TOTAL BASIN LENGTH (FT)=
6000.0 TOTAL BASIN SLOPE (FT/FT)=
0.0000 CENTROID LENGTH (FT)=
4800.0

TIME OF CONCENTRATION (HRS)= .2512 TIME TO PEAK (HRS)= .1675 LAG TIME (HRS)= .1884

RUNOFF HYD ID=-12 HYD-DEV.L AREA=0.6172 PER A=.0 PER B=.0 PER C=.0 PER D=.0 PER E=.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS)= .1675
K = .11738988 TP = 15746012 K/TP RATIO = .706663 SHAPE CONSTANT, N = 5.214875
UNIT PEAK = 273.37 CFS UNIT VOLUME = 1.000 D = .429.38 P60 = 1.0000
AREA = 0.02180 SQ MI IA = .40000 INCHES INF = .00000000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFECTION NUMBER METHOD - ET = .033333

K = .17403988 TP = 15746012 K/TP RATIO = 1.035939 SHAPE CONSTANT, N = 3.293721
UNIT PEAK = 273.37 CFS UNIT VOLUME = 1.000 D = 332.64 P60 = 1.0000
AREA = 0.02180 SQ MI IA = .37068 INCHES INF = .000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
**COMPUTE LT TP**

\[ \text{LENGTH} = 400 \text{ FT} \quad \text{SLOPE} = 0.045 \quad \text{K} = 1 \]

\[ \text{LENGTH} = 550 \text{ FT} \quad \text{SLOPE} = 0.044 \quad \text{K} = 2 \]

\[ \text{LENGTH} = 350 \text{ FT} \quad \text{SLOPE} = 0.044 \quad \text{K} = 3 \]

\[ \text{K} = 0.021 \quad \text{CENTRIPED LENGTH} = 4350 \text{ FT} \]

TC AND TD COMPUTED BY UPSTREAM/LAG TIME PROCEDURE

**SCS UPLAND METHOD FACTORS**

- **SHEET FLOW PORTION** = 400.0
- **SHALLOW FLOW PORTION** = 550.0
- **TOTAL BASIN** = 7500.0

**LAG EQUATION FACTORS:**

\[ K = 0.021 \]

\[ \text{TOTAL BASIN LENGTH} = 7500.0 \text{ FT} \]

\[ \text{TOTAL BASIN SLOPE} = 0.045 \text{ FT/FT} \]

**TIME OF CONCENTRATION (HRS):** 0.7888

**TIME TO PEAK (HRS):** 1.925

**LAG TIME (HRS):** 2.156

**COMPUTE NH HYD**

\[ \text{ID} = 13 \quad \text{HYD-DEV.N AREA} = 0.5484 \text{ PER A=0.0} \quad \text{B=12.0} \]

\[ \text{PER CH=0.0} \quad \text{PER CH=24.0} \quad \text{TP=40.0} \quad \text{RAINFALL=1} \]

**TIME TO PEAK (HRS):** 1.925

\[ K = 0.1382 \text{ TN} \quad \text{TP} = 0.132 \text{ TN} \quad \text{SHAPE CONSTANT, N} = 5,214875 \]

\[ \text{UNIT PEAK} = 507.6 \text{ CFS} \quad \text{UNIT VOLUME} = 1.000 \text{ B} = 429.38 \text{ PDR} = 1.0685 \]

\[ \text{AREA} = 0.2252 \text{ SQ MI} \quad \text{IA} = 10000 \text{ INCHES} \quad \text{INF} = 0.04505 \text{ PER HOUR} \]

**RUNOFF COMPUTED BY INITIAL ABRASION/INFILTRATION NUMBER METHOD:**

**BULKING FACTOR APPLIED TO HYDROGRAPH:**

\[ \text{FACTOR} = 1.0100 \text{ AT PEAK FLOW.} \]

PRINT HYD

\[ \text{ID} = 13 \quad \text{CODE=1} \]

**HYDROGRAPH FROM AREA DEV.N**

\[ \text{RUNOFF VOLUME} = 0.49630 \text{ INCHES} \quad 25.0082 \text{ ACRE-FEET} \]

\[ \text{PEAK DISCHARGE RATE} = 548.25 \text{ CFS} \quad \text{AT 1.567 HOURS} \quad \text{BASIN AREA} = 0.9464 \text{ SQ. MI.} \]

**Hydrograph from Area Dev.N

**COMPUTE LT TP**

\[ \text{LENGTH} = 400 \text{ FT} \quad \text{SLOPE} = 0.041 \quad \text{K} = 1 \]

\[ \text{LENGTH} = 550 \text{ FT} \quad \text{SLOPE} = 0.044 \quad \text{K} = 2 \]

\[ \text{LENGTH} = 350 \text{ FT} \quad \text{SLOPE} = 0.044 \quad \text{K} = 3 \]

\[ \text{K} = 0.021 \quad \text{CENTRIPED DISTANCE} = 3750 \text{ FT} \]

TC AND TD COMPUTED BY UPSTREAM/LAG TIME PROCEDURE

**SCS UPLAND METHOD FACTORS**

- **SHEET FLOW PORTION** = 400.0
- **SHALLOW FLOW PORTION** = 550.0
- **TOTAL BASIN** = 800.0

**LAG EQUATION FACTORS:**

\[ K = 0.021 \]

\[ \text{TOTAL BASIN LENGTH} = 8000.0 \text{ FT} \]

\[ \text{TOTAL BASIN SLOPE} = 0.041 \text{ FT/FT} \]

**TIME OF CONCENTRATION (HRS):** 0.7188

**TIME TO PEAK (HRS):** 2.132

**LAG TIME (HRS):** 2.590

**COMPUTE NH HYD**

\[ \text{ID} = 14 \quad \text{HYD-DEV.N AREA} = 0.9313 \text{ PER A=0.0} \quad \text{B=14.0} \]

\[ \text{PER CH=0.0} \quad \text{PER CH=24.0} \quad \text{TP=40.0} \quad \text{RAINFALL=1} \]

**TIME TO PEAK (HRS):** 0.2132

\[ K = 0.1343 \text{ TN} \quad \text{TP} = 0.132 \text{ TN} \quad \text{SHAPE CONSTANT, N} = 5.214875 \]

\[ \text{UNIT PEAK} = 450.0 \text{ CFS} \quad \text{UNIT VOLUME} = 1.000 \text{ B} = 429.38 \text{ PDR} = 1.0685 \]

\[ \text{AREA} = 0.2252 \text{ SQ MI} \quad \text{IA} = 10000 \text{ INCHES} \quad \text{INF} = 0.04505 \text{ PER HOUR} \]

**RUNOFF COMPUTED BY INITIAL ABRASION/INFILTRATION NUMBER METHOD:**

**BULKING FACTOR APPLIED TO HYDROGRAPH:**

\[ \text{FACTOR} = 1.0100 \text{ AT PEAK FLOW.} \]

PRINT HYD

\[ \text{ID} = 14 \quad \text{CODE=1} \]

**HYDROGRAPH FROM AREA DEV.N**

\[ \text{RUNOFF VOLUME} = 0.49194 \text{ INCHES} \quad 24.434 \text{ ACRE-FEET} \]

\[ \text{PEAK DISCHARGE RATE} = 495.41 \text{ CFS} \quad \text{AT 1.600 HOURS} \quad \text{BASIN AREA} = 0.9313 \text{ SQ. MI.} \]
COMPUTE ET TP
  LCODE=1  N=3  ISLPE=2
  LEND=400 FT  SLOPE=0.011  K=1
  LEND=560 FT  SLOPE=0.011  K=2
  LEND=560 FT  SLOPE=0.011  K=3

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

<table>
<thead>
<tr>
<th>Component</th>
<th>Length (ft)</th>
<th>Slope (ft/ft)</th>
<th>Composite K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheet Flow Portion</td>
<td>400.0</td>
<td>.01000</td>
<td>1.0000</td>
</tr>
<tr>
<td>Shallow Flow Portion</td>
<td>500.0</td>
<td>.01100</td>
<td>2.0000</td>
</tr>
<tr>
<td>Channel Flow Portion</td>
<td>500.0</td>
<td>.01100</td>
<td>3.0000</td>
</tr>
<tr>
<td>Total Basin</td>
<td>3000.0</td>
<td>.01300</td>
<td>2.0769</td>
</tr>
</tbody>
</table>

TIME OF CONCENTRATION (HRS)= .4391  TIME TO PEAK (HRS)= .3060  LAG TIME (HRS)= .3443

COMPUTE NH YD  ID=15  HYD=EX.OFF.C.  AREA=0.9100  PER A=30.0  PER B=20.0
  PPR C=20  V PR𧿹=30.0  VV=0.0  XAY=111.11

TIME TO PEAK (HRS)= .3060

K = .2144248  TP = .306050H  K/TP RATIO = .700663  SHAPE CONSTANT, N = 5.214475
UNIT PEAK = 383.39  CFS  UNIT VOLUME = 1.000  B = 459.38  PPD = 1.0000
AREA = .77370 SQ MI  TA = .10000 INCHES  IMP = .64000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .3602499  TP = .306050H  K/TP RATIO = 1.196699  SHAPE CONSTANT, N = 2.9568703
UNIT PEAK = 581.42  CFS  UNIT VOLUME = 1.000  B = 279.96  PPD = 1.0050
AREA = .37670 SQ MI  TA = .52743 INCHES  IMP = 1.31000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAPH, FACTOR = 1.01000 AT PEAK FLOW.

PRINT YD  ID=15  CORD=1

HYDROGRAPH FROM AREA EX.OFF.C

RUNOFF VOLUME = .44135 INCHES  = 21.4411 ACRE-FT
PEAK DISCHARGE RATE = 299.59 CFS AT 1.700 HOURS  BASIN AREA = .9100 SQ. MI.

*-----------------------------------------------------------------------------------------------*

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*-----------------------------------------------------------------------------------------------*

FINISH

NORMAL PROGRAM FINISH  END TIME (HR:MIN:SEC) = 08:20:33
**Project Name:** SANTOLINA  
**Date:** NOVEMBER 8, 2012  
**Input File Name:** 100DEV_E.HYM  
**Output File Name:** 100RNV.GOUT  
**Project Number:** 20120256  
**COMPACT:** 100 YEAR-5 INCH STORM

### Rainfall
- **Type:** 1  
- **Rain Quarter:** 0.0  
- **Rain Day:** 1  
- **Rain Days:** 2.66 IN  
- **Rain Depth:** 0.033333

---

### Basin Dev A
- **Computation:** Basin Dev A  
- **Bulk Factor:** 1.025  
- **Computation:** Length 400 FT  
  - **Slope:** 0.05  
- **Area:** 0.5438  
- **Rainfall:** 1

### Basin Dev B
- **Computation:** Basin Dev B  
- **Bulk Factor:** 1  
- **Computation:** Length 400 FT  
  - **Slope:** 0.5  
- **Area:** 0.1019  
- **Rainfall:** 1

### Basin Dev C
- **Computation:** Basin Dev C  
- **Bulk Factor:** 1  
- **Computation:** Length 400 FT  
  - **Slope:** 0.01  
- **Area:** 0.1564  
- **Rainfall:** 1

### Basin Dev D
- **Computation:** Basin Dev D  
- **Bulk Factor:** 1  
- **Computation:** Length 400 FT  
  - **Slope:** 0.015  
- **Area:** 0.0333  
- **Rainfall:** 1

### Basin Dev E
- **Computation:** Basin Dev E  
- **Bulk Factor:** 1  
- **Computation:** Length 400 FT  
  - **Slope:** 0.015  
- **Area:** 0.0333  
- **Rainfall:** 1

### Basin Dev F
- **Computation:** Basin Dev F  
- **Bulk Factor:** 1  
- **Computation:** Length 400 FT  
  - **Slope:** 0.015  
- **Area:** 0.0333  
- **Rainfall:** 1
**Basin Dev. G**

**Basin Dev. H**

**Basin Dev. I**

**Basin Dev. J**

**Basin Dev. K**

**Basin Dev. L**

**Basin Dev. M**

**Basin Dev. N**
COMPUTE LT TP
LCO=1. BM=3. ISLOPE=-1
LENGTH=400 FT SLOPE=0.011 K=1
LENGTH=1600 FT SLOPE=0.011 K=2
LENGTH=1600 FT SLOPE=0.011 K=3

COMPUTE HR HVD
ID=15 RTD=EX,OFF.C ARED=0.9109 PER A=30.0 PER B=20.0
PER C=50.0 PER D=30.0 TP=0.0 RAINFALL=-1

PRINT HVD
ID=15 CODE=1

FINISH
RUNOFF VOLUME = 1.06488 INCHES = 31.4614 AC-FEET
PEAK DISCHARGE RATE = 3004.67 CFS AT 1.509 HOURS
BASIN AREA = 5438 SQ. MI.

COMPUTE LT TP
L CODE=1 N=3 SLOPE=3
LENGTH=400 FT SLOPE=0.005 K=1
LENGTH=1600 FT SLOPE=0.005 K=2
LENGTH=6200 FT SLOPE=0.005 K=3
KM=0.031 CENTROID DISTANCE=2800 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE
SCS UPLAND METHOD FACTORS
SHEET FLOW PORTION
LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
400.0
200.0
8200.0
0.005000
2.5102

LAG EQUATION FACTORS:
KM= 0.0210 TOTAL BASIN LENGTH (FT)= 8200.0 TOTAL BASIN SLOPE (FT/FT)= 0.005000 CENTROID LENGTH (FT)= 2800.0

TIME OF CONCENTRATION (HRS)= .5659 TIME TO PEAK (HRS)= .3773 LAG TIME (HRS)= .4244

COMPUTE MH HYD
ID=2 HYD-DEV.B AREA=1.2781 PER A=0.0 PER B=0.0 PER C=0.0 PER D=0.0 RAINFALL=1

TIME TO PEAK (HRS)= .3773

K = .21764616
TP = .37727008 K/TP RATIO = .576127 SHAPE CONSTANT, N = 6.62116
UNIT PEAK = 377.7 CFS UNIT VOLUME = 1.000 N = 502.58 P60 = 1.8700
AREA = 1.716442 SQ MI IA = 10000 INCHES INF = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD – DF = .03333

K = .3163638
TP = .37727008 K/TP RATIO = .83861 SHAPE CONSTANT, N = 4.250046
UNIT PEAK = 1071.0 CFS UNIT VOLUME = 1.000 N = 371.51 P60 = 1.8700
AREA = 1.63678 SQ MI IA = 42500 INCHES INF = 1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD – DF = .03333

BUDDING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.

PRINT HYD
ID=3 CODE=1

HYDROGRAPH FROM AREA DEV.B

RUNOFF VOLUME = 1.56676 INCHES = 240.4941 AC-FEET
PEAK DISCHARGE RATE = 3695.00 CFS AT 1.767 HOURS
BASIN AREA = 2.3781 SQ. MI.

COMPUTE LT TP
L CODE=1 N=3 SLOPE=1
LENGTH=400 FT SLOPE=1.01 K=1
LENGTH=1600 FT SLOPE=1.01 K=2
LENGTH=3100 FT SLOPE=1.01 K=3
KM=0.021 CENTROID DISTANCE=1400 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE
SCS UPLAND METHOD FACTORS
SHEET FLOW PORTION
LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
400.0
1.0000
0.010000
3.0000
5100.0
0.010000
2.8736

LAG EQUATION FACTORS:
KM= 0.0210 TOTAL BASIN LENGTH (FT)= 5100.0 TOTAL BASIN SLOPE (FT/FT)= 0.010000 CENTROID LENGTH (FT)= 1400.0

TIME OF CONCENTRATION (HRS)= .4780 TIME TO PEAK (HRS)= .3187 LAG TIME (HRS)= .3585

COMPUTE MH HYD
ID=3 HYD-DEV.C AREA=1.5661 PER A=0.0 PER B=26.0 PER C=26.0 PER D=48.0 RAINFALL=1

TIME TO PEAK (HRS)= .3187

K = .18382766
TP = .18382766 K/TP RATIO = .57603 SHAPE CONSTANT, N = 6.622116
UNIT PEAK = 1184.0 CFS UNIT VOLUME = 1.000 N = 507.58 P60 = 1.8700
AREA = 1.79568 SQ FT IA = 10000 INCHES INF = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD – DF = .03333

K = .2072586
TP = .18382766 K/TP RATIO = .58382 SHAPE CONSTANT, N = 4.250046
UNIT PEAK = 384.0 CFS UNIT VOLUME = 1.000 N = 371.51 P60 = 1.8700
AREA = 1.83332 SQ FT IA = 42500 INCHES INF = 1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD – DF = .03333

BUDDING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.
RUNOFF VOLUME = 1.40377 INCHES = 116,912.8 ACRE-FEET
PEAK DISCHARGE RATE = 2041.04 CFS AT 3.700 HOURS BASIN AREA = 1.5641 SQ. MI.

-------------------------------------------------------------------------------------------------------------------
**BASIN DEV.0 **-------------------------------------------------------------------------------------------------------------------

**COMPUTE LC TP**

<table>
<thead>
<tr>
<th>CODE</th>
<th>KA</th>
<th>NS</th>
<th>ISLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>003</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

**LENGTH-400 FT** SLOPE-9.000 K=1
LENGTH-1000 FT SLOPE-9.000 K=2
LENGTH-4700 FT SLOPE-9.000 K=3
RN=0.021 CENTROID DISTANCE-3500 FT

**TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

<table>
<thead>
<tr>
<th>SCS METHOD</th>
<th>LENGTH (FT)</th>
<th>SLOPE (FT/FT)</th>
<th>COMPOSITE K</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHEET FLOW PORTION</td>
<td>400.0</td>
<td>.0008000</td>
<td>3.00000</td>
</tr>
<tr>
<td>SHALLOW FLOW PORTION</td>
<td>1600.0</td>
<td>.0008000</td>
<td>2.00000</td>
</tr>
<tr>
<td>CHANNEL FLOW PORTION</td>
<td>4700.0</td>
<td>.0008000</td>
<td>3.00000</td>
</tr>
<tr>
<td>TOTAL BASIN</td>
<td>6700.0</td>
<td>.0008000</td>
<td>2.42170</td>
</tr>
</tbody>
</table>

**LAG EQUATION FACTORS:**

K=0.0210 TOTAL BASIN LENGTH (FT)=6000.0
TOTAL BASIN SLOPE (FT/FT)=.0008000 CENTROID LENGTH (FT)=3500.0

**TIME OF CONCENTRATION (HRS)=.5237 TIME TO PEAK (HRS)=.3491 LAG TIME (HRS)=.3928**

**COMPUTE NH HYD**

<table>
<thead>
<tr>
<th>ID=4 HYD-DEV.0</th>
<th>AREA=4.5133 PER A=0.0 PER B=16.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>PER C=16.0 PER D=68.0 TP=0.0 RAINFALL=1</td>
<td></td>
</tr>
</tbody>
</table>

**TIME TO PEAK (HRS)=.3491**

K=.201376R DP=.349116R K/Ratio=7.87617 SHAPE CONSTANT, N=6,621216
UNIT PEAK=529.09 CFS UNIT VOLUME=.9999 IN=502.59 PD=1.87000
AREA=.361244 SQ MI IA=.010000 INCHES INF=.000000 INCHES PER HOUR

**RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT=.003333**

K=.297272R DP=.349116R K/Ratio=8.38611 SHAPE CONSTANT, N=4,250046
UNIT PEAK=380.92 CFS UNIT VOLUME=.9999 IA=371.51 PD=1.87000
AREA=.370396 SQ MI IA=.010000 INCHES INF=.000000 INCHES PER HOUR

**RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT=.003333**

**BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.**

**PRINT HYD**

<table>
<thead>
<tr>
<th>ID=4 CODE=1</th>
</tr>
</thead>
</table>

**HYDROGRAPH FROM AREA DEV.0**

**RUNOFF VOLUME = 1.63747 INCHES = 46.3991 ACRE-FEET**
PEAK DISCHARGE RATE = 760.04 CFS AT 1.733 HOURS BASIN AREA = .5333 SQ. MI.

-------------------------------------------------------------------------------------------------------------------
**BASIN DEV.0 **-------------------------------------------------------------------------------------------------------------------

**COMPUTE LC TP**

<table>
<thead>
<tr>
<th>CODE</th>
<th>KA</th>
<th>NS</th>
<th>ISLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>003</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

**LENGTH-400 FT** SLOPE-9.000 K=1
LENGTH-1000 FT SLOPE-9.000 K=2
LENGTH-9000 FT SLOPE-9.000 K=3
RN=0.021 CENTROID DISTANCE-5400 FT

**TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

<table>
<thead>
<tr>
<th>SCS METHOD</th>
<th>LENGTH (FT)</th>
<th>SLOPE (FT/FT)</th>
<th>COMPOSITE K</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHEET FLOW PORTION</td>
<td>400.0</td>
<td>.0000000</td>
<td>3.00000</td>
</tr>
<tr>
<td>SHALLOW FLOW PORTION</td>
<td>1600.0</td>
<td>.0000000</td>
<td>2.00000</td>
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<tr>
<td>CHANNEL FLOW PORTION</td>
<td>9500.0</td>
<td>.0000000</td>
<td>3.00000</td>
</tr>
<tr>
<td>TOTAL BASIN</td>
<td>13500.0</td>
<td>.0000000</td>
<td>2.6336</td>
</tr>
</tbody>
</table>

**LAG EQUATION FACTORS:**

K=0.0210 TOTAL BASIN LENGTH (FT)=11500.0
TOTAL BASIN SLOPE (FT/FT)=.0060000 CENTROID LENGTH (FT)=5400.0

**TIME OF CONCENTRATION (HRS)=.6510 TIME TO PEAK (HRS)=.3673 LAG TIME (HRS)=.4132**

**COMPUTE NH HYD**

<table>
<thead>
<tr>
<th>ID=5 HYD-DEV.E</th>
<th>AREA=2.4132 PER A=0.0 PER B=21.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>PER C=23.0 PER D=54.0 TP=0.0 RAINFALL=1</td>
<td></td>
</tr>
</tbody>
</table>

**TIME TO PEAK (HRS)=.3673**

K=.211029R DP=.367226R K/Ratio=.576817 SHAPE CONSTANT, N=6,621216
UNIT PEAK=1784.4 CFS UNIT VOLUME=1.000 IA=502.59 PD=1.87000
AREA=1.33372 SQ MI IA=.010000 INCHES INF=.000000 INCHES PER HOUR

**RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT=.003333**

K=.308045R DP=.367226R K/Ratio=.83661 SHAPE CONSTANT, N=4,250046
UNIT PEAK=1131.8 CFS UNIT VOLUME=1.000 IA=371.51 PD=1.87000
AREA=1.118908 SQ MI IA=.010000 INCHES INF=.000000 INCHES PER HOUR

**RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - DT=.003333**

**BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.**

**Page 3**
HYDROGRAPH FROM AREA DEV.E

RUNOFF VOLUME = 1.4748 INCHES = 191.0517 ACRE-FEET
PEAK DISCHARGE RATE = 3006.05 CFS AT 3.767 HOURS BASIN AREA = 2.4328 SQ. MI.

---

HYDROGRAPH FROM AREA DEV.G

RUNOFF VOLUME = 1.53162 INCHES = 248.9484 ACRE-FEET
PEAK DISCHARGE RATE =  422.06 CFS AT  1.700 HOURS  BASIN AREA =  3.0719 SQ. MI.

#******************************************************************************
#*********** BASIN DEV.H ***********************************************
#
COMPUTE LT TP  LCODE=1  MD=0  ISLOPE=1  LENGTH=15400 FT  SLOPE=0.02  K=3  
K=0.021  CENTROID DISTANCE=5400 FT  
TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE  
LAG EQUATION FACTORS:  Km = 0.20  TOTAL BASIN LENGTH (FT)=  13400.0  
TOTAL BASIN SLOPE (FT/FT)=  0.02000  CENTROID LENGTH (FT)=  5400.0  
TIME OF CONCENTRATION (HRS)=  .4621  TIME TO PEAK (HRS)=  .3082  
LAG TIME (HRS)=  .3467  
COMPUTE NI HYD  ID=8  HYD-DEV.H  AREA=2.2125  PER A=0.0  PER B=28.0  
PER C=28.0  PER D=44.0  TP=0.0  RAINFALL=1  

TIME TO PEAK (HRS)=  .3082  
K =  .377775Hr  TP =  .388399Hr  K/T RATIO =  .576817  SHAPE CONSTANT, N =  6.612115  
UNIT PEAK =  2587.5  CFS  UNIT VOLUME =  1.000  H =  592.58  PICO =  1.8700  
AREA =  .978100 SQ. MI  IA = 100000 INCHES  INF =  .04008 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .003333  

K =  .258499Hr  TP =  .388399Hr  K/T RATIO =  .832891  SHAPE CONSTANT, N =  4.259049  
UNIT PEAK =  2493.5  CFS  UNIT VOLUME =  1.000  H =  371.51  PICO =  1.8700  
AREA =  .125900 SQ. MI  IA = 45000 INCHES  INF =  1.0400 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .003333  
 
RUNOFF VOLUME =  1.35463 INCHES  =  355.8449 ACRE-FEET  
PEAK DISCHARGE RATE =  2608.14 CFS AT  1.700 HOURS  BASIN AREA =  2.2125 SQ. MI.  

#******************************************************************************
#*********** BASIN DEV.I ***********************************************
#
COMPUTE LT TP  LCODE=3  MD=3  ISLOPE=1  LENGTH=400 FT  SLOPE=0.03  K=1  
LENGTH=1500 FT  SLOPE=0.03  K=2  
LENGTH=8500 FT  SLOPE=0.03  K=3  
K=0.021  CENTROID DISTANCE=3400 FT  
TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE  

SCS UPLAND METRO FACTORS  
LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K  
SHELF FLOW PORTION  400.0  .030000  1.0000  
SHALLOW FLOW PORTION  1600.0  .030000  2.0000  
CHANNEL FLOW PORTION  6500.0  .030000  3.0000  
TOTAL BASIN  8500.0  .030000  2.5248  

LAG EQUATION FACTORS:  Km =  .0320  TOTAL BASIN LENGTH (FT)=  8500.0  
TOTAL BASIN SLOPE (FT/FT)=  .030000  CENTROID LENGTH (FT)=  3400.0  
TIME OF CONCENTRATION (HRS)=  .3367  TIME TO PEAK (HRS)=  .2245  
LAG TIME (HRS)=  .2520  
COMPUTE NI HYD  ID=9  HYD-DEV.I  AREA=1.0297  PER A=0.0  PER B=9.0  
PER C=60.0  PER D=25.0  TP=0.0  RAINFALL=1  

TIME TO PEAK (HRS)=  .2245  
K =  .129408Hr  TP =  .224409Hr  K/T RATIO =  .576817  SHAPE CONSTANT, N =  6.612115  
UNIT PEAK =  320.20  CFS  UNIT VOLUME =  1.000  H =  502.68  PICO =  1.8700  
AREA =  .228441 SQ. MI  IA = 100000 INCHES  INF =  .04008 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .003333  

K =  .127800Hr  TP =  .224409Hr  K/T RATIO =  .796496  SHAPE CONSTANT, N =  4.000334  
UNIT PEAK =  567.7  CFS  UNIT VOLUME =  1.000  H =  87.25  PICO =  1.8700  
AREA =  .791333 SQ. MI  IA = 3950 INCHES  INF =  1.97969 INCHES PER HOUR  
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =  .003333  
 
RUNOFF VOLUME =  1.21235 INCHES  =  66.5786 ACRE-FEET  
PEAK DISCHARGE RATE =  3531.04 CFS AT  1.600 HOURS  BASIN AREA =  1.0297 SQ. MI.  

#******************************************************************************
**BASIN DEV.3**

**COMPUTE LT TP**
L CODE = 1  N = 3  ISLOPE = -1
LENGTH = 400 FT  SLOPE = 0.076  K = 1
LENGTH = 4000 FT  SLOPE = 0.076  K = 2
LENGTH = 800 FT  SLOPE = 0.076  K = 3

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

**SCS UPLAND METHOD FACTORS**
LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K
400.0 0.076000 1.0000
1600.0 0.076000 2.0000
3200.0 0.076000 3.0000

**TOTAL BASIN**
2800.0 0.076000 1.0901

**TIME OF CONCENTRATION (HRS)** = .3478
**TIME TO PEAK (HRS)** = .0985
**LAG TIME (HRS)** = .1108

**TIME TO PEAK COMPUTED TO BE LESS THAN 0.1333 HOURS MINIMUM VALUE.**
**REVISED VALUES: TIME OF CONCENTRATION (HRS)** = .2000
**TIME TO PEAK (HRS)** = .1333
**LAG TIME (HRS)** = .1500

**COMPUTE MH HYD**
ID = 10  NID = 0  AREA = 0.6219 PER A = 0.0 PER B = 18.0
PER C = 29.0 PER D = 53.0  TP = 0.0  RAINFALL = 1

**TIME TO PEAK (HRS)** = .1333
K = .076091HR  TP = .33333HR  K/TP RATIO = .576817  SHAPE CONSTANT, N = 6.612116
UNIT PEAK = 3237.4  CFS  UNIT VOLUME = .9998  B = 502.5  P60 = 1.8700
AREA = .329070 SQ FT  TA = 10000 INCHES  XNF = .04003 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .310909HR  TP = .33333HR  K/TP RATIO = .925744  SHAPE CONSTANT, N = 4.322999
UNIT PEAK = 3237.4  CFS  UNIT VOLUME = 1.000  B = 370.16  P60 = 1.8700
AREA = .282280 SQ FT  TA = 7600 INCHES  XNF = .50065 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

**BULKING FACTOR APPLIED TO HYDROGRAPH**
**FACTOR** = 1.02500 AT PEAK FLOW.

**PRINT HYD**
ID = 10  CODE = 1

**HYDROGRAPH FROM AREA DEV.3**

**RUNOFF VOLUME = 1.47322 INCHES**
**PEAK DISCHARGE RATE** = 3464.70 CFS AT 1.500 HOURS
**BASIN AREA** = 0.6219 SQ. MI.

**BASIN DEV.6**

**COMPUTE LT TP**
L CODE = 1  N = 0  ISLOPE = -1
LENGTH = 1870 FT  SLOPE = 0.017  K = 3
KN = 0.021  CENTROID DISTANCE = 4800 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

**LAG EQUATION FACTORS:**
K = .0210  TOTAL BASIN LENGTH (FT) = 16700.0
TOTAL BASIN SLOPE (FT/FT) = .076060  CENTROID LENGTH (FT) = 4800.0

**TIME OF CONCENTRATION (HRS)** = .4912
**TIME TO PEAK (HRS)** = .3275
**LAG TIME (HRS)** = .3684

**COMPUTE MH HYD**
ID = 11  NID = 0  AREA = 4.4172 PER A = 0.0 PER B = 26.0
PER C = 26.0 PER D = 48.0  TP = 0.0  RAINFALL = 1

**TIME TO PEAK (HRS)** = .3275
K = .18881HR  TP = .327453HR  K/TP RATIO = .576817  SHAPE CONSTANT, N = 6.612116
UNIT PEAK = 3237.4  CFS  UNIT VOLUME = 1.000  B = 502.5  P60 = 1.8700
AREA = 2.125016 SQ FT  TA = 11000 INCHES  XNF = .64000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .273606HR  TP = .327453HR  K/TP RATIO = .838611  SHAPE CONSTANT, N = 4.259046
UNIT PEAK = 2906.0  CFS  UNIT VOLUME = 1.000  B = 371.51  P60 = 1.8700
AREA = 2.256094 SQ FT  TA = 42000 INCHES  XNF = 1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

**BULKING FACTOR APPLIED TO HYDROGRAPH**
**FACTOR** = 1.02500 AT PEAK FLOW.

**PRINT HYD**
ID = 11  CODE = 1

**HYDROGRAPH FROM AREA DEV.6**

**RUNOFF VOLUME = 1.40177 INCHES**
**PEAK DISCHARGE RATE** = 3646.01 CFS AT 1.500 HOURS
**BASIN AREA** = 4.4172 SQ. MI.
TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

SHEET FLOW PORTION LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
SHALLOW FLOW PORTION 500.0 .005000 2.00000
CHANNEL FLOW PORTION 1000.0 .005000 3.00000
TOTAL BASIN 1500.0 .005000 3.00000

LAG EQUATION FACTORS: K= 0.0210 TOTAL BASIN LENGTH (FT) = 1500.0
TOTAL BASIN SLOPE (FT/FT) = .005000 CENTERED LENGTH (FT) = 1200.0

TIME OF CONCENTRATION (HRS) = .2512 TIME TO PEAK (HRS) = .1675 LAG TIME (HRS) = .1894

COMPUTE NH HYD ID=12 HYD=DEV. L AREA=6.6172 PER A=0.0 PER B=1.0 PER C=61.0 PER D=15.0 TP=6.0 RAINFALL=1

TIME TO PEAK (HRS) = .1675
K = .1676DHR TP = .1676DHR K/TP RATIO = .57637 SHAPE CONSTANT, N = 6.612216
UNIT PEAK = 277.84 CFS UNIT VOLUME = .9999 B = .502.38 P60 = 1.8700
AREA = .092580 SQ MI IA = 22.0000 INCHES INF = .000045 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD = DT = .033333

K = .1676DHR TP = .1676DHR K/TP RATIO = .788809 SHAPE CONSTANT, N = 6.549534
UNIT PEAK = 12.00 CFS UNIT VOLUME = 1.0806 B = .590.38 P60 = 1.8700
AREA = .524620 SQ MI IA = 317.006 INCHES INF = .34972 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD = DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAPH FACTOR = 1.02500 AT PEAK FLOW.

PRINT HYD ID=13 CODE=1

HYDROGRAPH FROM AREA DEV. L

RUNOFF VOLUME = 1.15255 INCHES = 37.0385 ACRE-FEET
PEAK DISCHARGE RATE = 1081.26 CFS AT 1.533 HOURS BASIN AREA = .6172 SQ. MI.

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

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

COMPUTE LT TP

LENGTH=1000 FT SLOPE=0.0504 K=1
LENGTH=1650 FT SLOPE=0.0504 K=2
LENGTH=1500 FT SLOPE=0.0504 K=3
QT=0.011 CENTERED DISTANCE=4350 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

SHEET FLOW PORTION LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
SHALLOW FLOW PORTION 1000.0 .005000 2.00000
CHANNEL FLOW PORTION 1500.0 .005000 3.00000
TOTAL BASIN 2500.0 .005000 3.00000

LAG EQUATION FACTORS: K= 0.0210 TOTAL BASIN LENGTH (FT) = 2500.0
TOTAL BASIN SLOPE (FT/FT) = .005000 CENTERED LENGTH (FT) = 2410.0

TIME OF CONCENTRATION (HRS) = .2888 TIME TO PEAK (HRS) = .1925 LAG TIME (HRS) = .2165

COMPUTE NH HYD ID=13 HYD=DEV. L AREA=0.5848 PER A=0.0 PER B=12.0 PER C=64.0 PER D=24.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS) = .1925
K = .11160E08 TP = .19250000 K/TP RATIO = .576817 SHAPE CONSTANT, N = 6.612116
UNIT PEAK = 194.19 CFS UNIT VOLUME = 1.000 INF = 502.38 P60 = 1.8700
AREA = .22.0000 INCHES IA = 22.0000 INCHES INF = .000045 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD = DT = .033333

K = .15420E08 TP = .19250000 K/TP RATIO = .800995 SHAPE CONSTANT, N = 4.471984
UNIT PEAK = 3446.3 CFS UNIT VOLUME = 1.000 INF = 385.49 P60 = 1.8700
AREA = .717000 SQ MI IA = 373.680 INCHES INF = .30532 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD = DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAPH FACTOR = 1.02500 AT PEAK FLOW.

PRINT HYD ID=13 CODE=1

HYDROGRAPH FROM AREA DEV. L

RUNOFF VOLUME = 1.21092 INCHES = 61.2493 ACRE-FEET
PEAK DISCHARGE RATE = 1340.20 CFS AT 1.567 HOURS BASIN AREA = .0484 SQ. MI.
LENGTH=6800 FT  SLOPE=0.041  K=3  KN=0.021  CENTROID DISTANCE=3750 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

SHEET FLOW PORTION 400.0  0.01000  1.0000
SHALLOW FLOW PORTION 1600.0  0.01000  2.0000
CHANNEL FLOW PORTION 6800.0  0.01000  3.0000
TOTAL BASIN 8800.0  0.01000  2.5385

LAG ROTATION FACTORS:

KM = .0210  TOTAL BASIN LENGTH (FT) = 8800.0
TOTAL BASIN SLOPE (FT/FT) = .041000  CENTROID LENGTH (FT) = 3750.0

TIME OF CONCENTRATION (HRS) = .1898  TIME TO PEAK (HRS) = .2322  LAG TIME (HRS) = .2999

COMPUTE NH HYD  ID=44  CODE=1

HYDROGRAPH FROM AREA DEV.N

RUNOFF VOLUME = 1.2034 INCHES  PEAK DISCHARGE RATE = 1467.77 CFS AT 1.600 HOURS  BASIN AREA = .5313 SQ. MI.

PRINT HYD  ID=15  CODE=1

HYDROGRAPH FROM AREA EX.OFF.C

**BASIN EX. OFF.C ****************************

**COMPUTE LT TP  CODE=1  NH=3  ISLOPE=1

LENGTH=600 FT  SLOPE=0.011  K=1
LENGTH=1600 FT  SLOPE=0.011  K=2
LENGTH=3600 FT  SLOPE=0.011  K=3

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

SHEET FLOW PORTION 400.0  0.01000  1.0000
SHALLOW FLOW PORTION 1600.0  0.01000  2.0000
CHANNEL FLOW PORTION 6800.0  0.01000  3.0000
TOTAL BASIN 8800.0  0.01000  2.5385

TIME OF CONCENTRATION (HRS) = .4091  TIME TO PEAK (HRS) = .3060  LAG TIME (HRS) = .3443

COMPUTE NH HYD  ID=15  HYD=EX. OFF.C  AREA=0.9109  PER A=30.0  PER B=20.0  PER C=20.0  PER D=30.0  TP=0.0  RAINFALL=1

TIME TO PEAK (HRS) = .3060

K = .176538HR  TP = .306000HR  K/TP RATIO = .576817  SHAPE CONSTANT, N = 6.612146
UNIT PEAK = 448.75  CFS  UNIT VOLUME = 1.000  B = 502.58  P60 = 1.8709
AREA = .275276  SQ MI  iA = .39753 INCHES  INF = .90405 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INfiltrATION METHOD - DT = .033333

K = .282890HR  TP = .306000HR  K/TP RATIO = .909298  SHAPE CONSTANT, N = 3.851370
UNIT PEAK = 725.28  CFS  UNIT VOLUME = 1.000  B = 388.37  P60 = 1.8709
AREA = .657650  SQ MI  iA = .52431 INCHES  INF = 1.31000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INfiltrATION METHOD - DT = .033333

RUNOFF VOLUME = 1.05635 INCHES  51.3339 ACRE-FEET
PEAK DISCHARGE RATE = 538.89 CFS AT 1.700 HOURS  BASIN AREA = .9109 SQ. MI.

**FINISH

NORMAL PROGRAM FINISH  END TIME (HOURS:MIN:SEC) = 08:21:29
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<td>2</td>
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<td>9</td>
<td>812</td>
<td>25</td>
<td>J</td>
<td>2</td>
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</table>

**COMPUTE RN HYD**

ID=6 RN HYD-DEV.F AREA=1.6141 PER A=0.0 PER B=32.0 PER C=32.0 PER D=36.0 TP=0.0 RAINFALL=1

**DIVIDE HYD**

ID=8 Q=798 ID=T=24 HYD NO=F1

**PRINT HYD**

ID=20 CODE=1

**COMPUTE RN HYD**

ID=7 RN HYD-DEV.G AREA=3.0719 PER A=0.0 PER B=21.0 PER C=21.0 PER D=38.0 TP=0.0 RAINFALL=1

**DIVIDE HYD**

ID=10 Q=798 ID=T=24 HYD NO=F1

**PRINT HYD**

ID=22 CODE=1

**COMPUTE RN HYD**

ID=9 RN HYD-DEV.H AREA=1.0297 PER A=0.0 PER B=9.0 PER C=85.0 PER D=23.0 TP=0.0 RAINFALL=1

**DIVIDE HYD**

ID=11 Q=812 ID=T=25 HYD NO=F2

**PRINT HYD**

ID=24 CODE=1

**COMPUTE RN HYD**

ID=10 RN HYD-DEV.I AREA=0.6219 PER A=0.0 PER B=18.0 PER C=29.0 PER D=53.0 TP=0.0 RAINFALL=1

**DIVIDE HYD**

ID=12 Q=812 ID=T=26 HYD NO=F2

**PRINT HYD**

ID=26 CODE=1

**COMPUTE RN HYD**

ID=11 RN HYD-DEV.J AREA=4.472 PER A=0.0 PER B=26.0 PER C=38.0 PER D=48.0 TP=0.0 RAINFALL=1

**DIVIDE HYD**

ID=12 Q=812 ID=T=26 HYD NO=F3

**PRINT HYD**

ID=27 CODE=1

**COMPUTE RN HYD**

ID=12 RN HYD-DEV.L AREA=0.6372 PER A=0.0 PER B=4.0 PER C=41.0 PER D=15.0 TP=0.0 RAINFALL=1

**DIVIDE HYD**

ID=12 Q=812 ID=T=26 HYD NO=F4

**PRINT HYD**

ID=28 CODE=1
COMPUTE LY TP  
CODE=1  NZ=3  ISLOPE=1
LENGTH=400 FT  SLOPE=0.054  K=1
LENGTH=3600 FT  SLOPE=0.054  K=2
LENGTH=5500 FT  SLOPE=0.054  K=3
KH=0.021  CENTRIPED DISTANCE=4350 FT

COMPUTE NH HYD  
ID=13  HYD=540.0  AREA=0.9484  PER A=0.0  PER B=12.0
PER C=64.0  PER D=24.0  TP=0.0  RAINFALL=1

DIVIDE HYD  
ID=33  Q=742  ID=28  ID=11  ID=31  HYD NO=M1

PRINT HYD  
ID=28  CODE=1

PRINT HYD  
ID=29  CODE=1

*========================================================================
* BAGN EVV.N  
*========================================================================

COMPUTE LY TP  
CODE=1  NZ=3  ISLOPE=1
LENGTH=400 FT  SLOPE=0.041  K=1
LENGTH=3600 FT  SLOPE=0.041  K=2
LENGTH=6800 FT  SLOPE=0.041  K=3
KH=0.011  CENTRIPED DISTANCE=9750 FT

COMPUTE NH HYD  
ID=34  HYD=985.0  AREA=0.9313  PER A=0.0  PER B=14.0
PER C=67.0  PER D=24.0  TP=0.0  RAINFALL=1

DIVIDE HYD  
ID=34  Q=636  ID=20  ID=31  HYD NO=M1

PRINT HYD  
ID=20  CODE=1

PRINT HYD  
ID=31  CODE=1

*========================================================================
* BAGN EX. OFF C  
*========================================================================

COMPUTE LY TP  
CODE=1  NZ=3  ISLOPE=1
LENGTH=400 FT  SLOPE=0.011  K=1
LENGTH=3600 FT  SLOPE=0.011  K=2
LENGTH=6800 FT  SLOPE=0.011  K=3

COMPUTE NH HYD  
ID=35  HYD=556.0  AREA=0.9369  PER A=30.0  PER B=20.0
PER C=20.0  PER D=30.0  TP=0.0  RAINFALL=1

PRINT HYD  
ID=35  CODE=1

*========================================================================

FINISH
### Table: Computed 21 Hour Rainfall Distribution Maker on NOAA Atlas 3 – Peak at 10.40 hr.

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<thead>
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<th>Rainfall (in)</th>
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<tbody>
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<td>0.016</td>
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<tr>
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</tr>
<tr>
<td>0.1000</td>
<td>0.008</td>
</tr>
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The table above shows the computed 21-hour rainfall distribution on NOAA Atlas 3, with the peak at 10.40 hours.
# Sediment Bulk Factor

- **SEDIMENT BULK FACTOR**: 2.5

- **BULK FACTOR**: 1.053

For the basin in SANTOLINA - DEVELOPED CONDITION:

**S**

- **SEDIMENT BULK FACTOR FOR 100 Yr**: 2.5
- **SEDIMENT BULK**: 2.5
- **CODE**: 2
- **BULK FACTOR**: 1.053

**COMPUTE LT TP**

- **LCODE**: 1
- **NK**: 1
- **ISLOPE**: 1
- **LENGTH**: 400 FT
- **SLOPE**: 0.03
  - **K=1**: LENGTH=400 FT, SLOPE=0.05
  - **K=2**: LENGTH=600 FT, SLOPE=0.05
  - **K=3**: LENGTH=400 FT, SLOPE=0.05

**COMPUTE TC AND TP COMPUTED BY UPLAP/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

- **SHEET FLOW PORTION**: 400.0, 0.00000
- **SHALLOW FLOW PORTION**: 160.0, 0.00000
- **CHANNEL FLOW PORTION**: 400.0, 0.00000
- **TOTAL BASIN**: 2400.0, 0.00000

**TIME OF CONCENTRATION (HRS)**: 0.655
**TIME TO PEAK (HRS)**: 1.104
**LAG TIME (HRS)**: 0.1242

**TIME TO PEAK COMPUTED TO BE LESS THAN 0.13333 HOUR MINIMUM VALUE.**

**REVISED VALUES**: **TIME OF CONCENTRATION (HRS)**: 0.655
**TIME TO PEAK (HRS)**: 1.104
**LAG TIME (HRS)**: 0.124

**COMPUTE NN HYD**

- **ID**: 1
- **HYD-DEV.A**: AREA=0.5438 PER A=0.0 PER B=1.0
- **PER C=0.82 PER D=7.0 PER E=0.0 PER F=1.0
- **R=2.5000**
- **T=0.00 PER RAINFALL=1

**TIME TO PEAK (HRS)**: 0.133

**K**: 0.87696
**TP**: 0.13333
**K/TP RATIO**: 0.87848
**SHAPE CONSTANT**: N = 6.65116

- **UNIT PEAK**: 243.48 CFS
- **UNIT VOLUME**: 5.008

**AREA**: 0.038096 SQ MI
**IA**: 1.10000 INCHES
**XMP**: 0.04000 INCHES PER HOUR

**RUNOFF COMPUTED BY INITIAL ABRATION/INFLATION METHOD**: **K = 0.03333**

**K**: 0.18661
**TP**: 0.13333
**K/TP RATIO**: 0.87848
**SHAPE CONSTANT**: N = 4.57560

- **UNIT PEAK**: 248.64 CFS
- **UNIT VOLUME**: 1.000

**AREA**: 0.038096 SQ MI
**IA**: 0.00000 INCHES
**XMP**: 0.04000 INCHES PER HOUR

**RUNOFF COMPUTED BY INITIAL ABRATION/INFLATION METHOD**: **K = 0.03333**

**RUNOFF VOLUME**: 1.1121 INCHES = 2.2450 ACRE- FEET
**PEAK DISCHARGE RATE**: 204.47 FPS AT 1.500 HOURS BASIN AREA = 0.5438 SQ. MI.

**HYDROGRAPH FROM AREA DEV.A**

**RUNOFF VOLUME**: 1.1121 INCHES = 2.2450 ACRE- FEET
**PEAK DISCHARGE RATE**: 204.47 FPS AT 1.500 HOURS BASIN AREA = 0.5438 SQ. MI.

**COMPUTE LT TP**

- **LCODE**: 1
- **NK**: 1
- **ISLOPE**: 1
- **LENGTH**: 400 FT
- **SLOPE**: 0.03
  - **K=1**: LENGTH=400 FT, SLOPE=0.05
  - **K=2**: LENGTH=600 FT, SLOPE=0.05
  - **K=3**: LENGTH=400 FT, SLOPE=0.05

**COMPUTE TC AND TP COMPUTED BY UPLAP/LAG TIME PROCEDURE**

**SCS UPLAND METHOD FACTORS**

- **SHEET FLOW PORTION**: 400.0, 0.00000
- **SHALLOW FLOW PORTION**: 160.0, 0.00000
- **CHANNEL FLOW PORTION**: 400.0, 0.00000
- **TOTAL BASIN**: 2400.0, 0.00000

**LAG EQUATION FACTORS**: **KN**: 0.0210
**TOTAL BASIN LENGTH**: 8200.0
**TOTAL BASIN SLOPE**: 0.00000
**CENTROID LENGTH**: 2800.0

**TIME OF CONCENTRATION (HRS)**: 0.655
**TIME TO PEAK (HRS)**: 0.3773
**LAG TIME (HRS)**: 0.4244

**COMPUTE NN HYD**

- **ID**: 2
- **HYD-DEV.A**: AREA=2.8711 PER A=0.0 PER B=15.0
- **PER C=0.82 PER D=7.0 PER E=0.0 PER F=1.0
- **R=2.5000**
- **T=0.00 PER RAINFALL=1

**TIME TO PEAK (HRS)**: 0.3773

**K**: 0.21761
**TP**: 0.37770 HRS
**K/TP RATIO**: 0.57846
**SHAPE CONSTANT**: N = 6.62525

- **UNIT PEAK**: 237.71 CFS
- **UNIT VOLUME**: 1.000

**AREA**: 1.78424 SQ MI
**IA**: 0.00000 INCHES
**XMP**: 0.04000 INCHES PER HOUR

**RUNOFF COMPUTED BY INITIAL ABRATION/INFLATION METHOD**: **K = 0.03333**

**K**: 0.31643
**TP**: 0.37770 HRS
**K/TP RATIO**: 0.83686
**SHAPE CONSTANT**: N = 4.21504

- **UNIT PEAK**: 1077.0 CFS
- **UNIT VOLUME**: 1.000

**AREA**: 1.50000 SQ MI
**IA**: 0.00000 INCHES
**XMP**: 0.04000 INCHES PER HOUR

**RUNOFF COMPUTED BY INITIAL ABRATION/INFLATION METHOD**: **K = 0.03333**
BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02300 AT PEAK FLOW.
PRINT HYD ID=3 CODE=1

HYDROGRAPH FROM AREA DEV.C

RUNOFF VOLUME = 1.80380 INCHES = 276.7372 ACRE-FOOT
PEAK DISCHARGE RATE = 5651.00 CFS AT 1.767 HOURS BASIN AREA = 2.8783 SQ. MI.

**-------------------------------------------------------------**
**-------------------------------------------------------------**
** BASIN DEV.C ***********************************************
**-------------------------------------------------------------**
**-------------------------------------------------------------**

COMPUTE LT TP
LCDOWN=1 NO=3 ISOPE=1
LENGTH=600 FT SLOPE=0.01 K=1
LENGTH=1500 FT SLOPE=0.01 K=2
LENGTH=3100 FT SLOPE=0.01 K=3
K=0.021 CENTROID DISTANCE=3400 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

SHEET FLOW PORTION
LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
400.0 .010000 1.0000
SHALLOW FLOW PORTION
3000.0 .010000 3.0000
CHANNEL FLOW PORTION
1100.0 .010000 3.0000
TOTAL BASIN
5100.0 .010000 2.2856

LAG EQUATION FACTORS:
K= .0391 TOTAL BASIN LENGTH (FT)= 5100.0
TOTAL BASIN SLOPE (FT/FT)= .010000 CENTROID LENGTH (FT)= 1400.0

TIME OF CONCENTRATION (HRS)= .4280 TIME TO PEAK (HRS)= .3585
LAG TIME (HRS)= .3585

COMPUTE NH HYD ID=3 HYD-DEV.C AREA=3.5641 PER A=0.0 PER B=26.0
PER C=26.0 PER D=48.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS)= .3587

K = .183827HR TP = .318939HR K/TP RATIO = .576817 SHAPE CONSTANT, N = 6.821115
UNIT PEAK = 1384.50 CFS UNIT VOLUME = 1.000 R = .551.50 MOD = 1.8760
AREA = .750670 SQ FT IA = 100000 INCHES INF = .040000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .267292HR TP = .318939HR K/TP RATIO = .838611 SHAPE CONSTANT, N = 3.250045
UNIT PEAK = 948.33 CFS UNIT VOLUME = 1.000 R = .371.51 MOD = 1.8760
AREA = .113352 SQ FT IA = 42700 INCHES INF = 1.040000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.
PRINT HYD ID=3 CODE=1

HYDROGRAPH FROM AREA DEV.C

RUNOFF VOLUME = 1.58522 INCHES = 132.2615 ACRE-FOOT
PEAK DISCHARGE RATE = 2661.04 CFS AT 1.707 HOURS BASIN AREA = 1.5641 SQ. MI.

**-------------------------------------------------------------**
**-------------------------------------------------------------**
** BASIN DEV.D ***********************************************
**-------------------------------------------------------------**
**-------------------------------------------------------------**

COMPUTE LT TP
LCDOWN=1 NO=3 ISOPE=1
LENGTH=400 FT SLOPE=0.008 K=1
LENGTH=1600 FT SLOPE=0.008 K=2
LENGTH=4500 FT SLOPE=0.008 K=3
K=0.021 CENTROID DISTANCE=3500 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

SHEET FLOW PORTION
LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
400.0 .008000 1.0000
SHALLOW FLOW PORTION
3500.0 .008000 3.0000
CHANNEL FLOW PORTION
4700.0 .008000 3.0000
TOTAL BASIN
6700.0 .008000 2.4177

LAG EQUATION FACTORS:
K= .0381 TOTAL BASIN LENGTH (FT)= 6700.0
TOTAL BASIN SLOPE (FT/FT)= .008000 CENTROID LENGTH (FT)= 3500.0

TIME OF CONCENTRATION (HRS)= .5237 TIME TO PEAK (HRS)= .3491
LAG TIME (HRS)= .3928

COMPUTE NH HYD ID=4 HYD-DEV.D AREA=0.5313 PER A=0.0 PER B=15.0
PER C=10.0 PER D=68.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS)= .3491

K = .207706HR TP = .349116HR K/TP RATIO = .576817 SHAPE CONSTANT, N = 6.821115
UNIT PEAK = 320.09 CFS UNIT VOLUME = .5999 R = .501.58 MOD = 1.8765
AREA = .01248 SQ FT IA = 100000 INCHES INF = .040000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .292772HR TP = .349116HR K/TP RATIO = .838611 SHAPE CONSTANT, N = 4.250046
UNIT PEAK = 320.92 CFS UNIT VOLUME = .5999 R = .371.51 MOD = 1.8760
AREA = .017038 SQ FT IA = 42700 INCHES INF = 1.040000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

Page 3
BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.

DIVIDE HYD ID=4 Q=189 ID=16 HYD NO=01 ID=II=47 HYD NO=02
PRINT HYD ID=16 CODE=1

HYDROGRAPH FROM AREA D1.

RUNOFF VOLUME = 1.89709 INCHES = 31.0624 ACRE- FEET
PEAK DISCHARGE RATE = 389.00 CFS AT 1.467 HOURS BASIN AREA = 3159 SQ. MI.

PRINT HYD ID=37 CODE=1

HYDROGRAPH FROM AREA D2.

RUNOFF VOLUME = 1.89709 INCHES = 21.7933 ACRE- FEET
PEAK DISCHARGE RATE = 557.44 CFS AT 1.735 HOURS BASIN AREA = 2254 SQ. MI.

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.IsSuccess

Compute LT TP LCODE=1 N=3 ISLOPE=2
LENGTH/400 FT SLOPE/0.006 R=1
LENGTH=1500 FT SLOPE=0.006 R=2
LENGTH=9500 FT SLOPE=0.006 R=3
KN=1.071 CENTRIPEDAL DISTANCE=5400 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

LENGTH (FT) SLOPE (FT/FT) COMPOSITE K
SHEET FLOW PORTION 400.0 .000000 1.00000
SHALLOW FLOW PORTION 1000.0 .000000 2.00000
CHANNEL FLOW PORTION 9500.0 .000000 3.00000
TOTAL BASIN 11500.0 .000000 2.6336

LAG EQUATION FACTORS: KM=.9010 TOTAL BASIN LENGTH (FT)=11500.0
TOTAL BASIN SLOPE (FT/FT)=.000609 CENTRIPEDAL LENGTH (FT)=5400.0

TIME OF CONCENTRATION (HRS)=.3510 TIME TO PEAK (HRS)=.3673 LAG TIME (HRS)=.4132

COMPUTE NT HYD ID=5 HYD=DEV.E AREA=2.0232 PER A=0.0 PER B=23.0
PER C=25.0 PER D=54.0 TP=.0 RAINFALL=3

TIME TO PEAK (HRS)=.3673

K = .31866503 TP = .3672284 H/K RATI = .57827 SHAPE CONSTANT, N = 6.612116
UNIT PEAK = 3797.4 CFS UNIT VOLUME = 1.000 B = 202.56 PER = 1.8700
AREA = 1.313712 SQ MI IA = 30000 INCHES INF = .040000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .30804565 TP = .3672284 H/K RATI = .838611 SHAPE CONSTANT, N = 4.250046
UNIT PEAK = 3131.8 CFS UNIT VOLUME = 1.000 B = 211.31 PER = 1.8700
AREA = 1.138088 SQ MI IA = 42500 INCHES INF = 1.060000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.

DIVIDE HYD ID=5 Q=677 ID=18 HYD NO=01 ID=II=19 HYD NO=02
PRINT HYD ID=38 CODE=1

HYDROGRAPH FROM AREA E1.

RUNOFF VOLUME = 1.67831 INCHES = 121.0036 ACRE- FEET
PEAK DISCHARGE RATE = 677.60 CFS AT 1.467 HOURS BASIN AREA = 1.3519 SQ. MI.

PRINT HYD ID=19 CODE=1

HYDROGRAPH FROM AREA E2.

RUNOFF VOLUME = 1.67821 INCHES = 96.7540 ACRE- FEET
PEAK DISCHARGE RATE = 533.01 CFS AT 1.767 HOURS BASIN AREA = 1.0800 SQ. MI.

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.IsSuccess

Compute LT TP LCODE=1 N=3 ISLOPE=1
LENGTH=600 FT SLOPE=0.01 K=1
LENGTH=1600 FT SLOPE=0.01 K=2
LENGTH=8200 FT SLOPE=0.01 K=3
KN=4.021 CENTRIPEDAL DISTANCE=5450 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS
LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K
SHEET FLOW PORTION  400.0  .010000  1.0000
SHALLOW FLOW PORTION  1600.0  .010000  2.0000
CHANNEL FLOW PORTION  9000.0  .010000  3.0000
TOTAL BASIN  11200.0  .010000  2.6350

LAG EQUATION FACTORS: K = .0230  TOTAL BASIN LENGTH (FT) = 11200.0
TOTAL BASIN SLOPE (FT/FT) = .010000  CENTROID LENGTH (FT) = 5450.0

TIME OF CONCENTRATION (HRS) = .5029  TIME TO PEAK (HRS) = .3359  LAG TIME (HRS) = .3779

COMPUTE HN HYD  ID = 6  HN-DEV.P AREA = 6.164  PER A = 0.0  PER B = 22.0
PER C = 32.0  PER D = 30.0  TP = 0.0  RAINFALL = 1

TIME TO PEAK (HRS) = .3359

K = .185760  TP = .335928  K/TP RATIO = .576817  SHAPE CONSTANT, N = 6.622313
UNIT PEAK = 289.35  CPS  UNIT VOLUME = .9998  B = 502.58  P60 = 1.8700
AREA = .5590 SQ MI  IA = .10000 INCHES INF = .94000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .03333

K = .281206  TP = .335928  K/TP RATIO = .836611  SHAPE CONSTANT, N = 4.250046
UNIT PEAK = 1142.5  CPS  UNIT VOLUME = 1.000  B = 571.51  P60 = 1.8700
AREA = 1.033024 SQ MI  IA = .25000 INCHES INF = 1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .03333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.

DIVIDE HN HYD  ID = 6  Q = 524  ID T = 20  ID T = 21  HYD NO = 1

HYDROGRAPH FROM AREA F1

RUNOFF VOLUME = 139795 INCHES  PEAK DISCHARGE RATE = 524.60 CPS AT 1.500 HOURS  BASIN AREA = .9777 SQ. MI.

PRINT HYD  ID = 21  CODE = 3

HYDROGRAPH FROM AREA F2

RUNOFF VOLUME = 139795 INCHES  PEAK DISCHARGE RATE = 47.4471 ACRE-FEET AT 1.733 HOURS  BASIN AREA = .6304 SQ. MI.

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********************************************************** BASIN DEV.G **********************************************************

********************************************************** BASIN DEV.G **********************************************************

COMPUTE LT TP  ID = 2  NO = 0  ISLOPE = 1
LENGTH = 13300 FT  SLOPE = 0.021  K = 3
KN = 0.021  CENTROID DISTANCE = 6300 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS: K = .0210  TOTAL BASIN LENGTH (FT) = 13300.0
TOTAL BASIN SLOPE (FT/FT) = .030000  CENTROID LENGTH (FT) = 6300.0

TIME OF CONCENTRATION (HRS) = .4013  TIME TO PEAK (HRS) = .3209  LAG TIME (HRS) = .3510

COMPUTE HN HYD  ID = 7  HN-DEV.P AREA = 3.0719  PER A = 0.0  PER B = 21.0
PER C = 21.0  PER D = 58.0  TP = 0.0  RAINFALL = 1

TIME TO PEAK (HRS) = .3209

K = .185089  TP = .320989  K/TP RATIO = .576817  SHAPE CONSTANT, N = 6.622313
UNIT PEAK = 2720.2  CPS  UNIT VOLUME = 1.000  B = 502.58  P60 = 1.8700
AREA = 1.78120 SQ MI  IA = .10000 INCHES INF = .94000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .03333

K = .260303  TP = .320989  K/TP RATIO = .836611  SHAPE CONSTANT, N = 4.250046
UNIT PEAK = 1494.7  CPS  UNIT VOLUME = 1.000  B = 571.51  P60 = 1.8700
AREA = 1.280138 SQ MI  IA = .25000 INCHES INF = 1.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .03333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.

PRINT HYD  ID = 7  CODE = 1

HYDROGRAPH FROM AREA DEV.G

RUNOFF VOLUME = 17462 INCHES  PEAK DISCHARGE RATE = 4272.06 CPS AT 1.760 HOURS  BASIN AREA = 3.0719 SQ. MI.

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********************************************************** BASIN DEV.G **********************************************************

********************************************************** BASIN DEV.G **********************************************************

COMPUTE LT TP  ID = 1  NO = 0  ISLOPE = 1
LENGTH = 13400 FT  SLOPE = 0.021  K = 3
KN = 0.021  CENTROID DISTANCE = 5400 FT

Page 5
TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS: \( K = 0.0210 \)  TOTAL BASIN LENGTH (FT) = 13400.0
TOTAL BASIN SLOPE (FT/FT) = 0.020000  CENTROID LENGTH (FT) = 5400.0

TIME OF CONCENTRATION (HRS) = 0.4623  TIME TO PEAK (HRS) = 0.3082  LAG TIME (HRS) = 0.3467

COMPUTE MI HYD  ID=8 HYD-DEV.H AREA=2.1215 PER A=0.0 PER B=2.0 PER C=28.0 PER D=44.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS) = 0.3082
K = 0.5777778  TP = 3081.8900  K/TP RATIO = 0.3784  SHAPE CONSTANT, N = 6.612216
UNIT PEAK = 1587.5 CFS UNIT VOLUME = 1.000  B = 561.57  PHI = 1.8700
AREA = 0.0755  SQ MI  TA = 1090.00 INCHES TNP = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.023333

K = 0.3584588  TP = 3081.8900  K/TP RATIO = 0.3784  SHAPE CONSTANT, N = 4.250849
UNIT PEAK = 1495.5 CFS UNIT VOLUME = 1.000  B = 383.66  PHI = 1.8700
AREA = 0.0230  SQ MI  TA = 420.00 INCHES TNP = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.

DIVIDE HYD  ID=8 CODE=1  ID=12 HYD-ID=ML  ID=33 CODE=1

PRINT HYD  ID=22 CODE=1
HYDROGRAPH FROM AREA H1

RUNOFF VOLUME = 1.52323 INCHES = 110.4200 ACRE- FEET
PEAK DISCHARGE RATE = 308.09 CFS AT 1.467 HOURS  BASIN AREA = 1.3543 SQ. MI.

PRINT HYD  ID=23 CODE=1
HYDROGRAPH FROM AREA H2

RUNOFF VOLUME = 1.52323 INCHES = 65.3076 ACRE- FEET
PEAK DISCHARGE RATE = 7060.54 CFS AT 1.760 HOURS  BASIN AREA = 0.8331 SQ. MI.

******************************************************************************
******* BASIN DEV.1  ****************************
******************************************************************************

COMPUTE LT TP  ID=9 CODE=1  NK=3 ISLOPE=1
LENGTH-400 FT SLOPE-0.01 K=1
LENGTH-1600 FT SLOPE-0.01 K=2
LENGTH-5000 FT SLOPE-0.01 K=3
KM=0.021 CENTROID DISTANCE-3400 FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHO FACTORS

SHEET FLOW PORTION \( L_1 \)  SLOPE (FT/FT)  COMPOSITE K

SMALLER FLOW PORTION \( L_2 \)  SLOPE (FT/FT)  COMPOSITE K

CHANNEL FLOW PORTION \( L_3 \)  SLOPE (FT/FT)  COMPOSITE K

TOTAL BASIN \( L_4 \)  SLOPE (FT/FT)  COMPOSITE K

LAG EQUATION FACTORS: \( K = 0.0210 \)  TOTAL BASIN LENGTH (FT) = 13400.0
TOTAL BASIN SLOPE (FT/FT) = 0.020000  CENTROID LENGTH (FT) = 5400.0

TIME OF CONCENTRATION (HRS) = 0.3367  TIME TO PEAK (HRS) = 0.2245  LAG TIME (HRS) = 0.2526

COMPUTE MI HYD  ID=9 HYD-DEV.H AREA=1.0237 PER A=0.0 PER B=9.0 PER C=0.0 PER D=33.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS) = 0.2245
K = 0.5774000  TP = 224481111  K/TP RATIO = 0.2768  SHAPE CONSTANT, N = 6.612216
UNIT PEAK = 530.20 CFS UNIT VOLUME = 1.000  B = 561.57  PHI = 1.8700
AREA = 0.0755  SQ MI  TA = 1090.00 INCHES TNP = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.023333

K = 0.3584588  TP = 224481111  K/TP RATIO = 0.3784  SHAPE CONSTANT, N = 4.250849
UNIT PEAK = 1495.5 CFS UNIT VOLUME = 1.000  B = 383.66  PHI = 1.8700
AREA = 0.0230  SQ MI  TA = 420.00 INCHES TNP = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.

PRINT HYD  ID=9 CODE=1
HYDROGRAPH FROM AREA DEV.1

RUNOFF VOLUME = 1.30138 INCHES = 71.4524 ACRE- FEET
PEAK DISCHARGE RATE = 1539.04 CFS AT 1.460 HOURS  BASIN AREA = 1.0237 SQ. MI.
### AREA DEV. J

**BASIN DEV. J**

```
COMPUTE LT TP
  LOCODE=1
  NO=3
  ISLOPE=1
  LENGTH=500 FT  SLOPE=0.076  K=1
  LENGTH=1000 FT  SLOPE=0.076  K=2
  LENGTH=800 FT  SLOPE=0.076  K=3

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

- **SHEET FLOW PORTION**
  - LENGTH (FT): 400.0
  - SLOPE (FT/FT): .0766000
  - COMPOSITE K: 1.9500

- **SHALLOW FLOW PORTION**
  - LENGTH (FT): 1600.0
  - SLOPE (FT/FT): .076000
  - TIME TO PEAK: .0585

- **CHANNEL FLOW PORTION**
  - LENGTH (FT): 500.0
  - SLOPE (FT/FT): .076000

- **TOTAL BASIN**
  - LENGTH (FT): 2800.0
  - SLOPE (FT/FT): .076000

TIME OF CONCENTRATION (HRS) = .3478
TIME TO PEAK (HRS) = .0858
LAG TIME (HRS) = .1108

TIME TO PEAK COMPUTED TO BE LESS THAN 0.13333 HOURS MINIMUM VALUE,
REVERSED VALUES:
TIME OF CONCENTRATION (HRS) = .2000
TIME TO PEAK (HRS) = .1333
LAG TIME (HRS) = .3500

COMPUTE NH HYD
  ID=36 HYD=DEV. J
  AREA=6.0219 PER A=0.0 PER B=18.0
  PER C=9.0 PER D=13.0 TP=1.0

RAINFALL=1

TIME TO PEAK (HRS) = .1333

K = .076000
TP = 3333333HR
K/TP RATIO = 0.576817 SHAPE CONSTANT, N = 6.61215
UNIT PEAK = 1441.4 CFS UNIT VOLUME = .9058
AREA = .333907 SQ M
1A = .1006000 INCHES INF = 0.000000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - ET = .003333

K = .110000
TP = 3333333HR
K/TP RATIO = 0.82374 SHAPE CONSTANT, N = 4.32299
UNIT PEAK = 524.42 CFS UNIT VOLUME = 1.000
AREA = .292283 SQ M
1A = .407450 INCHES INF = 0.938900 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - ET = .003333

BULKING FACTOR APPLIED TO HYDROGRAPH.
FACTOR = 1.02500 AT PEAK FLOW.
```

### AREA DEV. K

**BASIN DEV. K**

```
COMPUTE LT TP
  LOCODE=1
  NO=4
  ISLOPE=1
  LENGTH=16700 FT  SLOPE=0.017  K=3

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

LAG EQUATION FACTORS:

- KM = 0.0010
- TOTAL BASIN LENGTH (FT) = 10700.0
- TOTAL BASIN SLOPE (FT/FT) = 0.017000
- CENTROID LENGTH (FT) = 4800.0

TIME OF CONCENTRATION (HRS) = .4012
TIME TO PEAK (HRS) = .3275
LAG TIME (HRS) = .3864

COMPUTE NH HYD
  ID=11 HYD=DEV. K
  AREA=4.4172 PER A=0.0 PER B=25.0
  PER C=25.0 PER D=35.0 TP=0.0 RAINFALL=1

TIME TO PEAK (HRS) = .3275

K = .188813 HR
TP = 3274539 HR
K/TP RATIO = 0.576817 SHAPE CONSTANT, N = 6.61215
UNIT PEAK = 327.4 CFS UNIT VOLUME = 1.000
AREA = 1.212026 SQ M
1A = .1000000 INCHES INF = 0.000000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - ET = .003333

K = .749041 HR
TP = 3274539 HR
K/TP RATIO = 0.838611 SHAPE CONSTANT, N = 4.250046
UNIT PEAK = 2605.0 CFS UNIT VOLUME = 1.000
AREA = 2.296093 SQ M
1A = .425000 INCHES INF = 1.040000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION METHOD - ET = .003333

BULKING FACTOR APPLIED TO HYDROGRAPH.
FACTOR = 1.02500 AT PEAK FLOW.
```

**HYDROGRAPH FROM AREA 31**

- **RUNOFF VOLUME** = 1.68542 INCHES = 48.6768 ACRE-FEET
- **PEAK DISCHARGE RATE** = 798.00 CFS AT 1.433 HOURS
- **BASIN AREA** = 5.415 SQ. MI.

**HYDROGRAPH FROM AREA 32**

- **RUNOFF VOLUME** = 1.68542 INCHES = 7.2249 ACRE-FEET
- **PEAK DISCHARGE RATE** = 626.70 CFS AT 1.500 HOURS
- **BASIN AREA** = 6.004 SQ. MI.

**HYDROGRAPH FROM AREA DEV. K**

- **HYDROGRAPH FROM AREA 31**
- **HYDROGRAPH FROM AREA 32**
- **HYDROGRAPH FROM AREA DEV. K**
RUNOFF VOLUME = 1.58138 INCHES = 373.4978 ACRE-FOOT
PEAK DISCHARGE RATE = 5046.01 CFS AT 1.700 HOURS  BASIN AREA = 4.4172 SQ. MI.

**BASIN DEV.L *********************

COMPUTE LT TP  LCOD=1  NC=3  ISLOPE=1
LENGTH=400  FT  SLOPE=0.06  K=1
LENGTH=2000  FT  SLOPE=0.06  K=2
LENGTH=4000  FT  SLOPE=0.06  K=3
KN=0.021  CENTROID DISTANCE=4200  FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS
SHEET FLOW PORTION
LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K
400.0  0.06000  1.000
1600.0  0.06000  2.000
4000.0  0.06000  3.000
TOTAL BASIN
6000.0  0.06000  4.000

LAG EQUATION FACTORS:
Ktotal = 0.021  TOTAL BASIN LENGTH (FT) = 6000.0
TOTAL BASIN LENGTH (FT) = 6000.0  CENTROID LENGTH (FT) = 4200.0

TIME OF CONCENTRATION (HRS) = .2512  TIME TO PEAK (HRS) = .1675  LAG TIME (HRS) = .1884

COMPUTE NH HYD  ID=12  HYD-DEV.L AREA=0.6172  PER A=0.0  PER B=4.0
PER C=8.0  PER D=23.0  TP=0.0  RAINFALL=1

TIME TO PEAK (HRS) = .1675
K = 0.096559H  TP = 0.167467H  K/TP RATIO = 0.576017  SHAPE CONSTANT, N = 6.612116
UNIT PEAK = 277.84  CFS  UNIT VOLUME = 0.9999  SQ FT
AREA = 0.46580  INCHES  TFR = 0.10000  INCHES  TFR = 0.04000  INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD = 0.033333

K = 1.3200H  TP = 0.167467H  K/TP RATIO = 0.788809  SHAPE CONSTANT, N = 4.549314
UNIT PEAK = 2222.6  CFS  UNIT VOLUME = 1.000  N = 390.28  PER = 1.8700
AREA = 0.374820  SQ FT  TFR = 1.05190  INCHES  TFR = 0.84970  INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD = 0.033333

BULKING FACTOR APPLIED TO PEAK FLOW = 1.02500 AT PEAK FLOW.

DIVIDE HYD  ID=12  Q=561  ID T=26  HYD NO=1  ID T=27  HYD NO=2

PRINT HYD  ID T=26  CODE=1  HYDROGRAPH FROM AREA L1

RUNOFF VOLUME = 1.21074 INCHES = 32.2084 ACRE-FOOT
PEAK DISCHARGE RATE = 361.09 CFS AT 1.433 HOURS  BASIN AREA = .49888 SQ. MI.

PRINT HYD  ID T=27  CODE=1  HYDROGRAPH FROM AREA L2

RUNOFF VOLUME = 1.21074 INCHES = 76455 ACRE-FOOT
PEAK DISCHARGE RATE = 520.26 CFS AT 1.533 HOURS  BASIN AREA = .3184 SQ. MI.

**BASIN DEV.H *********************

COMPUTE LT TP  LCOD=1  NC=3  ISLOPE=1
LENGTH=400  FT  SLOPE=0.054  K=1
LENGTH=1600  FT  SLOPE=0.054  K=2
LENGTH=4000  FT  SLOPE=0.054  K=3
KN=0.021  CENTROID DISTANCE=4350  FT

TC AND TP COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS
SHEET FLOW PORTION
LENGTH (FT)  SLOPE (FT/FT)  COMPOSITE K
400.0  0.05400  1.000
1600.0  0.05400  2.000
4000.0  0.05400  3.000
TOTAL BASIN
7500.0  0.05400  4.250

LAG EQUATION FACTORS:
Ktotal = 0.0210  TOTAL BASIN LENGTH (FT) = 7500.0
TOTAL BASIN LENGTH (FT) = 7500.0  CENTROID LENGTH (FT) = 4350.0

TIME OF CONCENTRATION (HRS) = .2888  TIME TO PEAK (HRS) = .2925  LAG TIME (HRS) = .2156

COMPUTE NH HYD  ID=13  HYD-DEV.H AREA=0.9484  PER A=0.0  PER B=32.0
PER C=64.0  PER D=24.0  TP=0.0  RAINFALL=1

TIME TO PEAK (HRS) = 0.2925
K = 0.11049H  TP = 0.193520H  K/TP RATIO = 0.576817  SHAPE CONSTANT, N = 6.552116
UNIT PEAK = 504.19  CFS  UNIT VOLUME = 1.000  B = 502.58  PER = 1.8700

Page 8
AREA = .22752 SQ MI  IA = 10000 INCHES  TNF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INfiltration NUMBER METHOD = .03333

K = .154208h  TP = .192126h  K/TP RATIO = .800095  SHAPE CONSTANT, N = 4.471984
UNIT PEAK = 344.3 CFS  UNIT VOLUME = 1.000  B = 381.49  PED = 1.6700
AREA = .72078 SQ MI  IA = .97368 INCHES  SNF = .89053 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INfiltration NUMBER METHOD = .03333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.

\[ h_{peak} = h_{area} - 0.51684 \times \text{ACRE-FOOT} \]
\[ Q_{peak} = 742.00 \text{ CFS AT 1.467 HOURS BASIN AREA} = .7416 \text{ SQ MI.} \]

\[ h_{area} = 1.301827 \text{ INCHES} = 34.3799 \text{ ACRE-FOOT} \]
\[ Q_{area} = 822.28 \text{ CFS AT 1.567 HOURS BASIN AREA} = .2048 \text{ SQ MI.} \]

\[ \text{BASIN DEV.} \text{H} \]

\[ \text{TIME TO PEAK (HRS)} = .3198  \text{ TIME TO PEAK (HRS)} = .2132  \text{ LAG TIME (HRS)} = .2399 \]

\[ \text{TIME TO PEAK (HRS)} = .2132  \]

\[ h_{peak} = .121897h  TP = .121321h  K/TP RATIO = .576817  SHAPE CONSTANT, N = 6.612116
UNIT PEAK = 326.56 CFS  UNIT VOLUME = 1.000  B = 321.56  PED = 1.8700
AREA = .22332 SQ MI  IA = 10000 INCHES  TNF = .04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INfiltration NUMBER METHOD = .03333

K = .171938h  TP = .121321h  K/TP RATIO = .803889  SHAPE CONSTANT, N = 4.545000
UNIT PEAK = 2271.0 CFS  UNIT VOLUME = 1.000  B = 384.37  PED = 1.8700
AREA = .70378 SQ MI  IA = .37765 INCHES  SNF = .90727 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INfiltration NUMBER METHOD = .03333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.

\[ h_{peak} = 1.28607 \text{ INCHES} = 48.6031 \text{ ACRE-FOOT} \]
\[ Q_{peak} = 636.00 \text{ CFS AT 1.467 HOURS BASIN AREA} = .7031 \text{ SQ MI.} \]

\[ h_{area} = 1.25607 \text{ INCHES} = 15.7712 \text{ ACRE-FOOT} \]
\[ Q_{area} = 751.77 \text{ CFS AT 1.600 HOURS BASIN AREA} = .2282 \text{ SQ MI.} \]
LENGTH=100 FT SLOPE=0.011 k=1
LENGTH=1600 FT SLOPE=0.011 k=2
LENGTH=1600 FT SLOPE=0.011 k=3

Tc AND Tp COMPUTED BY UPLAND/LAG TIME PROCEDURE

SCS UPLAND METHOD FACTORS

<table>
<thead>
<tr>
<th>SHEET FLOW PORTION</th>
<th>LENGTH (FT)</th>
<th>SLOPE (FT/FT)</th>
<th>COMPOSITE K</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>400.0</td>
<td>.011000</td>
<td>1.0000</td>
</tr>
<tr>
<td>Shallow Flow Portion</td>
<td>1600.0</td>
<td>.011000</td>
<td>2.0000</td>
</tr>
<tr>
<td>Channel Flow Portion</td>
<td>3600.0</td>
<td>.011000</td>
<td>3.0000</td>
</tr>
</tbody>
</table>

TOTAL BASIN

3600.0

TIME OF CONCENTRATION (HRS)= .4591 TIME TO PEAK (HRS)= .3060 LAG TIME (HRS)= .3443

COMPUTE NH HYD ID=15 HYD=EX.OFF.C AREA=0.9109 PER A=30.0 PER B=20.0
PER C=20.0 PER D=30.0 TP=0.0 RAINPALL=1

TIME TO PEAK (HRS)= .3060

K = .176135INH TP = .3060SQRH K/TP RATIO = .576817 SHAPE CONSTANT, N = 6.612116
UNIT PEAK = 568.75 CPS UNIT VOLUME = 1.000 B = 502.18 PDU = 1.8700
AREA = .276670 SQ Mi IA = .10000 INCHES INF = .04500 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - BT = .033333

K = .278790INH TP = .3060SQRH K/TP RATIO = .909075 SHAPE CONSTANT, N = 3.989370
UNIT PEAK = 725.28 CPS UNIT VOLUME = 1.000 B = 348.12 PDU = 1.8700
AREA = .576630 SQ Mi IA = .52243 INCHES INF = 1.31000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - BT = .033333

BULKING FACTOR APPLIED TO HYDROGRAPH. FACTOR = 1.02500 AT PEAK FLOW.

PRINT HYD ID=15 CODE=1

HYDROGRAPH FROM AREA EX.OFF.C

RUNOFF VOLUME = 1.17123 INCHES = 56.8996 ACRE-FOOT
PEAK DISCHARGE RATE = 938.80 CPS AT 1.700 HOURS. BASIN AREA = .9109 SQ. MI.

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

FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 08:21:02

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APPENDIX B – EXCERPTS OF RELATED AREA DMP’S

- WESTGATE DAM
- AMOLE HUBBEL DMP
- DON FELIPE DAM
- BORREGA DAM
RESOLUTION 1999-7
FURTHER MODIFICATIONS OF THE DRAINAGE MANAGEMENT PLAN
WESTERN ALBUQUERQUE METROPOLITAN AREA
AS IT PERTAINS TO THE AMOLE ARROYO BELOW WESTGATE DAM AND
OTHER DRAINAGE BASINS DRAINING TO THE AMOLE-HUBBELL DETENTION
SYSTEM

WHEREAS, the Drainage Management Plan Western Albuquerque Metropolitan Area Resolution 1975-8 adopted by AMAFCA, September 25, 1975, called for the construction of the Westgate, Amole and Hubbell detention facilities and the Borrega, Sacate Blanco and Power Line diversion channels.

WHEREAS, in 1976 AMAFCA completed the construction of the Westgate Dam.

WHEREAS, in 1978 AMAFCA completed the construction of the Sacate Blanco Diversion, the Amole-Hubbell Channel, the Amole Detention Dam and Hubbell Lake Detention Dam.

WHEREAS, Resolution 1980-15 revised AMAFCA’s Drainage Policy and provided additional criteria for development in the Amole watershed.

WHEREAS, in 1981 AMAFCA completed the construction of the Snow Vista Channel.

WHEREAS, in 1982 AMAFCA completed the construction of the Powerline Channel.

WHEREAS, in 1986 AMAFCA completed the Borrega Diversion Channel.

WHEREAS, since 1982 the City of Albuquerque, through the expenditure of CIP funds or as part of the SAD process, has completed the SAD 214, the North/South Coors and 98th and Central Ponds and the Amole del Norte Channel, Tierra Bayeta Channel, Unser diversion and Unser Storm Drain.

WHEREAS, in April of 1994 the AMAFCA Board adopted Resolution 1994-4 modifying the Drainage Management Plan for Western Albuquerque by proposing the construction of two additional detention facilities on the Amole Arroyo north of I-40 that would divert all flows to a proposed I-40 diversion channel that would out fall to the Rio Grande.

WHEREAS, on July 26, 1994, the Board of Directors authorized the preparation of a Drainage Management Plan for the Amole Arroyo-Hubbell Lake system below the Westgate Dam.

WHEREAS, said Drainage Management Plan has been prepared, with input and assistance from community agencies, private landowners and the general public.
<table>
<thead>
<tr>
<th>Existing Facility</th>
<th>Existing Design Capacity</th>
<th>Existing Conditions (100-Yr Event)</th>
<th>Developed Conditions-Existing Facilities (100-Yr Event)</th>
<th>Developed Conditions w/ DMP Facilities (100-Yr Event)</th>
<th>DMP Design Capacity (Future)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Westgate Dam (Detention)</td>
<td>425 AFI/425 AF</td>
<td>345 AF</td>
<td>421 AF (1)</td>
<td>421 AF</td>
<td>425 AF</td>
<td></td>
</tr>
<tr>
<td>Powerline Channel @ Amole</td>
<td>475 cfs/2000 cfs</td>
<td>502 cfs</td>
<td>941 cfs (3)</td>
<td>20 cfs</td>
<td>475 cfs</td>
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</tr>
<tr>
<td>Amole Arroyo @ Delgado CBC</td>
<td>720 cfs/720 cfs</td>
<td>652 cfs</td>
<td>1525 cfs</td>
<td>575 cfs</td>
<td>720 cfs</td>
<td></td>
</tr>
<tr>
<td>Snow Vista Channel @ Amole</td>
<td>1200 cfs/2800 cfs</td>
<td>1814 cfs (3)</td>
<td>2083 cfs (3)</td>
<td>2083 cfs</td>
<td>2100 cfs</td>
<td></td>
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<tr>
<td>Entrance Rundown to Amole Dam</td>
<td>4236 cfs/7480 cfs</td>
<td>3022 cfs (4)</td>
<td>6089 cfs</td>
<td>5293 cfs</td>
<td>5300 cfs</td>
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<tr>
<td>South Powerline Detention</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>65.1 AF</td>
<td>65.1 AF</td>
<td>New Facility</td>
</tr>
<tr>
<td>South Powerline Channel @ Rio Bravo</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>446 cfs</td>
<td>450 cfs</td>
<td>New Facility</td>
</tr>
<tr>
<td>Sacate Blanco Diversion @ Amole</td>
<td>853 cfs/1660 cfs</td>
<td>901 cfs</td>
<td>2380 cfs</td>
<td>1183 cfs (5)</td>
<td>1190 cfs</td>
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<tr>
<td>Rio Bravo Roadway Channel @ Hubbell</td>
<td>1105 cfs/2190 cfs</td>
<td>400 cfs</td>
<td>1004 cfs</td>
<td>658 cfs</td>
<td>1105 cfs</td>
<td></td>
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<tr>
<td>South Rio Bravo Channel @ Hubbell Lake</td>
<td>NA</td>
<td>357 cfs</td>
<td>734 cfs</td>
<td>644 cfs (5)</td>
<td>700 cfs</td>
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<tr>
<td>Borrega Detention Basin</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>51 AF</td>
<td>51 AF</td>
<td>New Facility</td>
</tr>
<tr>
<td>Borrega Diversion @ Inlet</td>
<td>225 cfs/225 cfs</td>
<td>612 cfs (5)</td>
<td>1627 cfs (5)</td>
<td>225 cfs</td>
<td>225 cfs</td>
<td></td>
</tr>
<tr>
<td>Amole Dam (Detention)</td>
<td>492 AFI/492 AF</td>
<td>492 AFI</td>
<td>492 AF</td>
<td>1352 AF</td>
<td>1352 AF</td>
<td>w/ Guac Basin</td>
</tr>
<tr>
<td>Hubbell Channel @ Amole Dam</td>
<td>10159 cfs/10159 cfs</td>
<td>122 cfs</td>
<td>2524 cfs</td>
<td>150 cfs</td>
<td>10159 cfs</td>
<td></td>
</tr>
<tr>
<td>Hubbell Dam</td>
<td>493 AFI/493 AF</td>
<td>519 AF</td>
<td>1301AF(1)</td>
<td>493 AF</td>
<td>493 AF</td>
<td></td>
</tr>
</tbody>
</table>

(1) Incorporates Amole Dams and Diversion of runoff north of I-40 (15 Sft).  
(2) w/o Amole Dams and Diversion north of I-40.  
(3) Contained within available freeboard.  
(4) Minor Channel upgrades to convey flows.  
(5) Significant improvements required to convey flows.
AMAPCA Board of Directors regarding the Amole and Hubbell drainage basins below the Westgate Dam.

PASSED, ADOPTED AND SIGNED THIS 20th DAY OF July, 1999

[Signature]
Ronald D. Brown, Chairman

ATTEST:  
[Signature]
Clifford E. Anderson, Secretary/Treasurer
## TABLE III-2
### HYDROLOGIC SUMMARY
#### POWERLINE BASIN

<table>
<thead>
<tr>
<th>AP NO</th>
<th>MAI NO</th>
<th>DESCRIPTION</th>
<th>VARIABLE</th>
<th>EXISTING FACILITIES</th>
<th>DEVEL</th>
<th>EXISTING CAPACITY</th>
<th>DMP</th>
<th>FUTURE CAPACITY</th>
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</thead>
<tbody>
<tr>
<td>11A</td>
<td>4</td>
<td>POWERLINE CHANNEL ABOVE CENTRAL AVE. CROSSING</td>
<td>Q (cfs)</td>
<td>677</td>
<td>403</td>
<td>577</td>
<td>600</td>
<td></td>
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**Notes/Legend:**
- AP - Analysis Point - See Figures this report, maps in Volume II and detail hydrology in Volume III.
- Q - Peak discharge rate
- Tvol - Total runoff volume
- Dvol - Maximum detained volume
- Runoff - inches of runoff
- cfs/ac - peak discharge rate per acre of contributing area.
- Existing - Existing land use and existing drainage facilities.
- DEVELX - Fully developed land use and existing drainage facilities.
- Capacity - Design capacity.
- DMP - Proposed improvements in place, fully developed land use.
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<td>619</td>
<td>1558</td>
<td>640</td>
<td>171</td>
<td>640</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tvol (AF)</td>
<td>33.1</td>
<td>94.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Dvol(AF)</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td>51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Runoff (in)</td>
<td>0.55</td>
<td>1.56</td>
<td></td>
<td></td>
<td>1.59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cfs/ac</td>
<td>0.85</td>
<td>2.14</td>
<td></td>
<td></td>
<td>0.86</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51.1</td>
<td>9</td>
<td>N. BORREGA ARROYO</td>
<td>Q (cfs)</td>
<td>513</td>
<td>1275</td>
<td>NA</td>
<td>1005</td>
<td>1005</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tvol (AF)</td>
<td>27.9</td>
<td>73.2</td>
<td></td>
<td></td>
<td>60.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Runoff (in)</td>
<td>0.55</td>
<td>1.55</td>
<td></td>
<td></td>
<td>1.57</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cfs/ac</td>
<td>0.85</td>
<td>2.11</td>
<td></td>
<td></td>
<td>2.47</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51.2</td>
<td>9</td>
<td>S. BORREGA ARROYO</td>
<td>Q (cfs)</td>
<td>112</td>
<td>320</td>
<td>NA</td>
<td>320</td>
<td>320</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tvol (AF)</td>
<td>5.25</td>
<td>16.3</td>
<td></td>
<td></td>
<td>16.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Runoff (in)</td>
<td>0.51</td>
<td>1.60</td>
<td></td>
<td></td>
<td>1.60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cfs/ac</td>
<td>0.92</td>
<td>2.61</td>
<td></td>
<td></td>
<td>2.81</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51.3</td>
<td>9</td>
<td>AREA 5B STORM DRAIN</td>
<td>Q (cfs)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>230</td>
<td>230</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tvol (AF)</td>
<td>12.50</td>
<td>12.50</td>
<td></td>
<td></td>
<td>1.60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Runoff (in)</td>
<td>1.60</td>
<td>1.60</td>
<td></td>
<td></td>
<td>2.44</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>9</td>
<td>BORREGA INLET TO HUBBELL LAKE</td>
<td>Q (cfs)</td>
<td>612</td>
<td>1627</td>
<td>225</td>
<td>225</td>
<td>225</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tvol (AF)</td>
<td>41.1</td>
<td>116</td>
<td>(bank full)</td>
<td>94</td>
<td>(with freeboard)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Runoff (in)</td>
<td>0.55</td>
<td>1.56</td>
<td></td>
<td></td>
<td>1.59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cfs/ac</td>
<td>0.69</td>
<td>1.83</td>
<td></td>
<td></td>
<td>0.86</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes/Legend**

AP - Analysis Point - See Figures this report, maps in Volume II and detail hydrology in Volume III.
Q - Peak discharge rate
Tvol - Total runoff volume
Dvol - Maximum detainted volume
Runoff - inches of runoff

Qout - Outflow peak discharge rate.

Exist - Existing land use and existing drainage facilities.
DEVE - Fully developed land use and existing drainage facilities.
Capacity - Design capacity.
DMP - Proposed improvements in place, fully developed land use.
cfs/ac - peak discharge rate per acre of contributing area.
RESOLUTION 2011-11
ADOPTION OF THE DON FELIPE DAM WATERSHED
DRAINAGE MANAGEMENT PLAN

WHEREAS, there is no comprehensive drainage management plan ("DMP") for the southwest mesa area ("Area") of Bernalillo County, New Mexico; and

WHEREAS, the Albuquerque Metropolitan Arroyo Flood Control Authority ("AMAFC") owns and operates three flood detention dams that receive stormwater runoff from the Area, one of which is the Don Felipe Dam; and

WHEREAS, the watershed upstream of the dam has not been re-studied since the dam was constructed in 1987; and

WHEREAS, in 2001, Bernalillo County adopted the Southwest Area Plan, which outlines development densities and includes the Don Felipe Dam watershed; and

WHEREAS, AMAFC and Bernalillo County recognize that the Area has potential for development in the future and wish to establish a plan for controlled drainage management; and

WHEREAS, in August 2006, the AMAFC Board of Directors approved an engineering services contract with Bohasman Huston, Inc. to re-evaluate the watershed hydrologic analysis and dam capacity and to recommend drainage management options; and

WHEREAS, AMAFC and Bernalillo County have pending MS-4 Stormwater Discharge Permits with the Environmental Protection Agency and wish to address stormwater quality treatment in the DMP.

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY, BERNALILLO COUNTY, NEW MEXICO:

The drainage management options and 100-year flow rates recommended by the Don Felipe Dam Watershed Drainage Management Plan, prepared by Bohasman Huston, Inc. and dated July 2011, are hereby adopted, subject to the following:

1. Modifications to the adopted Drainage Management Plan may be as circumstances dictate and shall be approved by the AMAFC Board of Directors.

2. The Drainage Management Plan identifies proposed drainage and flood control facilities that will provide protection to the community from stormwater runoff. The adoption of this plan does not imply a commitment on the part of the AMAFC Board of Directors or any other public agency to build any or all of said facilities. Financing and scheduling of improvements are subject to the availability of public funds and the initiatives of the private sector.

Passed, adopted and signed this 23rd day of July, 2011.

Attest:

[Signature]
Bruce M. Thomson, Secretary/Treasurer
Board of Directors

[Signature] (Chairman)
Dennis Hernandez, Chairman
Board of Directors
EXECUTIVE SUMMARY

The Don Felipe Dam (Dam) was completed in 1987 and designed as a retention dam for the 100-year storm event. The primary exit conduit (a 36' RCP) is gated and was designed to empty the Dam within 90 minutes of being opened after a storm event. Bovay Engineering, Inc., performed the original design, and the design report indicates a 100-year design inflow and volume of 201 cubic feet per second (cfs) and 128 acre-feet (af), respectively, for undeveloped conditions. Bovay used the SCS Unit Hydrograph Method for their hydrologic analysis. The overall Dam site occupies approximately 66 acres in area. Though the Dam was originally designed for retention, the United States Army Corps of Engineers’ (USACE) and AMAFCA’s Black Mesa Diversion Outfall project is allowing a change to detention. With this project, the Dam outflow will be conveyed, along with the outflows from the Raymond and McCoy Dams, to the Rio Grande.

The Don Felipe Drainage Management Plan (DMP), authorized by the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA), provides the framework for safe and orderly planning and implementation of drainage improvements within the Don Felipe Watershed. This DMP and supporting documents provide a comprehensive drainage management plan for the DMP study area, which covers approximately 2.49 square miles of the South Valley. The Don Felipe Watershed generally consists of the area west of the Don Felipe Detention Facility, east of Escarpment Road, and between the northern and southern bounding ridges, as shown on the attached Basin Map.

This report includes a literature review of past investigations into the drainage in the South Valley of Albuquerque and Serrano County, hydrologic analyses for existing and future conditions of the Don Felipe Watershed, and analysis of 3 options to control flooding and provide an overall drainage management plan for the project area.

Literature Review

The Literature Review section summarizes past investigations into the drainage conditions in the South Valley of Albuquerque and Serrano County in support of development of a drainage master plan for a portion of the area. The South Valley generally consists of the area bounded by the Rio Grande to the east, the Gun Club Lateral to the west, Interstate 25 to the south, and the drainage divide near Bridge Boulevard to the north. Included are descriptions of current and proposed flood and drainage conditions, anticipated land treatments, and current and proposed drainage structures. In addition, hydraulic analyses of existing and proposed systems are summarized where available. The Don Felipe DMP encompasses only the Dam Watershed, which includes the Don Felipe Watershed itself and the North Branch Pajarito Arroyo, a total of 3.49 square miles.

Hydrology and Hydraulics

A hydrologic and hydraulic analysis was performed to determine the existing and future conditions runoff rates and volumes to the Dam, and to determine the adequacy of the Dam under existing and future conditions. The 5-, 10-, and 100-year events were analyzed. Bovay performed the hydrologic analysis consistent with requirements in the Albuquerque Design Process Manual, Section 23 and implemented the AHYMO97 model. The flow rates determined by the BH analysis are generally higher than those presented in the original design report by Bovay Engineering due to changes to the community adopted hydrologic methodologies and software. A summary of flow rates and volume of runoff are shown in Table 1.

Table 1 – Summary of Flow Rates and Volume of Runoff

<table>
<thead>
<tr>
<th>Basin/AR</th>
<th>Existing Conditions</th>
<th>Future Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Peak Discharge</td>
<td>Runoff Volume</td>
</tr>
<tr>
<td></td>
<td>cfs</td>
<td>acre-ft</td>
</tr>
<tr>
<td>1</td>
<td>228.0</td>
<td>20.55</td>
</tr>
<tr>
<td>1a</td>
<td>65.2</td>
<td>2.03</td>
</tr>
<tr>
<td>2</td>
<td>62.3</td>
<td>2.05</td>
</tr>
<tr>
<td>3</td>
<td>157.3</td>
<td>12.06</td>
</tr>
<tr>
<td>4</td>
<td>42.8</td>
<td>1.76</td>
</tr>
<tr>
<td>5</td>
<td>216.2</td>
<td>17.33</td>
</tr>
<tr>
<td>6</td>
<td>85.7</td>
<td>6.69</td>
</tr>
<tr>
<td>7</td>
<td>214.9</td>
<td>16.09</td>
</tr>
<tr>
<td>8</td>
<td>78.3</td>
<td>6.47</td>
</tr>
<tr>
<td>9</td>
<td>97.0</td>
<td>7.28</td>
</tr>
<tr>
<td>10</td>
<td>108.4</td>
<td>4.79</td>
</tr>
<tr>
<td>11</td>
<td>100.3</td>
<td>5.22</td>
</tr>
<tr>
<td>12a</td>
<td>126.0</td>
<td>4.96</td>
</tr>
<tr>
<td>12b</td>
<td>126.7</td>
<td>4.54</td>
</tr>
<tr>
<td>12c</td>
<td>66.7</td>
<td>1.86</td>
</tr>
<tr>
<td>12d</td>
<td>51.4</td>
<td>1.44</td>
</tr>
</tbody>
</table>

A Sediment Transport Analysis and Prudent Line Study has been completed by Messeter Engineering, Inc. (MEI), now part of TetraTech. This study includes detailed hydraulic, sediment transport and lateral erosion analyses of the North Branch Pajarito Arroyo. A complete description of this analysis is included in the Don Felipe Watershed Drainage Management Plan Sediment Transport Analysis and...
Drainage Management Plan for Don Felipe Dam

Prudent Line Study (MEL, 2007). As a result of this study, prudent lines have been established for the North Branch of the Pajarito Arroyo. Figures outlining these prudent lines are included in the Don Felipe DMP.

Option Analysis

Options and recommendations were made for drainage management for the 100-year event in the upstream Watershed under future development conditions. The options were developed with the assumption of an open gate condition in accordance with the USACE and AMAFCA Black Mesa Diversion Project. These options have been discussed with AMAFCA staff, and are as follows:

1. Option 1 consists of a series of 19 small ponds located throughout the Watershed, connected via a storm drain system discharging to the Dam. The ponds are designed to reduce the peak inflow into the Dam under developed conditions so that the Dam can detain the 100-year developed flow with its current geometry and 1 foot of freeboard. All the ponds were designed to be less than 80 ac-ft in volume and less than 25 feet in depth, and therefore are not subject to regulation by the Office of the State Engineer. This option does not require modifying the current Dam pool, but does require the Dam pool to be maintained to ensure that it exhibits the rating curve indicated on the as-built. The total estimated project cost of Option 1 is about $9.4 Million.

2. Option 2 consists of a series of small ponds throughout part of the Watershed, combined with an area of free discharge. Within the 1 dwelling units per acre (duals) zoned portion of the Watershed, 6 upland ponds of approximately 20 ac-ft or less are distributed similarly to Option 1. Within the higher 6 duals area of the Watershed, discharge runs freely into a storm drain system and is routed to the Dam. Option 2 will allow for the development in higher densities to proceed without the restrictions of locating ponds within this area. The upland ponds are designed to reduce the peak inflow into the Dam under developed conditions so that the Dam can detain the 100-year developed flow with its current geometry and 1 foot of freeboard. The total estimated project cost of Option 2 is about $5.8 million.

3. Option 3 for the drainage management system consists of free discharge throughout the entire Watershed, with storm drain systems routing the runoff to the Dam. This option requires the size of the Dam pool to be increased within the current AMAFCA right of way to accept the higher runoff generated under developed conditions with 1 foot of freeboard. This option eliminates the need for any small ponds within the Watershed. The total estimated project cost of Option 3 is about $15.5 Million.

Development and Water Quality

This section of the DMP addresses developers' responsibilities to construct the master-planned facilities and the requirements for water quality treatment and low impact design.

Conclusion and Recommendations

This report establishes the existing and proposed hydrology for the 2-, 10-, and 100-year events, and provides 3 constructed options for drainage management in the Don Felipe Watershed. Analysis of the constructed options has determined preliminary locations, sizes, and alignments for hydraulic structures including major storm sewers, channels, and detention ponds.

Based on the cost of construction and the ability to allow for development with fewer restrictions Bohannan Huston recommends Option 2. This option will address the long term needs of the Don Felipe Watershed and meet the discharge requirements for the Black Mesa Diversion Outfall project.
DRAINAGE MANAGEMENT PLAN FOR DON FELIPE DAM

I. INTRODUCTION

The Don Felipe Dam Drainage Management Plan (DMP), authorized by the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA), provides the framework for safe and orderly planning and implementation of drainage improvements within the Don Felipe Watershed. This DMP, and supporting documents, provide a comprehensive drainage management plan for the DMP study area, which covers approximately 3.49 square miles of the South Valley. The Don Felipe Watershed generally consists of the area west of the Don Felipe Dam (Dam), east of Encampment Road, and between the northern and southern bounding ridges.

The Dam was completed in 1967 and designed as a retention dam for the 100-year storm event. Though the Dam was originally designed for retention, the United States Army Corps of Engineers' (USACE) and AMAFCAs's Black Mesa Diversion Outfall project is allowing a change to detention. With this project, the Dam will be conveyed, along with the outflows from the Raymose and McCoy Dams, to the Rio Grande. Table 2 provides a summary of data from the Dam's as-built filing sheet.

<table>
<thead>
<tr>
<th>Description</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Height Above Foundation</td>
<td>32 feet</td>
</tr>
<tr>
<td>Length</td>
<td>2,600 feet</td>
</tr>
<tr>
<td>Maximum Width at Base</td>
<td>137 feet</td>
</tr>
<tr>
<td>Slope Upstream of Face</td>
<td>3.5%</td>
</tr>
<tr>
<td>Slope Downstream of Face</td>
<td>2%</td>
</tr>
<tr>
<td>Elevation at Crest of Dam</td>
<td>493 feet</td>
</tr>
<tr>
<td>Elevation at Spillway of Dam</td>
<td>497 feet</td>
</tr>
<tr>
<td>Elevation of Bottom Tower Outfall</td>
<td>4950 feet</td>
</tr>
<tr>
<td>Elevation of Flow Line of Outlet Conduit</td>
<td>4950 feet</td>
</tr>
<tr>
<td>Width of Spillway</td>
<td>150 feet</td>
</tr>
<tr>
<td>Discharge Capacity of Spillway at elav. 4979.02 ft</td>
<td>1,260 cfs</td>
</tr>
<tr>
<td>Outlet Conduit Type and Size</td>
<td>36&quot; RCP</td>
</tr>
<tr>
<td>Outlet Conduit Capacity</td>
<td>40 cfs</td>
</tr>
<tr>
<td>Evaporation Time</td>
<td>80 hrs.</td>
</tr>
<tr>
<td>Drainage Area</td>
<td>3.78 sq. mi.</td>
</tr>
</tbody>
</table>

* Elevation based on 6298 datum

Table 2 – Summary of Elevation Sheet

This report includes a literature review of past investigations into the drainage in the South Valley of Albuquerque and Bernalillo County, hydrologic analyses for existing and future conditions of the Don Felipe Watershed, and analysis of 3 options to control flooding and provide an overall drainage management plan for the project area to assure that the capacity of the Don Felipe Dam is maintained. It also includes requirements for water quality treatment.

II. LITERATURE REVIEW

This section summarizes past investigations into the drainage conditions in the South Valley of Albuquerque and Bernalillo County in support of development of a drainage master plan for a portion of the area. The South Valley generally consists of the area bounded by the Rio Grande to the east, the Gunn Club Lateral to the west, Interstate 25 to the south, and the drainage divide near Bridge Boulevard to the north. Included are descriptions of current and proposed flood and drainage conditions, anticipated land treatments, and current and proposed drainage structures. In addition, hydraulic analyses of existing and proposed systems are summarized where available. The Don Felipe DMP will encompass only the Dam Watershed, which includes the Don Felipe Watershed itself and the North Branch Pajarito Arroyo, a total of 3.49 square miles.

A. "DON FELIPE DETENTION FACILITY – ENGINEERING REPORT SUPPLEMENT", BOVAY ENGINEERS, INC., JUNE 1982

This report is an engineering report that presents the design parameters and preliminary calculations for the proposed Don Felipe Dam, located near the intersection of Coors Road and Don Felipe Road. In addition to the proposed detention facility, Bovay Engineers, Inc. suggests diverting runoff into the project site from two adjoining areas, one area to the northwest of the project location, and one area from the southwest area. The preliminary design in this report includes the design of a detention facility with the two diversions as well as design of the detention facility without the diversions.

In addition to the preliminary design of the proposed Don Felipe Dam Project, this report contains the following:
- Documentation of previously developed hydrology for the Watershed above the proposed Dam site.
- Description of the projects alternatives, of which there are three.
- Preliminary plans that are 60% complete.
- Preliminary estimate of construction cost which includes right-of-way costs.

For the design of the project, the primary guide that was used was the "Design of Small Dams", published by the United States Department of Interior, Bureau of Reclamation. Other forms of guidance include:

Bohannan Huston
AMOLE ARROYO - WESTGATE DAM DRAINAGE MANAGEMENT PLAN

July 1992
For the analysis representing existing conditions, seven key locations are the focus of the resulting hydrology:

4.8.1 Westgate Dam

The following table lists the characteristic data for which Westgate Dam was designed:

<table>
<thead>
<tr>
<th>TABLE 5 - WESTGATE DAM DESIGN PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-year peak inflow - westerly Amole Arroyo</td>
</tr>
<tr>
<td>100-year peak inflow - easterly Amole Arroyo</td>
</tr>
<tr>
<td>100-year combined peak inflow to dam</td>
</tr>
<tr>
<td>100-year accumulated inflow volume</td>
</tr>
<tr>
<td>100-year sediment inflow</td>
</tr>
<tr>
<td>Emergency spillway crest elevation</td>
</tr>
<tr>
<td>Emergency spillway width/depth</td>
</tr>
<tr>
<td>Top of dam elevation</td>
</tr>
<tr>
<td>Length of dam</td>
</tr>
<tr>
<td>Base width of dam</td>
</tr>
<tr>
<td>Crest width of dam</td>
</tr>
<tr>
<td>Slope of upstream face</td>
</tr>
<tr>
<td>Slope of downstream face</td>
</tr>
<tr>
<td>Diameter of outlet pipe</td>
</tr>
<tr>
<td>100-year max. water surface elev.</td>
</tr>
<tr>
<td>Evacuation period</td>
</tr>
<tr>
<td>100-year peak outflow</td>
</tr>
</tbody>
</table>

The above parameters were extracted from the filing sheet contained in the construction plans for Westgate Dam. It should be noted that the computed storage-depth curve from the new mapping differs from the storage-depth curve on the filing sheet. The filing sheet data is used when discussing the dam design parameters. Computed curves are used in all new modelling.

Table 6 below provides a comparison of the dam design parameters and those computed under AHYMO991 for this study. Areal reduction is applied in calculating the values shown in the AHYMO991 column ($P_{24\text{hr.}} = 2.59\text{"}$).

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APPENDIX C – REQUEST FOR CONCURRENCE
LETTER FROM THE OFFICE OF THE STATE ENGINEER
December 20, 2012

Mr. Jess Ward  
New Mexico Office of the State Engineer  
5550 San Antonio Dr. NW  
Albuquerque, New Mexico 87109

Re: Continued Retention of Storm Events: Santolina Master Planned Community

Dear Mr. Ward:

The Santolina Master Planned Community (Santolina) is a proposed long term development located south of Interstate 40, and west of the Rio Grande River, in Bernalillo County, NM. The development encompasses approximately 14,000 acres and roughly spans from I-40 on the north to the Pajarito Land Grant on the south, from 118th St on the east and the Rio Puerco escarpment on the west.

The Santolina master plan area is a unique, mostly mesa top environment in which there are (1) drainage basins with large natural land depressions, or playas, and (2) drainage basins naturally draining to the Rio Grande River. The Santolina stormwater master plan continues and preserves both of these existing drainage patterns. Accordingly, as with previous master plans in the Albuquerque region, the purpose of this letter is to obtain concurrence from the Office of the State Engineer regarding the retention of stormwater in the following manner:

I. Full post-development stormwater retention of storm events in the basins that are controlled (in the existing condition) by natural depressions (or playas).

II. Post-development retention up to the 5-year, 24-hour storm events in the basins that (in the existing undeveloped condition) discharge to the river.

As portrayed on the enclosed Master Plan exhibits, Santolina is proposing the following Post-Development Stormwater Management Plans, for each of the two major drainage basin types:

**Basins with Natural Depressions (Playas)**

As noted on the tables of the enclosed Master Plan, the existing "available volume" of the depressions within Santolina far exceed the "volume generated" in the undeveloped condition's 100-year, 10-day storm event volume (this storm event is the County's design storm event, and is used herein to compare stormwater flows). This determination reveals that, for even major storm events, drainage flows from these basins do not historically discharge to or reach the Rio Grande River in the existing undeveloped condition.
Accordingly, the Santolina Stormwater Master Plan proposes full post-development stormwater retention of storm events. Land development within these basins shall be required to retain the developed 100-year, 10-day storm volume. It is noted that the proposed retention ponding provides for some minor shallow groundwater recharge and water harvesting. Full post-development retention of flows in natural depression (playa)-controlled basins was previously approved by your office for the Community Master Plan for the Mesa del Sol Development, dated September 15, 2005. Enclosed is the letter from your office approving this method at that time. The proposed Santolina stormwater master plan is in accordance with this precedent.

Basins which Historically Discharge to River in Large Events

In an effort to provide some stormwater capture for water harvesting, minimization of downstream drainage infrastructure and shallow recharge, Santolina proposes to capture and retain only those drainage flows that do not historically reach the river from a storm event. These "retained" flows represent the initial extrapolation of rainfall by the existing natural soil surfaces, reducing or eliminating runoff flows from the land to the drainage arroyos. All runoff exceeding this initial extrapolation is discharged to the river in time.

The enclosed "Table D" provides runoff volumes for several storm events. The 5-year, 24 hour storm event is selected to represent "initial extrapolation" for the following reasons:

- Our hydrologic analysis summarized in Table D demonstrates minimal or no excess runoff in this 5-yr storm event, and most closely represents the single storm event of the initial extrapolation occurrence.
- The Quail Ranch, Phase One Conceptual Infrastructure Analysis Report, prepared by Bohannan Huston on January 26, 2005 and reviewed with the OSE, has similar site characteristics (location, vegetation, soil type and terrain) and had recommended this 5-yr storm event based on a hydrologic analysis that showed no runoff is produced, under existing natural conditions by storm events less than or equal to the 5-year event.
- The 5-year storm event is a widely used and available data set for use in these hydrologic calculations.

Given the above analysis, Santolina's Stormwater Management Plan proposes to construct post-development drainage infrastructure, such as detention dams, with minor retention capabilities up to the 5-yr, 24-hr storm event volume.

Summary

In summary, the two proposed stormwater management approaches (by type of basin) do not adversely affect downstream drainage expectations. Storm water runoff to the Rio Grande River from the Santolina development in the post-development condition will be equal to or more than that of the historic drainage condition. We believe that this result complies with the OSE's regulations for stormwater management in the Rio Grande Basin.
Your written concurrence with the proposed storm water management approaches would be greatly appreciated. Please find enclosed supplemental information, supporting the approval of this request.

If you have any questions or need additional information, please contact me. Thank you for your time.

Sincerely,

Brian C. Patterson, P.E.
Project Engineer
Community Development & Planning

BCP/tms
Enclosures

cc: James Topmiller, BHI