PLAN OF DEVELOPMENT REPORT

for

SOUTHWEST PROVING GROUND

CHRYSLER CORPORATION

June 1, 1978

prepared by

Johannessen & Girand
Consulting Engineers, Inc.

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TYPE OR USE BLACK INK ONLY

APPLICATION FOR AMENDMENT OF THE ZONING ORDINANCE OR CHANGE OF ZONING DISTRICT BOUNDARIES FOR UNINCORPORATED AREAS OF MARICOPA COUNTY, ARIZONA

Cash Receipt No. _____ Amount _____ Date _____ Case No. _____

TO MARICOPA COUNTY BOARD OF SUPERVISORS, PHOENIX, ARIZONA

I hereby request a change of zoning classification, an amendment of the zoning regulations, or approval of a Special Permit as follows: (list the present zoning classification and then the proposed classification, using separate parcel numbers if more than one change of zoning is proposed):

Parcel 1 From: _____ To: _____
Parcel 2
Parcel 3 Request to permit an experimental and proving ground as a
Parcel 4 Special Use in Rural-43 zoning district pursuant to Article XXIV, Section 2401, M.C.Z.O.

The legal description of the property proposed to be rezoned by this application is as follows: (if more space is needed, attach separate sheet):

Sections 4, 5, 6, 7, 8, 9 of T5N, R2W G&SRB&M

The size (to nearest tenth of an acre) and general location of the subject property is as follows (give direction and distance from nearest mapped street):

Size - 3,816.9 gross acres

Location - Beginning approximately one-half mile northeast of the corner of Birdsong Avenue and North Center Street in Wittman

(Please answer the following questions in the space provided or submit a separate signed statement if additional space is needed).

1. Why is the property in question not reasonably suited for use permitted under present zoning districting? Use permit required

2. Are there any known changes in land use, street arrangement, or other physical conditions that have altered the character of your property, or adjoining property, since the present zoning was adopted? Please explain "yes" answer.

   No.

3. If your requested change is to provide additional commercial or industrial zoning is there a demonstrable need for this zoning in order to serve the community or neighborhood, as the case may be? Explain. Yes. Area is isolated and ideally located for automotive proving ground

4. Does the requested change conform to any public land use plans, the adopted major street and highway plan for Maricopa County, Flood Control Plans, adopted plan for a system of hiking and riding trails, and any other public physical plans for schools, parks, and other recreational facilities?

   Yes. Development will conform to Flood Control and major street and highway plans.

5. Other reasons for the subject request. The development of this use will create new jobs and be beneficial to the School District as a tax producing entity.

Describe existing and proposed future use of subject property, buildings and structures:

See attached brochure

Attach any supporting information, statements or plans* to this application and submit same in person to: Maricopa County Planning and Zoning Commission-Department, 111 South 3rd Avenue, Phoenix, Arizona. (Note: The land owner(s) must sign below or else the applicant must submit a letter signed by the owner authorizing him to apply for this change of zoning.)

Frank Haze Burch	P.O. Box 13528	Phoenix, Az 85002	252-7701
(Name of applicant or representive)	(Address)		(Phone)
~~Chrysler Corporation~~ c/o F.H. Burch	"	"	"
(Name of land Owner)	(Address)		(Phone)

Frank Haze Burch P.O. Box 13528 Phoenix, Arizona 85002
(Name and address of person to whom petition and notices should be mailed)

(Signature of applicant) (Date)

*Note: Plans shall accompany an application filed for the following: Special Use, Neighborhood Unit Plan of Development, and Residential Unit Plan of Development pursuant to Article XXIV of "The 1969 Amended Zoning Ordinance for the Unincorporated Area of Maricopa County".

DO NOT FILL OUT FOLLOWING
(FOR OFFICE RECORDS ONLY)

LEGAL PUBLICATION

ZONING CASE NUMBER _____

6/18/75

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APPENDICES

ITEM 2 - PURPOSE OF REQUEST

The property included in the request for special use will be used for the testing and development of automotive vehicles for Chrysler Corporation.

Testing and development of automobiles and trucks for the consumer market is a coordinated effort in which laboratories, proving grounds, rented facilities, and public streets and highways are utilized. In addition, the testing must be accomplished over a wide range of climatic and topographic conditions and on a variety of road surfaces.

Laboratories play an important role in the initial development of the automotive vehicle; however, this effort must be correlated or verified by actual "in the field" testing. Laboratory testing must be conducted in a simulated environment which seldom if ever contains the infinite number of complex variables which occur during actual vehicle operation. Proving ground facilities are thus the logical extension of the laboratory testing effort. The proving ground facilities contain a variety of roads which closely simulate the actual driving conditions that the customer experiences with his own vehicle. At a proving ground, vehicles can be tested under controlled and safe conditions free from interferences from the motoring public.

Chrysler Corporation operates a well-developed proving ground facility near Chelsea, Michigan. The testing effort in Michigan has been supplemented by road trips to various parts of the country

and by use of rented test facilities in cold-weather areas of Canada, mountainous areas of Colorado, and in the warm, arid areas of Arizona. For the past 20 years Chrysler has operated a test station in the Phoenix area, where much of the testing has been conducted on public roads or at facilities rented from other proving grounds in the area.

The need for a supplemental proving ground facility arises mainly from the product development workload which must be accomplished over the next several years. The federally mandated fuel economy, vehicle emissions, and safety standards are creating an entirely new family of motor vehicles which must be developed to meet these standards. The amount of development and testing required has increased, and much of it must now be accomplished in a shorter and more restrictive time frame than ever before. Much of the present and future workload must be accomplished during the winter months when the ice and snow in Michigan have an extremely adverse affect on all testing programs. A southwestern proving ground facility is required to provide the calendar days and a year-round testing effort which is necessary.

A further need for a southwestern proving ground facility stems from the fact that much of our present operation at the test station in Sun City has utilized public roads in the area. Since the advent of the 55mph speed law, many operations which must be conducted at high speeds have been conducted at other proving ground facilities where less than adequate testing conditions frequently prevail. Even though the motoring public must observe the legal

speed limits, the automobile manufacturer must test his product at higher speed ranges to insure product reliability and durability and to satisfy the requirements imposed by police agencies for their pursuit vehicles. In addition, the growth of traffic in the Phoenix area has created congested driving conditions in which controlled and repeatable vehicle test operations are difficult or seldom attained.

A privately-owned test road network is required to provide safe and controlled conditions for vehicle test operations.

A number of potential southwestern proving ground sites were studied prior to the selection of the site near Wittmann, Arizona. Among the various sites considered were several locations in southern California, western Texas, and sites near Phoenix, Eloy and Tucson in Arizona.

The site near Wittmann was selected since it met most of the requirements for development of a proving ground at reasonable cost:

*The land is generally flat and will accommodate construction of those road facilities which require a flat gradient without the requirements to move an excessive amount of earth and disturb the environment. Approximately ten percent (10%) of the proposed 3,808 acres will be affected by this development.

*Availability of a large tract of land under single ownership permits assemblage of sufficient acreage for a proving ground without experiencing the delays which would occur when contacting multiple owners.

*Present land is natural desert with no present development. This area facilitates placement of proving ground facilities on site and still permits the majority of the site to remain in its natural desert condition.

*Surrounding area is sparsely inhabited and helps to retain relative seclusion of the site from the public, and provides opportunity for product security.

*Site is not too distant from the large metropolitan area of Phoenix, which provides the necessary supporting services and labor market as well as excellent transportation facilities.

*Electric power and telephone service are available not too distant from the proposed development, and can be extended to the site at reasonable cost.

*Site can be reached from a major highway, and the surrounding road network facilitates access to mountainous areas to the north for further vehicle testing under high altitude conditions.

The nature of a proving ground operation is such that it does not create noise, pollution, or traffic volumes, and thus has little impact on the surrounding area. The development of a water supply and sewage disposal system on site will create a great measure of self-sufficiency without a need to affect the rather limited services in the Wittmann community area. Since a proving ground facility will create little if any environmental impact, it can co-exist with a variety of land uses in the area, even including residential. It is particularly well suited to the existing rural environment, since most facilities can be placed on the site in such a manner that the property retains its natural desert appearance. A 300' wide buffer strip is proposed around the entire site perimeter to assist in preserving this natural desert appearance.

Proving ground employment should not create an adverse impact on the surrounding area. An estimated 50 to 70 employees will be required initially. The majority of these personnel will be

employees presently located at the test station in Sun City. It is assumed that most personnel will continue to reside in the Phoenix metropolitan area and either drive their personal vehicles or utilize "ride pools" to get to work.

Employees working at the proving ground will include engineers, technicians, test drivers, mechanics, clerical personnel, and service personnel required to maintain buildings and grounds facilities and provide material procurement services. It is anticipated that most new employees will be obtained from within the existing labor market in the Phoenix area.

A growth pattern is assumed for the future years, with additional buildings, laboratories and road testing facilities being added. Employment level may ultimately climb to approximately 200 personnel after the facility is in a more advanced stage of development.

ITEM 3 - DESCRIPTION OF PROPOSAL

A portion of the six-section development consists of an area to be set aside for the construction of buildings and the supporting and service facilities which are required for proving ground operation. The remaining area, which comprises the majority of the site acreage, will be used to construct test roads and miscellaneous supporting facilities associated with road test operations. The spatial relationship between test roads and the building development area is depicted on the attached graphic site "Plan of Development."

The graphic material which is presented is intended to portray the general character and overall location on the site of the major road test facilities. As engineering designs for each facility are completed, there may be some minor changes in location and in dimensional details; however, in all cases the overall use of the site will remain the same. It is proposed that building structures be constructed to a height not to exceed 30'.

The following comments will describe the general details and purpose for each of the proposed facilities. For clarity this has been arranged in three sections: buildings and related facilities, road testing facilities, and future development.

1. Buildings and Related Facilities

Garage-Office Building: The initial building to be constructed on site will be a combination garage and office building approximately 15,000 square feet in area. Space

will be provided in the building for offices, restrooms, test vehicle parts and supplies storage, and for a vehicle service garage which will be operated and equipped similar to a commercial automobile dealership garage facility. The building will be set back over 400' from the property line, to present an unobstructed view between the front of the building and the incoming entrance road. Landscaping in front of and adjacent to the building will utilize native cactus transplanted from other areas of the site in which roads are to be constructed.

Parking: Bituminous paved parking is proposed for on site parking for visitors, employees and test vehicles. Initial paving will be provided for an estimated total of 50 test vehicles, with a separate paved visitor and employee parking area to accommodate an additional 50 vehicles. Employee and visitor parking will be arranged to permit ease of access to both office and garage areas of the building. Employee and visitor parking will be situated adjacent to the main building area, to retain desired facilities set-back from the property line. Test vehicle parking will be situated in a lot adjacent to the garage-office building, but separate from the employee and visitor parking areas.

Material Deliveries: Initial development contemplates construction of a material delivery area adjacent to the stockroom area of the garage building.

Material Exposure Storage Area: A natural area will be

cleared in an area adjacent to the garage building which will be used to store material samples such as paint "chips," glass, vinyl material, sealants, and plastic trim to determine the fade and durability characteristics of materials when exposed to ambient weather and solar radiation. It is proposed to mount such samples on wooden racks in a position to obtain maximum exposure to direct sunlight.

Vehicle Wash Area: A concrete slab with a grit collection chamber and oil separator is proposed to be constructed in an area near to the garage building. This facility will be used for exterior washing and interior cleaning and vacuuming of test vehicles. It is proposed to construct an overhead metal canopy structure over the wash slab to provide shading from direct sunlight. Future additions to this facility may consist of automatic vehicle washing equipment.

Axle Weighing Scales: Present plans contemplate installation of platform axle weighing scales covered by a canopy structure adjacent to the outside vehicle wash area. This facility will also contain a small metal or block structure to house ballast bags which are used to simulate passenger and material loadings in test vehicles. The scales are used to determine axle loadings for test vehicles. An alternative location for this facility is a location within the garage building interior, with the exact location to be determined at the time the building is designed.

Fueling Facilities: All fuels will be procured locally and

stored on site. Installation of four 12,000 gallon underground fuel storage tanks is proposed. These tanks will contain various grades of gasoline and diesel fuel for use in vehicle testing. Submersible pumps will be installed in each tank which will deliver fuel to "island" dispensers similar to those at commercial gasoline stations. A metal canopy structure is contemplated over the fuel dispenser islands to provide shading from the sun and to reduce the effects of intense solar heating load in the vicinity of the fuel dispensers.

Waste Oil Storage: An underground storage tank will be provided to store oil which is drained from test vehicles. Size of this tank will be determined during design of the building and related facilities. A vendor will be utilized to remove oil from the storage tank on an "as needed" basis.

Water Supply: At the present time, a well is located in Section 17 on property to be acquired by Chrysler but which will not be included in the special use permit. Well data and water analysis indicate that this supply will be adequate for present known requirements. An economic study must be performed to determine whether a new well installed closer to the building site would prove to be a better financial investment initially. Available maps showing groundwater supplies in the area tend to indicate that sufficient groundwater supplies are available on site.

Sewage Disposal: Initial development will utilize a septic

tank and disposal system installed in accordance with local Maricopa County Health Department standards. Information obtained from soils maps of the area indicate that soils in the area have suitable permeability for subsurface disposal by leaching pit or similar methods of disposal.

Building Heating: Natural gas is not available in the area for use in heating. Present plans anticipate the use of either liquid propane or fuel oil for building space heating. The specific heating source will be determined at the time the building and related facilities are designed, along with a study on the economics of providing a solar heating source for the building.

Telephone and Electric Power: These utilities must be extended to the site from a location somewhat distant from the proposed development. This subject is treated elsewhere in the narrative presentation.

Area Lighting: Low intensity security lighting is proposed around the perimeter of the garage-office building and in the vicinity of service and storage areas. Parking lot type fixtures are proposed for vehicle parking areas.

Perimeter Fencing: Perimeter fencing in the building site area is proposed to be 6' high chain link type fence fabric, supported by galvanized steel posts, top rail, and including top arms with three strands of barbed wire. Other perimeter fencing will consist of four strands of barbed wire to a height of four feet, fastened to galvanized steel posts. It

is proposed to install all fencing 40' inside the property line to facilitate construction of external section line roads on easements to be dedicated for future road construction.

Site Security: Specific details for providing internal site security remain to be determined. The facility will operate on a basic five day, three shift operation, which will necessitate some form of site security during weekends and holiday periods. A contract security service may be provided until such time as a permanent employee-manned facility security force is established. Exterior area lighting will also be installed within the building development area to increase security.

Fire Protection: Initial construction will include a ground level storage tank or enclosed reservoir for storage of water for domestic and fire-fighting purposes. Suitable pumping equipment is envisioned which will provide pressure to lines in the area. Yard hydrants are contemplated to service the garage building and fueling facility areas. All hydrant and hose connections will be compatible with equipment operated by the local Wittmann area Volunteer Fire Department. As an additional back-up system, purchase of a combination water sprinkler-fire truck vehicle is planned in the initial development, to serve both the needs of vehicle testing and to be capable of responding to vehicle or grass fires on the site.

Emergency Equipment: Additional on site emergency equipment

will consist of a wrecker for towing disabled vehicles, and an ambulance for use in transporting personnel for medical treatment. Training will be provided for emergency vehicle personnel in accordance with state and local licensing requirements.

2. Road Testing Facilities

Test Track: The purpose of this facility is to enable vehicles to be driven safely at high speed to obtain testing data such as fuel economy, component durability, and overall vehicle performance in a warm-weather environment. The test track will be oval in configuration, with a minimum length of 4 miles, level straightaways, and lie in a uniform plane which will generally slope to conform with the existing ground topography. The track will consist of three bituminous concrete pavement lanes each 15' wide and designed for speeds of 40, 80 and 100mph without lateral acceleration to the vehicle when it is proceeding at design speed. Separate lanes are also to be included adjacent to the inside lane of the track at four locations to accommodate reversing operations. Proposed access to the track interior is provided by an underpass structure which has a minimum inside width dimension of 30', and a clear height of 16'. Provisions to remove accumulations of rain water from the interior of this structure are also contemplated. An alternative access to the track interior from a grade level crossing along a straightaway portion of the track is also to be provided. Access and

departure roads to the inner track lane are included to permit vehicles to safely merge with or depart from test track traffic.

City Traffic Simulation/City Block Course: The purpose of this facility is to simulate city traffic driving and to obtain engine cooling data. The course consists of two bituminous paved lanes (24' wide) placed in a city block configuration two blocks long and one block wide. Each block will be approximately 440' long.

City Traffic Circle - 134' Diameter: This facility is also used for city traffic simulation testing cycles to obtain engine cooling data. The course consists of a 12' wide asphalt paved lane placed in a 134' diameter circle. The entire circle will lie in one level plane.

Straightaway Road: This facility is required for cycle fuel economy, acceleration testing, and for conducting road-to-dynamometer rolls coastdown horsepower measurements. In addition, the ends of this road facility will be utiliized for high speed braking stops. Pavement surface will be composed of bituminous concrete paving placed in two adjacent 12' wide traffic lanes. In the area designated for brake testing, the pavement shall consist of 1,000' of Portland Cement concrete with adjacent 15' wide bituminous paved safety lanes. The straightaway will be nominally two and a half (2½) miles in length, with a level longitudinal grade (0%). A bituminous paved, 100' diameter turnaround pad shall be provided at each

end of the straightaway and at the midpoint.

Brake Testing Grades: This facility will be used to evaluate vehicle parking brakes, transmission brake locking, and fluid level determinations. Three short length grades are required, one with a 15% slope, one with a 20% slope, and the final with a 30% slope. Each grade will have approximately 50' of actual grade length and a maximum height of 25'. Vertical pavement transition curves are provided between the access to the grade and the start of the grade slope to permit a vehicle operator either to drive in forward gear up the grade or to back the vehicle up the grade in reverse gear. Proposed elevations at the top of the grades will not exceed a height of 25' above the surrounding ground. Each grade will be paved with concrete placed in a 15' wide lane.

Brake Wetting Facility: This facility is a trough or pond-like structure into which vehicles may be driven to wet wheel braking components. Trough length is 50', with normal water depth of 6". Ramp approaches are provided at each end of the trough to enable vehicles to enter and depart the trough. Inside wall-to-wall dimension of the trough will be 12' minimum.

Perimeter Security Road: To maintain visual security of the site an internal perimeter security road will be constructed along a path which will generally follow along inside the property fence line. It is proposed that this road will be an earth trail graded in the native soils of the site and which follows the existing contours of the property and is

suitably graded to facilitate grade level crossing of existing drainage washes on site.

Internal Access Roads: Developed facility access roads will be 24' wide bituminous surfaced pavements with stabilized gravel shoulders constructed similar to paved county roads in the area. The purpose of these roads is to provide hard surfaced pavement access to the major road testing facilities. Other unpaved internal access roads are also proposed. These unpaved roads will facilitate traffic circulation throughout the site.

Wind Screens: Six wind screens are required to shelter vehicles while conducting hot starting performance tests. The wind screens are to be located adjacent to the inside lane of the test track and equidistant from the track entrance-exit. Each wind screen is designed to shield the test vehicle and will be constructed to car height and length.

3. Future Development

Specific priorities and sequences for future on site facilities cannot be determined with any accuracy at this time; however, the types of facilities listed below are representative examples of potential site facilities to be included in the area zoned for special use.

Buildings:

Carburetor laboratory with flow stands to determine the fuel flow characteristics of carburetors and fuel-handling systems.

Emissions laboratory equipped with dynamometers and exhaust gas analysis equipment for use in determining high ambient temperature effects on vehicle exhaust and vapor emissions.

Covered work stalls located outside, with vehicle hoists mounted below a canopy structure. This type facility can be used to service "warm" vehicles without adding to the air conditioning load in garage work space.

Warehouse building for storage of tires, vehicle components and supplies.

Garage building providing expanded space to the existing structure or additional vehicle work space as required by future testing programs.

Durability road paved for accumulating endurance mileage on test vehicles.

Ride and handling road for use in evaluating vehicle ride and handling characteristics and for evaluation of the high temperature effect on vehicle suspension components.

Dust road for determining vehicle durability and dust infiltration patterns for passenger compartments, trunk space, transmissions, air intake systems, braking systems and other vehicle components. This facility will be located in the interior of the site so as not to impact on surrounding properties.

Passby noise measuring site for recording external noise

on passenger vehicles and trucks.

Off-road test course for evaluating trucks and four-wheel drive vehicles.

ITEM 4 - RELATIONSHIP TO SURROUNDING PROPERTIES

The entire six square mile Southwest Proving Ground site is at present optioned by Chrysler Corporation from several owners. The majority of the acreage is owned by Arizona Rochester Development Corporation. The site has Rural-43 zoning and is entirely vacant. Property southeast of the site is vacant, open desert land owned by the Sperry Rand Corporation. To the north, the land is also vacant, open desert land, with the majority of that area owned by the State of Arizona. To the west is the Town of Wittmann, which is an unincorporated community with a population of about 560 in 1970. To the southwest across Highway 60-89-93, the land is used for agricultural activities, with isolated shops and commercial uses along the highway.

Land surrounding the proposed special use permit area is sparsely inhabited, natural desert land with no present development. The nearest dwellings are one-half mile from the site boundary and over a mile and a half from the main testing facilities. Twenty-one parcels surround the proposed special use permit area.

The nature of the proving ground is such that it will create little impact on the surrounding area. Chrysler intends to retain its relative seclusion from the public, which will provide opportunity for product security. Placement of the facilities on the site has been well set back to provide maximum buffer from future development on surrounding parcels. A concerted effort

will be made to minimize scarring of the terrain so that over ninety percent (90%) of the total 3,808 acre site can remain in its natural desert condition.

The proposed Chrysler proving ground facilities is ideally suited to the existing rural nature of the area, and represents a compatible usage with the variety of land uses in the area.

ITEM 5 - LOCATION AND ACCESSIBILITY

Present Conditions

The proposed proving ground site is located on the northwest side of State Highway 60-89-93 near Wittmann, Arizona, 32 miles northwest of Phoenix. The highway is a paved two-lane roadway connecting Sun City and Phoenix with Wickenburg and other points to the northwest.

Access is not now available from the highway directly to the site. However, application can be made to the Arizona Department of Transportation (ADOT) for such access.

State Highway 74 (Morristown-New River Highway) is a paved two-lane east-west roadway approximately two miles north of the site. No direct access exists from the highway to the site, but a county-maintained roadway near the west boundary of the proving ground connects State Highways 74 and 60-89-93. Again, application can be made to ADOT for direct access.

Birdsong Avenue is a county road which extends eastward from the Town of Wittmann along the section line between Section 18 and 7. Present right-of-way dedications extend a few hundred feet east of Nadaburg School on Birdsong Avenue and one-quarter mile north of the school on the mid-section line. Maricopa County maintenance and jurisdiction for Birdsong Avenue ends about one-half mile west of the west section line of Section 7 and 18. From that location to

the site the road becomes merely a single-lane dirt path.

In 1976 the average daily traffic on Highway 60 just southeast of the Town of Wittmann was about 5,700 vehicles; east of the Town of Beardsley, which is southeast of the site, the average daily traffic was 6,400 vehicles.

The Atchison, Topeka and Santa Fe (AT&SF) railroad line is located approximately one mile south of the site, parallel to and on the northeast side of Highway 60-89-93. These tracks are used for freight trains only, with the number of trains averaging four to six daily, generally in the evening. One major unsignalized crossing of the railroad is provided in downtown Wittmann.

Proposed Access

Access to the proving ground has been proposed in two phases (See Figure 1). Temporary initial access will continue to be through Wittmann via Birdsong Avenue to the main entrance. To reduce traffic through the town and past Nadaburg School, ultimate plans contemplate a permanent 1.8 mile paved 28' roadway from Highway 60-89-93 north to the site along the section line between Section 17 and 18. This roadway would be built to Maricopa County Highway Department standards on 80' of dedicated right-of-way.

In order to complete the ultimate north-south entrance road, a public crossing over the AT&SF railroad must be provided along with access to Highway 60-89-93. It is proposed that the required railroad crossing and highway access

permits be obtained by the Maricopa County Highway Department.

Because of the time delays inherent in such applications, temporary use of the Birdsong entrance is initially required.

Chrysler Corporation proposes to obtain the required 80' right-of-way dedication along the section line between Sections 17 and 18. It is proposed that the access road shall have a bituminous pavement surface constructed to Maricopa County Highway standards. A similar 80' right-of-way dedication will be obtained along existing Birdsong Avenue eastward from the present termination of Maricopa County right-of-way dedication to the proposed proving ground entrance. It is proposed that this initial route be graded from the existing native soils with provision for an oil treatment to control dust.

The nature of the proving ground facilities does not permit public access through the six square mile site. For this reason, access within the general area must be via section line roads bordering the site. It is proposed to provide a forty foot wide half street dedication at a future date when such boundary roadways are required.

ITEM 6 - SCHEDULE OF DEVELOPMENT PHASING

Development of Chrysler's southwest proving ground will be an evolutionary process occurring over many years. As new testing requirements are mandated, additional, as-yet unforeseen facilities may be necessary at the proving ground. At this time, however, Chrysler anticipates constructing only the facilities identified in Item 3 - Description of Proposal.

Current planning envisions these facilities to be constructed during the following time periods:

Phase 1 - (0-2 years)

1. Perimeter and security fencing
2. Access road (temporary and permanent)
3. Utilities (including provisions for fire protection)
4. Building complex:
   - Garage-office building
   - Visitor, employee and test vehicle parking
   - Material delivery facilities
   - Material exposure storage area
   - Vehicle wash area
   - Axle weighing scales
   - Fueling facilities
   - Waste oil storage
   - Landscaping and screening around buildings
5. Perimeter security road

Phase 2 - (1-3 years)

1. Road testing facilities
   - Four-mile test track
   - City traffic simulation (city block) course
   - City traffic circle
   - Straightaway road
   - Brake test grades
   - Brake wetting facility
   - Wind screens
2. Supporting facilities for road testing operations
3. Interior access roads to connect facilities

Phase 3 - (3 years and beyond)

Potential site facilities could include:

1. Carburetor laboratory
2. Emissions laboratory
3. Covered work stalls
4. Warehouse building
5. Garage building
6. Durability road
7. Ride and handling road
8. Dust road
9. Passby noise measuring site
10. Off-road test course
11. Additional facilities as required or mandated by federal law or required for product development and testing.

ITEM 7 - PUBLIC UTILITIES AND SERVICES

Water Supply

Two water companies serve the Wittmann area at present, the Wittmann Water Company, and Spear 7 Water Company. Of the proposed use area, only the southwest quarter of Section 7 lies within a franchised area (Spear 7). At this time, Spear 7 Water Company is in receivership and being operated by the Arizona State Corporation Commission.

Chrysler Corporation intends to provide domestic and firefighting water from existing and proposed private wells within its property. A possible initial source of water could be supplied by an existing well in the northern portion of Section 17, Township 5 North, Range 2 West. Results of pumping and water quality tests on this well are contained in the Appendix. As water needs increase, an additional well and/or ground storage capacity may be added to the system. The location of a second well will depend on the results of further economic study.

Sewage Disposal

There are no existing sewer lines in the Wittmann area. All sewage is handled with individual septic tanks. An analysis of the soil conditions at the site indicates that septic tanks will function quite adequately for the type of development proposed.

Initially, a septic tank sized for 100 people will be installed in accordance with Maricopa County Health Department standards. In future stages of development, when projected maximum employment is reached, an additional septic tank will be constructed. Locations will be suffiently removed from any wells, to prohibit contamination.

Electricity and Gas

Electrical and natural gas service to the Wittman area is provided by Arizona Public Service. The nearest point of electrical service is via existing overhead 3-phase, 12,500 volt power lines that extend to a point approximately 600' southwest of Birdsong Avenue near Nadaburg School, one-half mile from the nearest use permit area.

It is proposed that initial electrical service to the main building complex be provided by an extension of these existing overhead electrical service west along Birdsong Avenue. Future service may be provided from the south in conjunction with an additional access road directly connecting the site with Highway 60-89-93. In either case, sufficient power is available to meet all projected power needs for proving ground facilities.

Natural gas availability is limited, due to the present moratorium on further expansion of the system. Although this policy is temporary, and gas availability may change considerably in the future, no plans are being made to use gas. This option, however, does remain open, based on

availability and further economic study.

Telephone

Mountain Bell provides telephone installation and service in the area. Existing overhead lines serve both Nadaburg School and the residences immediately to the north. Extension of these overhead lines east along Birdsong Avenue can take place in conjunction with the proposed electrical service extension. Sufficient capacity is not presently available to accommodate all expected Chrysler needs. Contact has been made with Mountain Bell representatives to explain Chrysler's needs and initiate plans to supply sufficient capacity for ultimate development.

Police Protection

Police protection is provided by the Maricopa County Sheriff's Department. Chrysler also intends to provide fencing around the proving grounds perimeter, and security fencing around sensitive areas. Additionally, consideration is being given to either permanent or contract supplemental security service.

Fire Protection

The Wittmann area is served by the Rural Fire Department. Chrysler intends to provide additional on-site fire-fighting facilities as a further protection of its investment. A ground storage tank or enclosed ground level reservoir is envisioned to serve both domestic and fire-fighting needs. Yard hydrants will be placed to service the garage and fuel

facility areas. A combination water sprinkler-fire truck vehicle is planned in the initial development to serve the testing program and as back-up for the local community fire-fighting force. In addition, fire prevention will be a major consideration in design of facilities.

Refuse Collection/Disposal

Several options exist for refuse collection and disposal. The most desirable appears to be utilization, on a contract basis, of a private service. Several operate in the Wittmann area and could adequately serve the proving grounds.

APPENDIX A

UTILITY COMMITMENTS

AND SUPPORTING LETTERS

ARIZONA PUBLIC SERVICE COMPANY
P. O. BOX 158 • GOODYEAR, ARIZONA 85338

May 18, 1978

Mr. Gerald Pruder
Chrysler Corporation
P. O. Box 1919
Detroit, Michigan 48231

Dear Mr. Pruder:

Arizona Public Service Company will provide electric service in the area of the SE¼ of the SE¼ of Section 7, T5N, R2W subject to our present extension policy filed with the Arizona Corporation Commission and any extensions would be subject to right of way availability and railroad permits, if necessary.

Sincerely,

L. F. Matteson
Engineering Supervisor
Western Division

LFM:la

cc: Frank Haze Burch
Al Heitzmann

Mountain Bell

Phoenix, Arizona
May 30, 1978

Mr. Gerald D. Pruder, P. E.
Facilities Planning Supervisor
Chrysler Corporation
Chelsea, Michigan 48118

Dear Mr. Pruder:

You have requested a letter from The Mountain States Telephone and Telegraph Company concerning the availability of telephone service to the property described as follows:

All of Sections 4, 5, 6, 7, 8, & 9, T-5-N, R-2-W, G&SRB&M, Maricopa County, Arizona.

The following information is provided in accordance with the rules and regulations of the Office of Interstate Land Sales Registration, Section 1710.105, Part VIII, Subparagraph D:

1. The above-described property is within the operating area of The Mountain States Telephone and Telegraph Company, but telephone facilities are not available at this time to provide service to the area.

2. The Mountain States Telephone and Telegraph Company is a public utility subject to regulation by the Arizona Corporation Commission and the Federal Communications Commission.

3. Telephone facilities have not been extended to the property.

4. A schedule for the installation of facilities to extend telephone service to the property has not been established. Extension of telephone facilities depends on numerous factors, including such things as the Telephone Company's capital requirements and ability to raise capital, availability of manpower and supplies, potential use of the facilities and the economic feasibility of providing the service. Construction charges will be assessed for the installation of facilities in accordance with Telephone Company tariffs. In addition, telephone service is provided pursuant to the terms, conditions, rates and charges set forth in Telephone Company tariffs on file with the applicable regulatory agencies.

Very truly yours,

J. F. Leatherwood
Financial Supervisor
Forecast & Development

The Atchison, Topeka and Santa Fe Railway Company

A Santa Fe Industries Company

121 East Sixth Street, Los Angeles, California 90014, Telephone 213/628-0111 ext. 2553

Los Angeles, May 23, 1978

File: 231.2 (AF-160.2)

Mr. Gerald D. Pruder, P.E.
Facility Engineering Supervisor
Engineering Office
Chrysler Corporation
P. O. Box 387
Chelsea, MI 48118

Dear Mr. Pruder:

Reference is made to May 22nd telephone conversation between Mr. Earl Nichols of our Los Angeles office, Ted Kauffman and yourself regarding access road across our Fourth District main track to serve your proposed test facility near Whittman, Arizona.

This letter will confirm understanding reached whereby Santa Fe, in this instance, will not oppose establishment of a grade crossing at approximately Mile Post 160.2 providing such crossing is desired by Maricopa County, approved by the Arizona Corporation Commission, provided with adequate automatic grade crossing warning system and constructed at no cost to Santa Fe.

Very truly yours,

J. G. Fry

J. G. Fry,
Assistant General Manager
Engineering

cc: T. A. Kauffman
AT&SF Railway Company
Room 664 Arizona Public Service Bldg.
411 North Central Avenue
Phoenix, AZ 85004

APPENDIX B

WATER QUALITY AND PUMPING TESTS

FOR PRIVATE WELL, SECTION 17

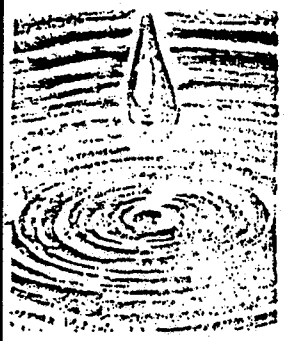
APPENDIX B

THE FOLLOWING DATA REGARDING

WATER WELLS

WAS OBTAINED FROM

THE ARIZONA STATE LAND DEPARTMENT



YOUR WATER SYSTEMS DEALER

COWLEY PUMP & SUPPLY

5510 E. WASHINGTON
Phone 273-7356
PHOENIX, ARIZONA

April 26, 1972

Western American Mortgage
728 E. McDowell Rd.
Phoenix, Arizona

Attn: Mr. Suggs

Dear Sir:

We tested the well at Wittman which was drilled by Arizona Well Drilling. The following results were obtained.

Hole size	8"
Pump setting	700'
Pump	190P Sta Rite 40HP (curve enc)
Static Level	479'
Pumping at 175 GPM	Dynamic head is 528'
Pumping at 195 GPM	Dynamic head is 541'

At a depth of 575' the well should easily produce 225 GPM.

Yours truly,

Duke Cowley
Cowley Pump & Supply
[illegible] Washington St.
Phoenix, Arizona 85034

ARIZONA TESTING LABORATORIES

A DIVISION OF CLAUDE E. McLEAN & SON LABORATORIES, INC.
817 WEST MADISON ST. PHOENIX, ARIZONA 85007 PHONE 254-6181

For: Mr. Clarence Suggs
728 East McDowell
Phoenix, Arizona

Date: March 30, 1972

Lab. No.: 2260

Sample: Water

Marked: No Mark

Received: 3-29-72

Submitted by: Arizona Well Drilling

REPORT OF LABORATORY TESTS

Total Soluble Salts		465 ppm
Iron	l.t.*	0.1
Fluorides		1.2
Calcium		42
Magnesium		15
Sodium		74
Chlorides		68
Carbonates		0
Bicarbonates		1[illegible]
Sulphates		[illegible]
Nitrates		3
Chromates, hexavalent	l.t.	.05
Phenolphthalein Alkalinity		0
Methyl Orange Alkalinity		144
Calcium Hardness		104
Magnesium Hardness		62
Total Hardness		166
pH	7.9	

l.t.* = less than

LAW DEPARTMENT
REC'D. 3-29- 1972
ACTION

Respectfully submitted,

ARIZONA TESTING LABORATORIES

Claude E. McLean, Jr.

APPENDIX C

DRAINAGE CONSIDERATIONS

APPENDIX C
DRAINAGE CONSIDERATIONS

General Requirements:

As described by the Maricopa County Flood Control District (MCFCD), there are two main objectives with respect to drainage. These include maintenance of flow direction and peak flow values based on a 100-year flood. In measuring the achievement of these objectives, the District compares pre-development and post-development runoff.

Plans for detention are needed where a proposed development is characterized by one or more of the following:

1. Special use
2. Roadways with large diversion or detention
3. Large parking lot, paved or roofed areas.

Requirements are not specific but instead set on a per-case basis. Preliminary contact with MCFCD indicates that for this project only the building development area will be subject to the stormwater detention criteria. This requirement will be met in the design of individual facilities to be included within the building development area.

Computation and Collection of Runoff:

To meet MCFCD requirements, the following general approach has been developed.

1. Obtain plan/profile drawings for State Highway 74 directly north of the study area.

2. Locate and identify all drainage structures on the applicable section of State Highway 74.

3. Using USGS quad sheets, establish and identify the individual drainage areas (see Figure C-1).

4. Compute peak flow for the 100-year storm, Q_{100}, according to Soil Conservation Service (SCS) methodology, as contained in "Hydraulic Design for Highway Drainage in Arizona," published by the Arizona Department of Transportation.

5. Using Bureau of Public Roads charts, calculate maximum flow through the drainage structures under Highway 74, assuming the 100-year storm does not overtop the highway.

6. Calculate Q_{100} for the drainage areas between Highway 74 and the north boundary of the site.

7. Calculate lag time (or travel time) for Q_{100} above Highway 74 to reach the north boundary, and add hydrographs to determine total peak flow entering the site from the north.

8. Develop general concepts for handling calculated flow through the site.

SCS Assumptions and Methodology: The method developed by the SCS for estimating runoff from drainage areas incorporates recorded rainfall data and drainage basin characteristics such as area, shape, slope, vegetation type, percent of vegetative cover and the infiltration capacity of the basin soil. The procedures apply both to small drainage basin areas less than 10 square miles, and with some modification to drainage areas larger than 10 square miles.

For the drainage areas impacting this project, vegetation consists largely of desert brush, which is typical of lower elevations with low annual rainfall.

The hydrologic cover density, defined as the percent of ground surface covered by the crown canopy of live plants and litter is poor (approximately 10%).

The hydrologic soil group comprising a large percentage of basin topsoil is classified as Group C. Included in Group C are soils having slow infiltration rates when thoroughly wetted, consisting chiefly of soils with a layer that impedes the downward movement of water, or soils with a moderately fine to fine texture and a slow infiltration rate. These soils have a slow rate of water transmission.

Attachment 1 to this appendix contains the step-by-step procedure utilized in applying the SCS methodology to this development.

Attachment 2 contains the peak flow computation sheets for the drainage areas north of Highway 74 and the area between the highway and the north boundary.

Table 1 on the following page summarizes the results of the calculations and indicates peak discharges expected along the north site boundary during the 100-year storm.

TABLE I

PEAK FLOWS AT NORTH BOUNDARY OF SITE
(100-YEAR FLOW)

DRAINAGE AREA	TIME TO PEAK (T_p in hrs.)	PEAK DISCHARGE (Q_p in CFS)
1	1.86	555
2	0.88	184
3	1.75	2,074
4A	1.34	821
4B	1.89	2,458
5	1.04	337
6	1.66	1,925
7	0.84	151
8	0.84	276
9	0.84	185
10*		
11*		

*Note: Drainage areas 10 and 11 cut across the extreme northeast portion of the site. Approximately 25% of this flow will contribute to on-site drainage; however, the remainder is assumed to have little effect on the proposed development.

Storm Water Routing: Hydrographs for the individual drainage areas were developed and routed to the north boundary of the site. The computation of these hydrographs is contained in Attachment 3 to this appendix. A combined hydrograph was then drawn to accumulate the flows at the north boundary from all the individual drainage areas (excluding areas 10 and 11, which bypass planned facilities). The results indicate a maximum flow, Q_p=8,109 cfs, with a time to peak, T_p=1.7 hours.

The combined hydrograph becomes the basis for design concepts discussed in the final section of this report.

Design Implications:

The plan of development indicates the conceptual layout of the proposed proving ground facilities. The most critical of these, from a drainage standpoint, is the 2.4 mile straightaway. Its east-west orientation, northernmost location on the site (i.e., first recipient of drainage), and requirement to be level necessitates special drainage considerations. In essence, the straightaway becomes the controlling facility. Its location on the site has been established to optimize proving ground operations. The level of the finished surface will be established after a careful analysis of the costs incurred, with various options available to accommodate drainage. The following considerations must be evaluated before that decision can be made: 1) What level of protection is desirable for test road facilities (i.e., 25, 50, 100-year storm), and 2) what level of damage/-maintenance is acceptable should the design storm be exceeded.

Initial indications are that it will be more economically feasible to increase storage capacity behind the straightaway than to increase the culvert sizes to pass through major storm flows. By utilizing earthen berms on the ends of the straightaway, the entire north side of the track can be used for storage without ponding on adjacent property. Drainage structures can be located under the straightaway to carry smaller than design flows and to maintain flow direction.

Additionally, these culverts can be sized to vary storm-water storage volume. Sizing and exact placement of drainage

structures will be accomplished during design, after a thorough economic evaluation of storage/discharge tradeoffs affecting construction costs. The final configuration, however, will provide detention to reduce peak flows from the planned development to downstream areas and will not redirect existing stormwater runoff.

The remaining proving ground facilities will be keyed to the final straightaway configuration. Preliminarily, it appears the 4-mile oval will also act to detain peak stormwater runoff. Water intercepting the northern stretch will either be rerouted around the oval or pass through culverts into the center of the track. Culverts will also be placed along the southern portion of the track to discharge stormwater into original drainage channels. The southernmost portion inside the oval has been designated as an additional detention area to be sized during design.

Pad elevations for buildings within the building development area will be established to remain above the 100-year flood elevation. This determination will depend upon the discharge rate from the straightaway directly to the north. Berming and channelization will also be utilized to keep stormwater within defined waterways and to further protect the structures. On-site detention for the building area will be for the 2-hour, 100-year storm (current MCFCD standard).

The net effect of proposed dreainage improvements should substantially reduce peak flows and produce an overall improvement in drainage for downstream properties.

RED PICACHO QUADRANGLE
ARIZONA
7.5 MINUTE SERIES (TOPOGRAPHIC)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MOUNTAINS
BUCKHORN
MOUNTAINS
HIEROGLYPHIC MTS
HIEROGLYPHIC MOUNTAINS
Mt Vernon
Mt Pechan
White Picacho
Red Picacho
Rincon Basin
Rincon Spring
St Anthony Spring
Big Hells Gate
Layton Tank
Grandview Tank
Horse Creek Tank
Morgan City
Garfias
Ritter
Picacho Wash
Ruby Wash
Tiblow Wash
Dominga Wash
Cedar Basin Wash
Creek
YAVAPAI CO.
MARICOPA CO.
4A
3A
3B
4B
6A
6B
6C
6D
1
2
3
4
5
6
7
8
9
10
11
NORTH BOUNDARY
7-8-9
12
SOUTH BOUNDARY
Wittmann

FIG. C-1
DRAINAGE AREAS
PROPOSED SOUTHWEST
PROVING GROUND SITE

ROAD CLASSIFICATION
Heavy duty — Light duty
Unimproved dirt
U.S. Route — State Route

Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
Photographs taken 1962. Field checked 1965
Polyconic projection. 1927 North American datum
10,000-foot grid based on Arizona coordinate system, central zone
1000-meter Universal Transverse Mercator grid ticks
zone 12, shown in blue

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

SCALE 1:24000

WITTMANN, ARIZ.

ATTACHMENT 1, APPENDIX C

DRAINAGE CONSIDERATIONS

The basic parameters for hydrologic design for both small and large drainage areas are identical; however, the design procedures and application of the various parameters are somewhat different. Only one of the nineteen relevant drainage areas is larger than ten square miles. Both are discussed herein, however, in order to provide a clear understanding of procedures followed.

Procedure Common to all Drainage Areas

Steps 1 through 16 are followed regardless of the size of the drainage area.

Step 1. The boundaries of the drainage areas are defined utilizing contour maps. Figure C-1 represents a reduction of the contour map (scale: 1" = 2000') used.

Step 2. Design frequency is selected. The Flood Control District has set standards with reference to the 100-year flood. Therefore, peak flows published herein are relevant to that design frequency.

Step 3. Map values for 6 and 24 hours of precipitation values for all return periods are read and then tabulated in the column entitled "Map Values" in Table 1.

Step 4. Map values are plotted on Figure 2.

Step 5. Lines of best fit are drawn on Figure 2.

Step 6. Adjusting points to represent values on the line, the new set of values is tabluated in the column entitled "Corrected Values" in Table 1.

Step 7. The 1-hour precipitation value for the 100-year return frequency is determined:

$$Y_{100} = 0.494 + 0.755\frac{X_3^2}{X_4}$$

where: Y_{100} = 100-year, 1-hour value

X_3 = 100-year, 6-hour value

X_4 = 100-year, 24-hour value

Values for X_3 and X_4 are obtained from corrected values on Table 1 for a 100-year return period.

$X_3 = 3.3$

$X_4 = 4.1$

$$Y_{100} = 0.494 + 0.755\frac{3.3^2}{4.1}$$

$Y_{100} = 2.5$ inches

Step 8. The hydrologic cover type and density are selected through empirical evidence and field investigation. All of the relevant drainage areas contain desert brush vegetation types with a cover density of approximately 10%.

Step 9. The hydrologic soil group is determined by referring to the Generalized Hydrologic Soil Map published by the Soil Conservation Service and field investigation. The group comprising a large percentage of basin topsoil is classified as Group C.

Step 10. The size of the contributing drainage area for each sub-basin is determined. This is accomplished through the use of a planimeter on a large contour map (1" = 2000') with boundaries delineated. These values are found on the calculation sheets included in Attachment 2.

Step 11. The length of each sub-basin in feet is determined through applying a distance wheel to the contour map and following the longest wash. Values are found on the calculation sheets.

Step 12. The width of each sub-basin in feet is determined by dividing the area of each sub-basin in feet by its length in feet. Values are listed on the calculation sheets.

Step 13. The elevation at the top of each drainage area is taken from the contour map and noted on the calculation sheets.

Step 14. The elevations at the points where peak flows are to be found are taken from the contour map and noted on the calculation sheets.

Step 15. The slope of each drainage area is found by dividing the change in elevations (as described in Steps 13 and 14, above) by the length of the drainage area in feet. These slopes are

noted on the calculation sheets.

Step 16. The curve number (CN) is determined. This number is based on vegetation type and density. Referring to Figure 3, the relevant curve number is 89.

Procedure Common to Drainage Areas Less than Ten Square Miles in Size

Steps 1-16 in the previous section apply to both large and small drainage areas.

Step 17. The direct runoff value (Q) is determined. Figure 4 demonstrates the use of the curve number to modify storm rainfall to achieve values for direct runoff. The direct runoff value obtained from the graphical solution of the relationship between accumulated rainfall and accumulated runoff is 1.45 inches.

Step 18. The values for time of concentration (T_c) are determined through use of Figure 5. These values are noted on the calculation sheets.

Step 19. The width factors (W_f) are determined by applying area widths in feet to the Table in the upper left corner of Figure 5.

Step 20. The time to peak (T_p) values are found by applying the width factor to the time of concentration for each area.

Step 21. The solution for the peak runoff (Q_p) for the 100-year design frequency, the 1-hour storm rainfall and the drainage area characteristics is determined by the following equation:

$$Q_p = \frac{484AQ}{T_p}$$

where: Q_p = peak rate of discharge in cfs
A = contributing drainage area in sq. miles
Q = storm runoff in inches
T_p = time to peak (hours) where $T_p = T_c(W_f)$

Values for Q_p are tabulated on the calculation sheets.

Procedures Common to Drainage Areas Greater than Ten Square Miles in Size

Steps 1-16 in the first section apply to both large and small drainage areas.

Step 17. Point precipitation values for additional storm durations

are established. From previous calculations, point precipitations for 1-hour and 6-hour durations are 2.5" and 3.3" respectively. Values for 2-hour and 3-hour storm durations are calculated as follows:

2-hour = 0.341(6-hour) + 0.659(1-hour)

3-hour = 0.569(6-hour) + 0.431(1-hour)

2-hour = 2.8"

3-hour = 3.0"

These values are noted on the calculation sheet.

Step 18. Point precipitation values are reduced to area values by Figure 6. The percent of point rainfall on the vertical access describes the percent by which point precipitation is reduced to achieve area precipitation.

Step 19. The volume of direct runoff is determined for each storm duration using the areal values and the curve number (CN) and applying these to Figure 4.

Step 20. The time of concentration (T_c) is determined through application of the following equation which is shown graphically in Figure 7:

$$T_c = \frac{L^{1.15}}{7700H^{.38}}$$

where: T_c = time of concentration in hours
L = length of the drainage area in feet
H = elevation in feet

Values are calculated for storm duration of 1-, 2-, 3- and 6-hours and noted on the calculation sheet.

Step 21. The peak discharge (Q_p) is computed for each storm duration per the following equation:

$$Q_p = \frac{484AQ}{\frac{D}{2} + .6T_c}$$

where: Q_p = peak rate of discharge in cfs
A = contributing drainage area in sq. miles

Q = storm runoff in inches

D = storm duration

T_c = time to concentration in hours

Step 22. The design discharge for the selected design frequency is the greatest peak runoff obtained in Step 21 above.

ADDENDUM to "HYDROLOGIC DESIGN FOR HIGHWAY DRAINAGE IN ARIZONA" April 1975

Steps to be used to determine precipitation values for various durations and return periods.

STEP 1. From the precipitation maps in the manual "Hydrologic Design for Highway Drainage in Arizona", determine the precipitation values for the 6 and 24 hour duration storms for return periods of 2, 5, 10, 25, 50 and 100 years. Tabulate these values in Table 1 in the column headed 'Map Values'

TABLE 1

Return Period (Years)	Precipitation Values (inches)			
	6 hour duration		24 hour duration	
	Map Value	Corrected Value	Map Value	Corrected Value
2	1.4"	1.4"	1.6"	1.7"
5	1.8"	1.9"	2.2"	2.3"
10	2.2"	2.2"	2.7"	2.7"
25	2.7"	2.6"	3.3"	3.2"
50	3.0"	3.0"	3.7"	3.7"
100	3.3"	3.3"	4.1"	4.1"

NOTE: There is a possibility of making an error while reading the maps because, (1) a site is not easy to locate precisely on a series of 12 maps, (2) there may be some slight registration differences in printing, and (3) precise interpolation between isolines is difficult. In order to minimize any errors in reading the maps, these values should be plotted on the diagram "Precipitation Depth versus Return Period" Fig. 1.

Project No. _____ Station _____

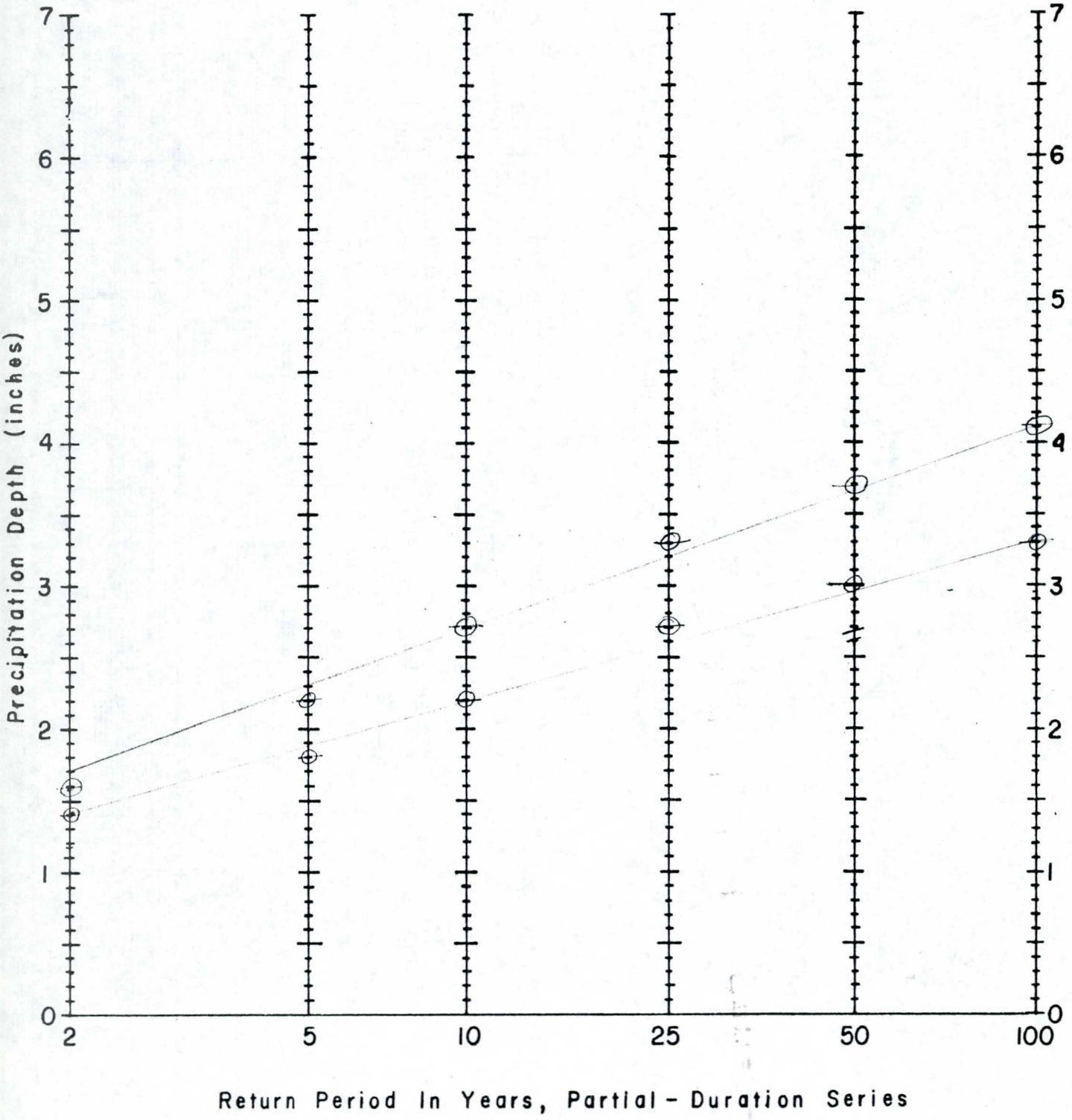


Figure 2 Precipitation Depth Versus Return Period for Partial – Duration Series

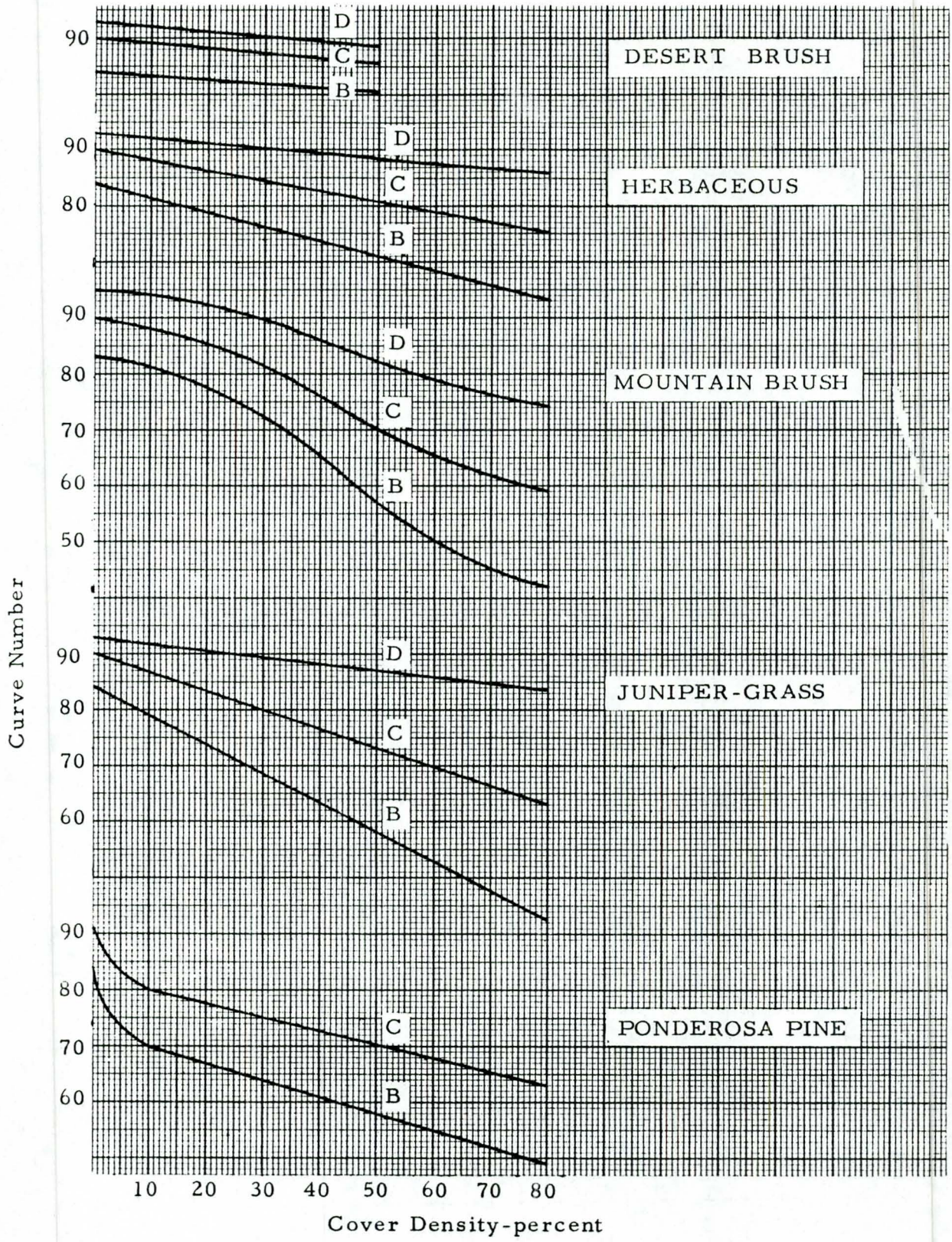


FIGURE 3

HYDROLOGIC SOIL - COVER COMPLEXES
AND ASSOCIATED CURVE NUMBERS

Soil Conservation Service

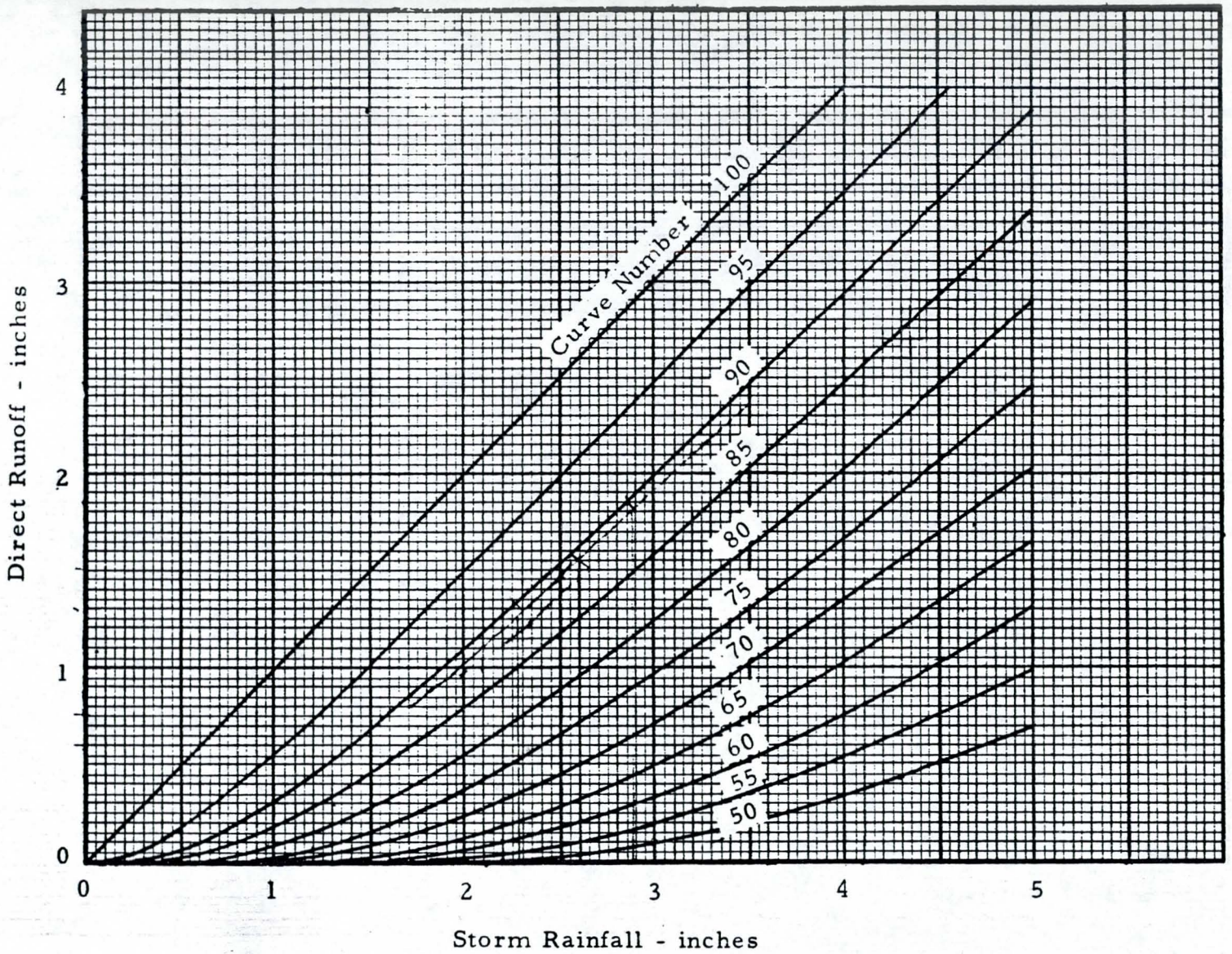


Fig. 4

SOLUTION OF
RAINFALL - RUNOFF EQUATION

Soil Conservation Service

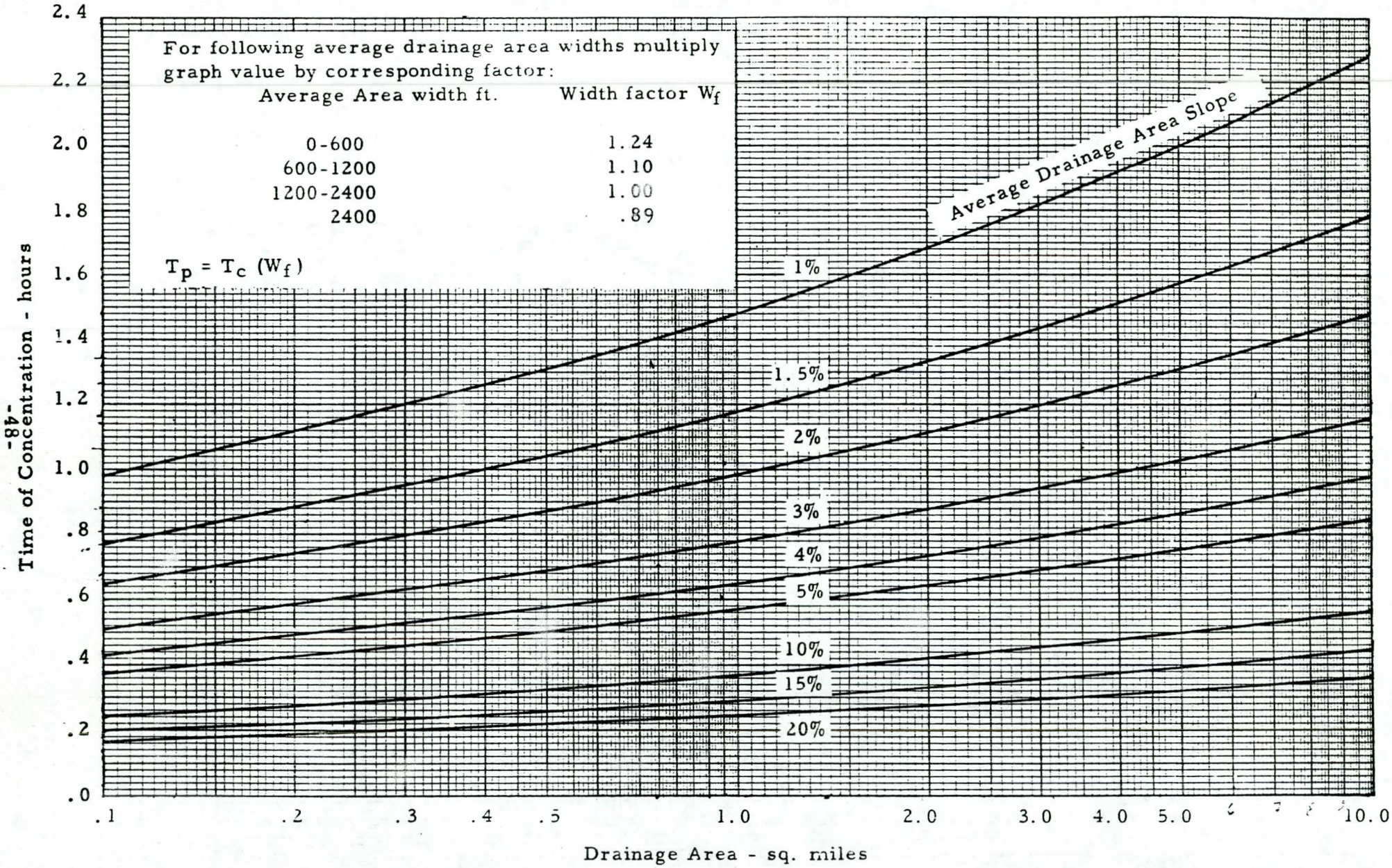


Fig. 5

TIME OF CONCENTRATION
FOR
DRAINAGE AREAS LESS THAN 10 SQ. MILES

Soil Conservation Service

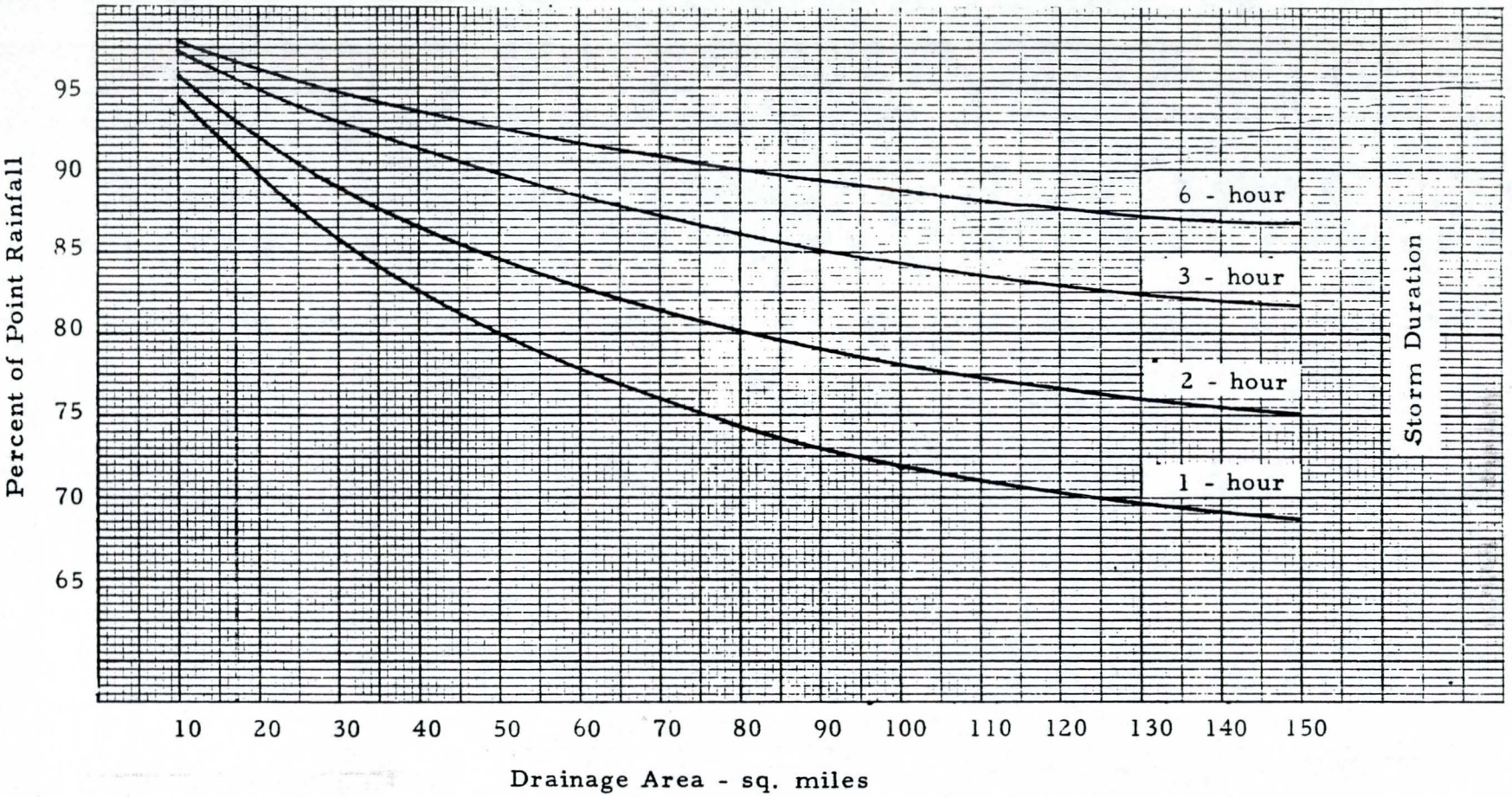
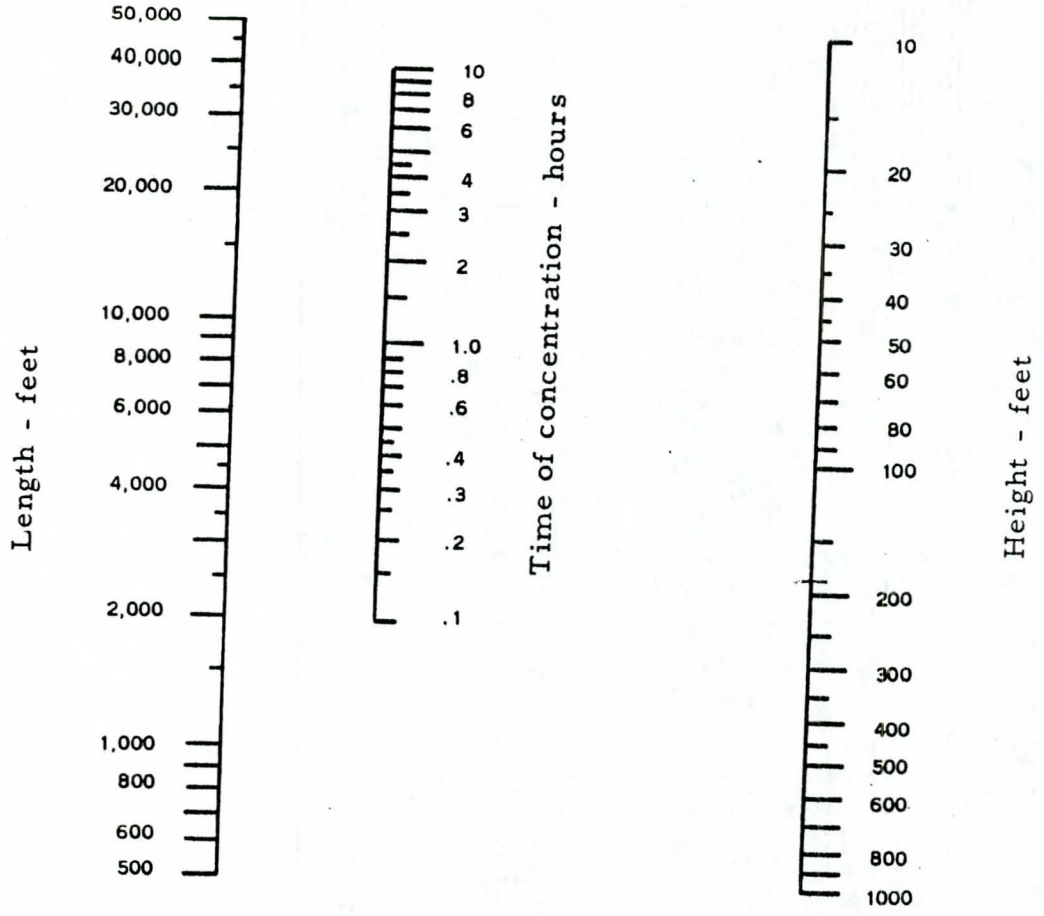


Fig. 6

AREA - DEPTH CURVES



$$T_c = \frac{L^{1.15}}{7700\ H^{.38}}$$

T_c = time of concentration - hours
L = length of drainage area - feet
H = elevation - feet

Fig. 7

TIME OF CONCENTRATION
FOR
DRAINAGE AREAS GREATER THAN 10 SQ. MILES

Soil Conservation Service

ATTACHMENT 2,

APPENDIX C

PEAK FLOW COMPUTATION SHEETS

DRAINAGES ABOVE HWY 74

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway Arizona 74 County Maricopa
Location Above Hwy 74 - Culvert No. 5
Project ~~No.~~ Chrysler Sld Proving Grounds Station —
Name of Stream /

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.47	square miles
Drainage Length	11,600	feet
Elevation		
Top of Drainage Area	2250	feet
At Structure	1995	feet
Drainage Area Slope	2.20	%
Drainage Width	1130	feet
Width factor W_f	1.10	
Vegetative Cover Type	desert brush	
Vegetative Cover Density	10	%
Soil Group	C	
Precipitation		
P = 6 hour =	3.3	inches
P = 24 hour =	4.1	inches

778 csm

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.5	inches
Curve Number		89	
Runoff	Q =	1.45	inches
Time of Concentration	Tc	0.82	hours
Time of Peak	Tp = (Tc)(W_f)	0.90	hours

.75
.82

Peak Discharge $Qp = \frac{484\,AQ}{Tp} = \frac{484\,(0.47)\,(1.45)}{0.90}$

39.1%

= 366 cfs

Fig 7-5 OR

Fig 7.12

Computed by D Healy Date 5/27/78

1 of 10

OK

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway Arizona 74 County Maricopa

Location Hwy 74 Culvert No. 7

Project ~~No.~~ Chaplin SW Proving Grounds Station —

Name of Stream 3A

DESIGN DATA:

Design Frequency	100	years
Drainage Area	1.78	square miles
Drainage Length	21,800	feet
Elevation		
Top of Drainage Area	2600	feet
At Structure	1980	feet
Drainage Area Slope	2.82	%
Drainage Width	2000	feet
Width factor W_f	1.00	
Vegetative Cover Type	desert brush	
Vegetative Cover Density	10	%
Soil Group	C	
Precipitation		
P = 6 hour =	3.3	inches
P = 24 hour =	4.1	inches

L = 22,000'

779 CSM

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.5	inches
Curve Number		89	
Runoff	Q =	1.95	inches
Time of Concentration	Tc	0.9	hours
Time of Peak	Tp = (Tc)(W_f)	0.9	hours
Peak Discharge	$Qp = \frac{484\,AQ}{Tp}$ =	$\frac{484(1.78)(1.95)}{0.9}$	
	=	1388	cfs

1.27 Fig 2.5

7.6 ? 5.4

984 cfs

Computed by D. Healey Date 5/27/78

2 of 10

OK

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway Arizona 74 County Maricopa
Location Above Hwy 74 - Culvert Nos 9 & 10
Project No. Chrysler Shl Flowing Grids Station —
Name of Stream 3B

DESIGN DATA:

Design Frequency	100	years
Drainage Area	1.01	square miles
Drainage Length	16,500	feet
Elevation		
Top of Drainage Area	2400	feet
At Structure	1990	feet
Drainage Area Slope	2.98	%
Drainage Width	1700	feet
Width factor W_f	1.00	
Vegetative Cover Type	desert brush	
Vegetative Cover Density	10	%
Soil Group	C	
Precipitation		
P = 6 hour =	3.3	inches
P = 24 hour =	4.1	inches

835 cfm

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.5	inches
Curve Number		89	
Runoff	Q =	1.45	inches (Fig 2-7 .73)
Time of Concentration	Tc	0.84	hours .99
Time of Peak	Tp = (Tc)(W_f)	0.84	hours

5.5'/sec

Peak Discharge $Qp = \frac{484\,AQ}{Tp} = \frac{484\,(1.01)(1.45)}{0.84}$

= 844 cfs (762 cfs)

Computed by D Healey Date 5/27/78

3 of 10

OK

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway Arizona 74 County Maricopa
Location Above Hwy 74 - Culverts Nos 13 & 14
Project ~~No~~ Chrysler Stu Proving Grounds Station —
Name of Stream 4A

DESIGN DATA:

Design Frequency	100	years
Drainage Area	3.60	square miles
Drainage Length	27,600	feet
Elevation		
Top of Drainage Area	2600	feet
At Structure	1280	feet
Drainage Area Slope	2.87	%
Drainage Width	3640	feet
Width factor W_f	0.89	
Vegetative Cover Type	desert brush	
Vegetative Cover Density	10	%
Soil Group	C	
Precipitation		
P = 6 hour =	3.3	inches
P = 24 hour =	4.1	inches

1500cfm

C = 21,600

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.5	inches
Curve Number		89	
Runoff	Q =	1.45	inches
Time of Concentration	Tc	1.1	hours
Time of Peak	$Tp = (Tc)(W_f)$	1.08	hours
Peak Discharge	$Qp = \frac{484\,AQ}{Tp} =$	$\frac{484(3.6)(1.45)}{1.08}$	
	=	2340	cfs

7/100

Computed by D Healey Date 5/27/78

4 of 10

OK

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway Arizona 74 County Maricopa

Location Above Hwy 74 - Culvert No 19

Project ~~No.~~ Chrysler SW Proving Grounds Station —

Name of Stream 4B

DESIGN DATA:

Design Frequency	100	years
Drainage Area	1.86	square miles
Drainage Length	21,700	feet
Elevation		
Top of Drainage Area	2480	feet
At Structure	1950	feet
Drainage Area Slope	2.44	%
Drainage Width	2390	feet
Width factor W_f	1.00	
Vegetative Cover Type	desert brush	
Vegetative Cover Density	10	%
Soil Group	C	
Precipitation		
P = 6 hour =	3.3	inches
P = 24 hour =	4.1	inches

716 cfm

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.5	inches
Curve Number		89	
Runoff	Q =	1.45	inches
Time of Concentration	Tc	0.98	hours
Time of Peak	Tp = (Tc)(W_f)	0.98	hours
Peak Discharge	$Qp = \frac{484\,AQ}{Tp}$ =	$\frac{484(1.86)(1.45)}{0.98}$	
	=	1332	cfs

1.16 hrs

6.1 1/08

1185 cfs

Computed by D Healey Date 5/27/78

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway Arizona 74 County Maricopa
Location Above Hwy 74 - Culvert No. 23
Project ~~No~~ Chrysler SW Proving Grounds Station —
Name of Stream 6A

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.19	square miles
Drainage Length	5830	feet
Elevation		
Top of Drainage Area	2100	feet
At Structure	1970	feet
Drainage Area Slope	2.23	%
Drainage Width	900	feet
Width factor W_f	1.10	
Vegetative Cover Type	desert brush	
Vegetative Cover Density	10	%
Soil Group	C	
Precipitation		
P = 6 hour =	3.3	inches
P = 24 hour =	4.1	inches

910 cfm

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.5	inches
Curve Number		89	
Runoff	Q =	1.45	inches
Time of Concentration	Tc	0.70	hours
Time of Peak	Tp = (Tc)(W_f)	0.77	hours

.44
.48

2.3 1/4

Peak Discharge $Qp = \frac{484\,AQ}{Tp} = \frac{484(0.19)(1.45)}{0.77}$

= 173 cfs

Fig 2-5 OK ↔ 277 cfs Fig 2-7

Computed by D Healey Date 5/27/78

OK

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

*

LOCATION DATA:

Highway Arizona 74 County Maricopa
Location Above Hwy 74 - Culvert No. 25
Project ~~No~~ Chrysler SW Proving Grounds Station —
Name of Stream 6B

DESIGN DATA:

Design Frequency	100	years
Drainage Area	1.27	square miles
Drainage Length	18,000	feet
Elevation		
Top of Drainage Area	2360	feet
At Structure	1970	feet
Drainage Area Slope	2.17	%
Drainage Width	1970	feet
Width factor W_f	1.00	
Vegetative Cover Type	desert brush	
Vegetative Cover Density	10	%
Soil Group	C	
Precipitation		
P = 6 hour =	3.3	inches
P = 24 hour =	4.1	inches

702 cfm

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.5	inches
Curve Number		89	
Runoff	Q =	1.45	inches
Time of Concentration	Tc	1.0	hours
Time of Peak	Tp = (Tc)(W_f)	1.0	hours

1.05

5 1/sec

Peak Discharge $Qp = \frac{484\,AQ}{Tp} = \frac{484(1.27)(1.45)}{1.0}$

$= 892$ cfs

848

Computed by D Heskey Date 5/27/78

7 of 10

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway Arizona 74 County Maricopa
Location Above Hwy 74 - Culvert No. 29
Project ~~No.~~ Chrysler Sled Proving Grounds Station —
Name of Stream 6C

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.17	square miles
Drainage Length	4720	feet
Elevation		
Top of Drainage Area	2080	feet
At Structure	1270	feet
Drainage Area Slope	2.33	%
Drainage Width	1020	feet
Width factor W_f	1.10	
Vegetative Cover Type	desert brush	
Vegetative Cover Density	10	%
Soil Group	C	
Precipitation		
P = 6 hour =	3.3	inches
P = 24 hour =	4.1	inches

935 CSM

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.5	inches
Curve Number		89	
Runoff	Q =	1.45	inches
Time of Concentration	Tc	0.68	hours
Time of Peak	Tp = (Tc)(W_f)	0.75	hours
Peak Discharge	$Qp = \frac{484\,AQ}{Tp}$ =	$\frac{484(0.17)(1.45)}{0.75}$	
	=	159	cfs

1.9 A

Computed by D Healey Date 5/27/78

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway Arizona 74 County Maricopa
Location Show Hwy 74 - Culvert No. 32
Project ~~No~~ Chrysler Sh Proving Grounds Station —
Name of Stream 6D

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.43	square miles
Drainage Length	9100	feet
Elevation		
Top of Drainage Area	2190	feet
At Structure	1280	feet
Drainage Area Slope	2.31	%
Drainage Width	1310	feet
Width factor W_f	1.0	
Vegetative Cover Type	desert brush	
Vegetative Cover Density	10	%
Soil Group	C	
Precipitation		
P = 6 hour =	3.3	inches
P = 24 hour =	4.1	inches

877 cfs

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.5	inches
Curve Number		89	
Runoff	Q =	1.45	inches
Time of Concentration	Tc	0.8	hours
Time of Peak	Tp = (Tc)(W_f)	0.8	hours

Peak Discharge $Qp = \frac{484\,AQ}{Tp} = \frac{484\,(0.43)(1.45)}{0.80}$

$= 377$ cfs

3.2 1/2

Computed by D Healey Date 5/27/78

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
SCS METHOD: PART II

LOCATION DATA:

Highway Arizona 74 County Maricopa
Location Hwy 74 - Culvert Nos. 34, 35, 36
Project ~~No.~~ Chrysler SW Proving Grds Station —
Name of Stream 10 (ME Wash)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	16.66	square miles
Drainage Length	57,300	feet
Elevation		
Top of Drainage area	3240	feet
At Structure	1925	feet
Drainage Area Slope	3.39	%
Vegetative Cover Type	desert brush	
Vegetative Cover Density	10	%
Soil Group	C	
Precipitation		
P = 6 hour =	3.3	inches
P = 24 hour =	4.1	inches

DESIGN COMPUTATION:

Curve Number	89	
Time of Concentration	2.17	hours
Peak Design Discharge		
$Qp = \frac{484AQ}{\frac{D}{2} + .6Tc} =$		cfs

Storm Duration	Point Precipitation	Areal Reduction	Areal Precipitation	Direct Runoff	Peak Discharge
1 hour	2.5	0.91	2.28	1.25	5600
2 hour	2.8	0.93	2.60	1.55	5435
3 hour	3.0	0.96	2.88	1.80	5185
6 hour	3.3	0.97	3.20	2.10	3938

Computed by: D Healey Date 5/27/78

DRAINAGES BELOW HWY 74 & ABOVE NORTH BOUNDARY

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway — County Maricopa
Location N boundary to Hwy 74
Project ~~No.~~ Chrysler S.W. Proving Grds Station —
Name of Stream —

DESIGN DATA:

Design Frequency	100	years
Drainage Area	.48	square miles
Drainage Length	12,800	feet
Elevation		
Top of Drainage Area	1995	feet
At Structure	1818	feet
Drainage Area Slope	1.38	%
Drainage Width	1045	feet
Width factor W_f	1.10	
Vegetative Cover Type	desert brush	
Vegetative Cover Density	10	%
Soil Group	C	
Precipitation		
P = 6 hour =	3.3	inches
P = 24 hour =	4.1	inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.5	inches
Curve Number		89	
Runoff	Q =	1.45	inches
Time of Concentration	Tc	1.10	hours (.96)
Time of Peak	Tp = (Tc)(W_f)	1.21	hours (1.06)
Peak Discharge	$Qp = \frac{484\,AQ}{Tp}$ =	$\frac{484(0.48)(1.95)}{1.21}$	
	=	278	cfs (318 cfs)

Computed by D. Healey Date 5/27/78

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway — County Maricopa
Location N boundary to hwy 74
Project ~~No.~~ Chrysler S.W. Proving Grounds Station —
Name of Stream 3

DESIGN DATA:

Design Frequency	100	years
Drainage Area	.71	square miles
Drainage Length	12,200	feet
Elevation		
Top of Drainage Area	1990	feet
At Structure	1815	feet
Drainage Area Slope	1.43	%
Drainage Width	1620	feet
Width factor W_f	1.09	
Vegetative Cover Type	desert brush	
Vegetative Cover Density	10	%
Soil Group	D	
Precipitation		
P = 6 hour =	3.2	inches
P = 24 hour =	4.1	inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.5	inches
Curve Number		89	
Runoff	Q =	1.45	inches
Time of Concentration	Tc	1.18	hours .91
Time of Peak	Tp = (Tc)(W_f)	1.18	hours
Peak Discharge	$Qp = \frac{484\,AQ}{Tp} = \frac{484(0.71)(1.45)}{1.18}$		
	=	422	cfs

Fig 2-5 OK used urbanity 547 cfs Fig 2-7

Computed by D. Healey Date 5/27/78

2 of 7

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway Arizona 74 County Maricopa
Location Hwy 74 to North Boundary
Project No. Chrysler S.W. Proving Grounds Station —
Name of Stream 4A

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.48	square miles
Drainage Length	11,800	feet
Elevation		
Top of Drainage Area	1985	feet
At Structure	1815	feet
Drainage Area Slope	1.44	%
Drainage Width	1135	feet
Width factor W_f	1.10	
Vegetative Cover Type	desert brush	
Vegetative Cover Density	10	%
Soil Group	C	
Precipitation		
P = 6 hour =	3.3	inches
P = 24 hour =	4.1	inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.5	inches
Curve Number		89	
Runoff	Q =	1.45	inches
Time of Concentration	Tc	1.08	hours
Time of Peak	$Tp = (Tc)(W_f)$	1.19	hours
Peak Discharge	$Qp = \frac{484\,AQ}{Tp}$ =	$\frac{484(0.48)(1.45)}{1.19}$	
	=	283	cfs

Fig 8-5 OK

Computed by D. Healey Date 5/27/78

3 of 7

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway Arizona 74 County Maricopa
Location Hwy 74 to North Boundary
Project ~~No.~~ Chrysler S.W. Proving Ground Station —
Name of Stream 4B

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.70	square miles
Drainage Length	11,800	feet
Elevation		
Top of Drainage Area	1980	feet
At Structure	1815	feet
Drainage Area Slope	1.40	%
Drainage Width	1650	feet
Width factor W_f	1.00	
Vegetative Cover Type	desert brush	
Vegetative Cover Density	10	%
Soil Group	C	
Precipitation		
P = 6 hour =	3.3	inches
P = 24 hour =	4.1	inches

594 csm

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.5	inches
Curve Number		89	
Runoff	Q =	1.45	inches
Time of Concentration	Tc	1.18	hours
Time of Peak	Tp = (Tc)(W_f)	1.18	hours

.90

Peak Discharge $Qp = \frac{484\,AQ}{Tp} = \frac{484(0.70)(1.45)}{(1.18)}$

= 416 cfs

Fig 2-5 used correctly

546 cfs Fig 2-7

Computed by D. Healy Date 5/27/78

4 of 7

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

No

LOCATION DATA:

Highway — County Maricopa
Location N boundary to hwy 74
Project ~~No~~ Chrysler SW Proving Grounds Station —
Name of Stream 6

DESIGN DATA:

Design Frequency	100	years
Drainage Area	1.07	square miles
Drainage Length	11,200	feet
Elevation		
Top of Drainage Area	1980	feet
At Structure	1820	feet
Drainage Area Slope	1.43	%
Drainage Width	2660	feet
Width factor W_f	.89	
Vegetative Cover Type	desert brush	
Vegetative Cover Density	10	%
Soil Group	C	
Precipitation		
P = 6 hour =	3.2	inches
P = 24 hour =	4.1	inches

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.5	inches
Curve Number		89	
Runoff	Q =	1.45	inches
Time of Concentration	Tc	1.24	hours
Time of Peak	Tp = (Tc)(W_f)	1.10	hours
Peak Discharge	$Qp = \frac{484\,AQ}{Tp} =$	$\frac{484(1.07)(1.45)}{1.10}$	
	=	683	cfs

Fig 3-5 used correctly

Computed by D. Heaky Date 5/27/78

5 of 7

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET

S C S METHOD: PART I

LOCATION DATA:

Highway — County Maricopa
Location N boundary to hwy 74
Project ~~No.~~ Chrysler Stat Proving Grds Station —
Name of Stream 10 (ME Wash)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.57	square miles
Drainage Length	10,400	feet
Elevation		
Top of Drainage Area	1970	feet
At Structure	1820	feet
Drainage Area Slope	1.44	%
Drainage Width	1530	feet
Width factor W_f	1.00	
Vegetative Cover Type	desert brush	
Vegetative Cover Density	10	%
Soil Group	C	
Precipitation		
P = 6 hour =	3.3	inches
P = 24 hour =	4.1	inches

638 cfm

DESIGN COMPUTATION:

Precipitation	P = 1 hour =	2.5	inches
Curve Number		89	
Runoff	Q =	1.45	inches
Time of Concentration	Tc	1.10	hours
Time of Peak	Tp = (Tc)(W_f)	1.10	hours

Peak Discharge $Qp = \frac{484\,AQ}{Tp} = \frac{484(0.57)(1.45)}{1.10}$

$= 364$ cfs

Computed by D. Healey Date 5/27/78

6 of 7

ARIZONA HIGHWAY DEPARTMENT
BRIDGE DIVISION

HYDROLOGIC DESIGN DATA SHEET
SCS METHOD: PART II

LOCATION DATA:

Highway — County Maricopa
Location Hwy 74 to North Boundary
Project ~~No~~ Chrysler Sal Proving Gr. Station —
Name of Stream 10 (NE Wash)

DESIGN DATA:

Design Frequency	100	years
Drainage Area	0.57	square miles
Drainage Length	10,400	feet
Elevation		
Top of Drainage area	1995	feet
At Structure	1820	feet
Drainage Area Slope	1.68	%
Vegetative Cover Type	desert brush	
Vegetative Cover Density	10	%
Soil Group	C	
Precipitation		
P = 6 hour =	3.3	inches
P = 24 hour =	4.1	inches

DESIGN COMPUTATION:

Curve Number	89	
Time of Concentration	0.76	hours
Peak Design Discharge		
$Qp = \frac{484AQ}{\frac{D}{2} + .6Tc} =$	329	cfs

Storm Duration	Point Precipitation	Areal Reduction	Areal Precipitation	Direct Runoff	Peak Discharge
1 hour	2.5	0.91	2.28	1.25	329
2 hour	2.8	0.93	2.60	1.55	268
3 hour	3.0	0.96	2.88	1.80	232
6 hour	3.3	0.97	3.20	2.10	153

Computed by: D Healey Date 5/27/70

7 of 7

ATTACHMENT 3,

APPENDIX C

DEVELOPMENT OF HYDROGRAPHS

SECTION

DESIGNED BY D. Healey DATE 5/27/78

CHECKED BY DATE

JOHANNESSEN & GIRAND
CONSULTING ENGINEERS INC.,
PHOENIX, ARIZONA

JOB TITLE Chrysler S.W. Proving Ground **JOB. NO.** 2475.01

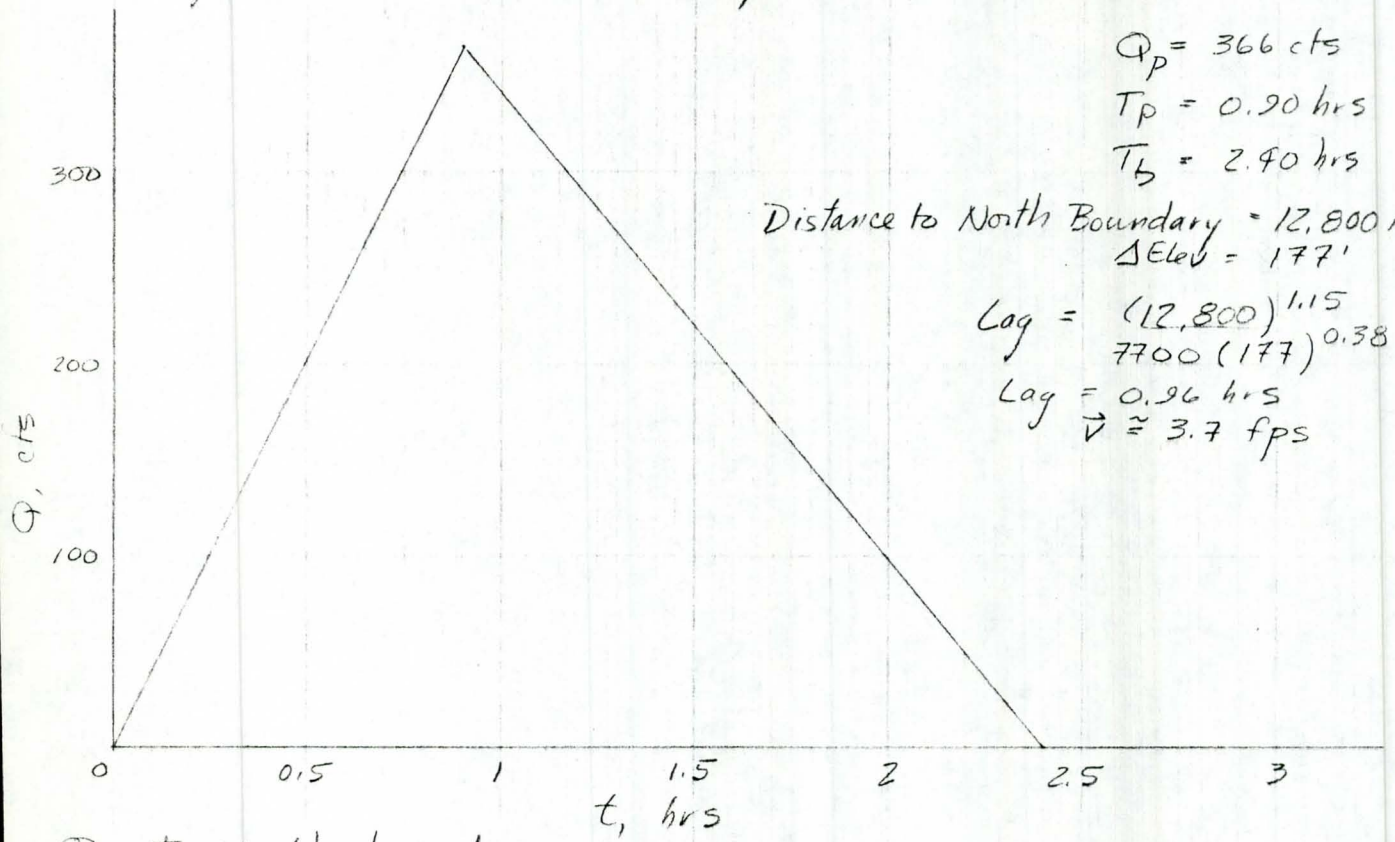
DA	Culvert	Type	Possible Head	Inlet Control HW/D	Inlet Control Q	Outlet Control H	Outlet Control Q
1	4	48" RCP	10'	2.5	170	6'	180
	(5)	2-8'x4' BC	4.5'	1.13	430	0.5	280
	6	24" RCP	3.5'	1.75	28	1.5'	20
3	(7)	2-8'x7' BC	7.5'	1.08	(930)	1.75'	(930)
	8	36" RCP	5'	1.67	70	2'	55
	(9)	2-8'x4' BC	7'	1.75	690	3'	680
	(10)	2-8'x4' BC	6.5'	1.63	640	2.5'	620
4	11	48" RCP	6.5'	1.63	140	2.5'	110
	12	24" RCP	5'	2.5	32	3'	28
	(13)	2-8'x4' BC	6'	1.5	(560)		
	(14)	2-10'x6' BC	6'	1.00	(860)		
	15	36" RCP	6'	2	75	3'	65
	16	36" RCP	6'	2	75	3'	65
	17	24" RCP	3'	1.5	20	1'	15
	18	42" RCP	7'	2	110	3.5'	100
	(19)	3-10'x5' BC	13'	2.6	2400	8'	2550
	20	24" RCP	6'	3	35	4'	30
	21	24" RCP	4'	2	30	2'	20
	22	60" RCP	8'	1.6	230	3'	200
6	(23)	1-8'x5' BC	10'	2	650	5'	500
	24	30" RCP	4'	1.6	40	1.5'	30
	(25)	3-5'x10' BC	8.5'	1.7	1740	3.5'	1650
	26	48" RCP	7'	1.75	140	3'	125
	27	48" RCP	12'	3	200	8'	200
	28	30" RCP	9'	3.6	65	6.5'	65
	(29)	1-6'x5' BC	9'	1.8	360	4'	360
	30	24" RCP	5'	2.5	30	3'	25
	31	30" RCP	4'	1.6	40	1.5'	30
	(32)	1-10'x5' BC	6'	1.2	400	1'	320
10	33	60" RCP	15'	3	350	10'	370
	(34)	2-10'x8' BC	11.5'	1.44	2000	3.5'	2000
	(35)	3-10'x8' BC	11.5'	1.44	3000	3.5'	3000
	(36)	4-10'x8' BC	11.5'	1.44	4000	3.5'	4000
	37	36" RCP	4'	1.33	55	1'	50
	38	42" RCP	8'	2.29	120	5.5	125
	39	30" RCP	6'	2.4	55	3.5	45
	40	30" RCP	6'	2.4	55	3.5	50

SECTION Civil
DESIGNED BY D. Healey DATE 5/27/78
CHECKED BY _____ DATE _____
JOB TITLE Chrysler Hydrology

JOHANNESSEN & GIRAND
CONSULTING ENGINEERS INC.,
PHOENIX, ARIZONA

JOB. NO. 2475.01

Drainage Area 1 - above Hwy 74 at culvert No 5



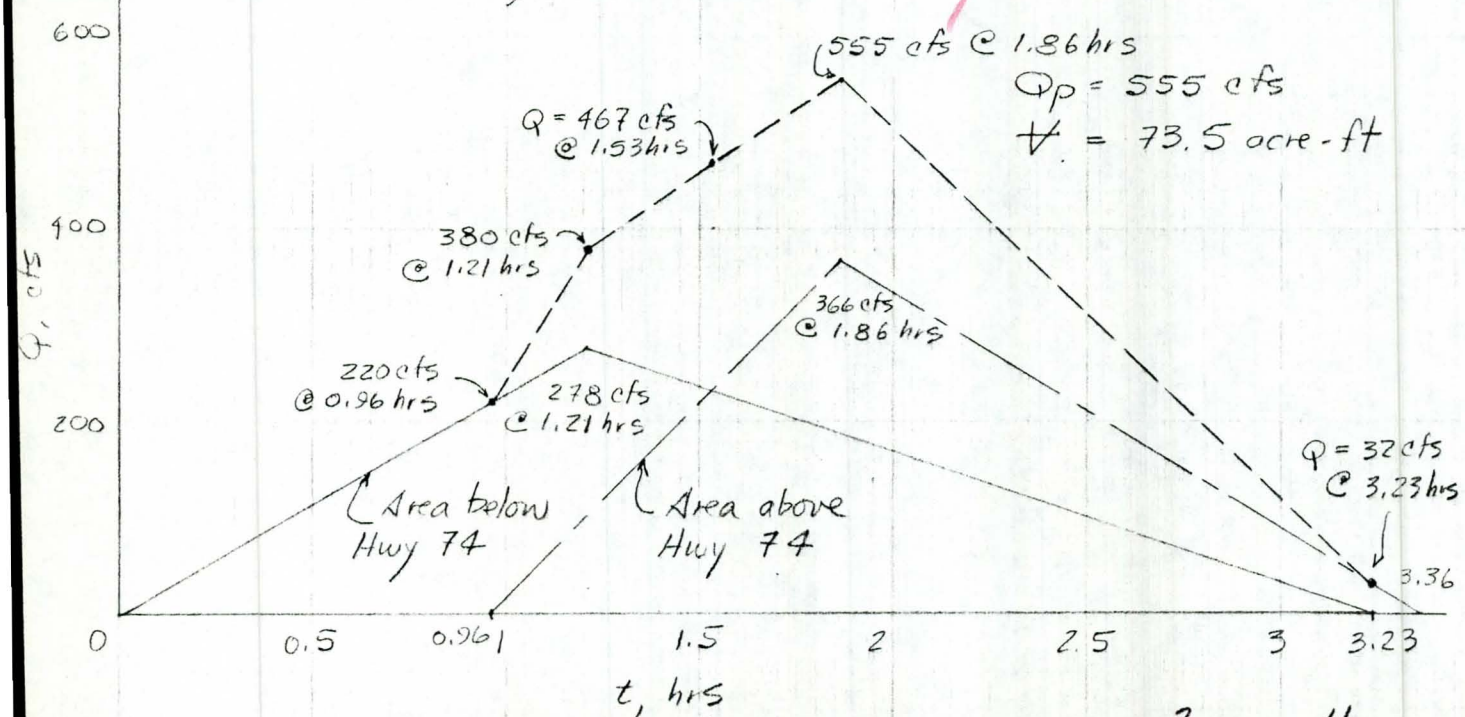
Q_p = 366 cfs
T_p = 0.90 hrs
T_b = 2.40 hrs

Distance to North Boundary = 12,800 ft
ΔElev = 177'

$$Lag = \frac{(12{,}800)^{1.15}}{7700\,(177)^{0.38}}$$

Lag = 0.96 hrs
$\bar{V} \approx 3.7$ fps

Q at North boundary



Q_p = 555 cfs
$\bar{V}$ = 73.5 acre-ft

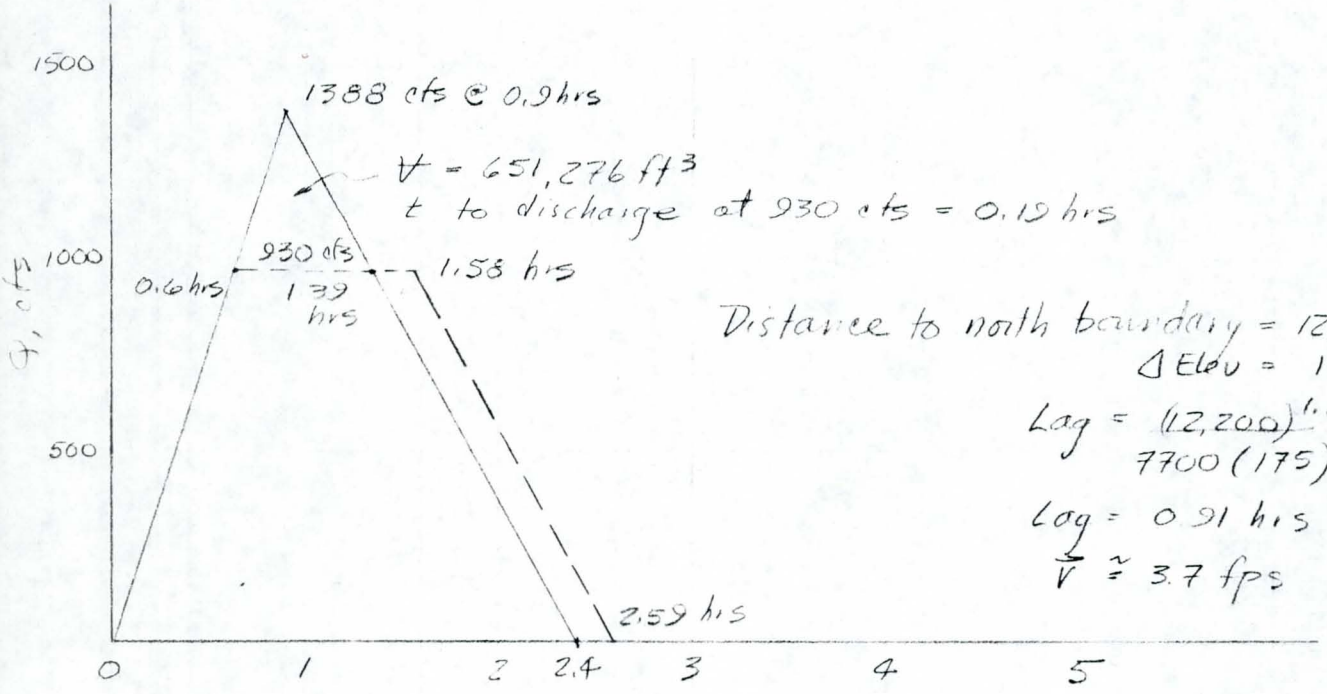
SECTION Civil
DESIGNED BY D Healey DATE 5/27/78
CHECKED BY _____ DATE _____
JOB TITLE Chrysler Hydrology

JOHANNESSEN & GIRAND
CONSULTING ENGINEERS INC.,
PHOENIX, ARIZONA

JOB. NO. 2475.01

Drainage Area 3 - above Hwy 74 at Culvert No. 7

Q_p = 1388 cfs. Capacity of Culvert = 930 cfs
T_p = 0.9 hrs
T_b = 2.40 hrs

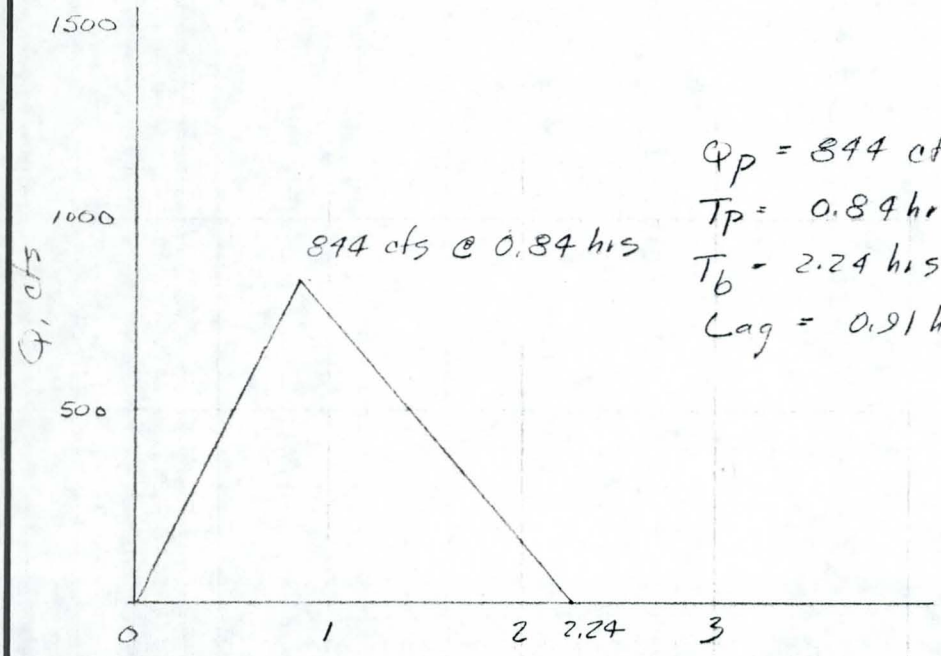


Distance to north boundary = 12,200'
Δ Elev = 175'

$$Lag = \frac{(12{,}200)^{1.15}}{7700\,(175)^{0.38}}$$

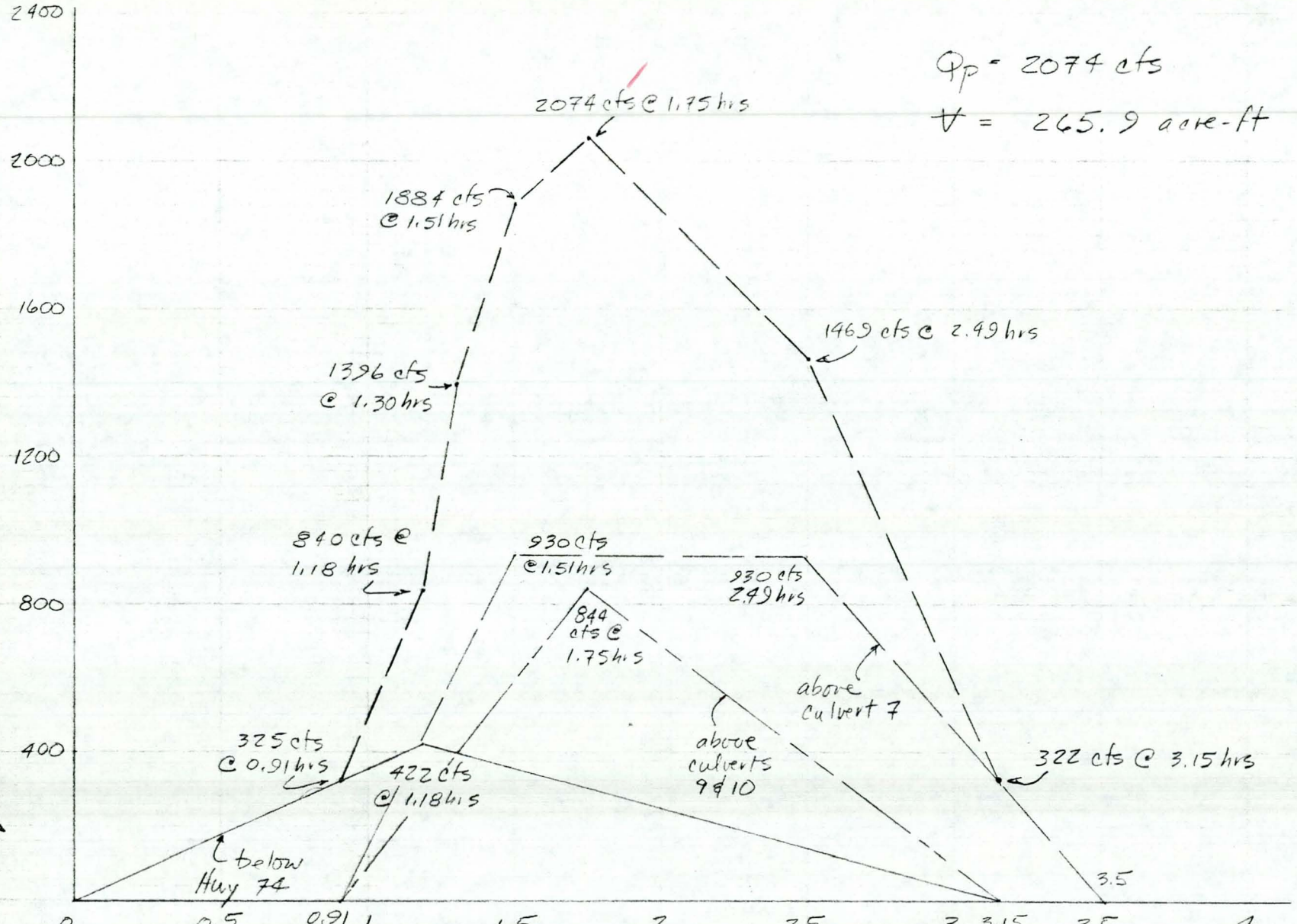
Lag = 0.91 hrs
$\bar{V} \approx$ 3.7 fps

Drainage Area 3 - above Hwy 74 @ Culverts Nos. 9 & 10



Q_p = 844 cfs
T_p = 0.84 hrs
T_b = 2.24 hrs
Lag = 0.91 hrs (same as above)

Drainage Area 3 - Ht Wash Boundary



Q_p = 2074 cfs

V = 265.9 acre-ft

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DATE 5/27/78
DATE
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PHOENIX, ARIZONA

SHEET NO. 4 OF 11

SECTION Civil
DESIGNED BY D. Healey DATE 5/27/78
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JOB TITLE Chrysler Hydrology

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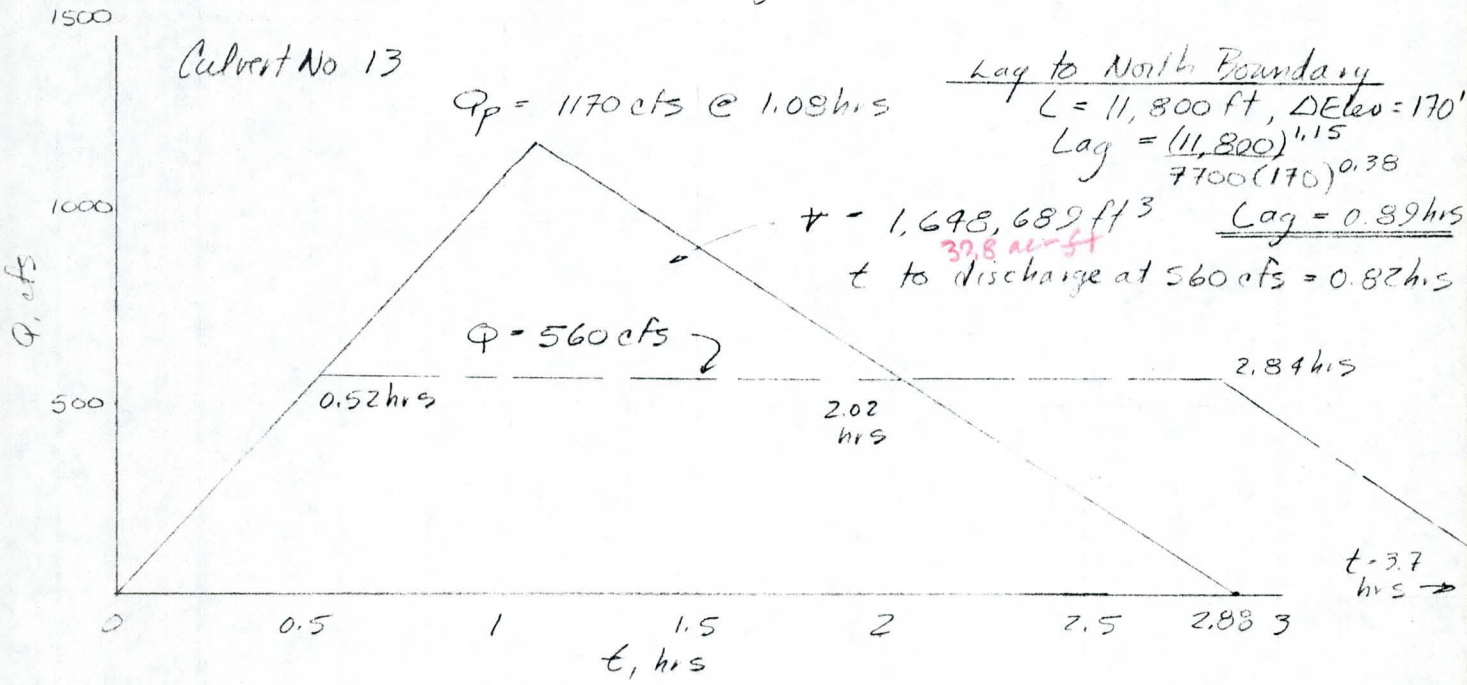
JOB. NO. 2475.01

Drainage Area 4A

1. Q_p above Hwy 74 = 2340 cfs
   a. Q to culvert no. 13 = 1170 cfs Capacity = 560 cfs
   b. Q to culvert no 14 = 1170 cfs Capacity = 860 cfs
   c. flow from culvert no. 14 joins flow from culvert no. 13



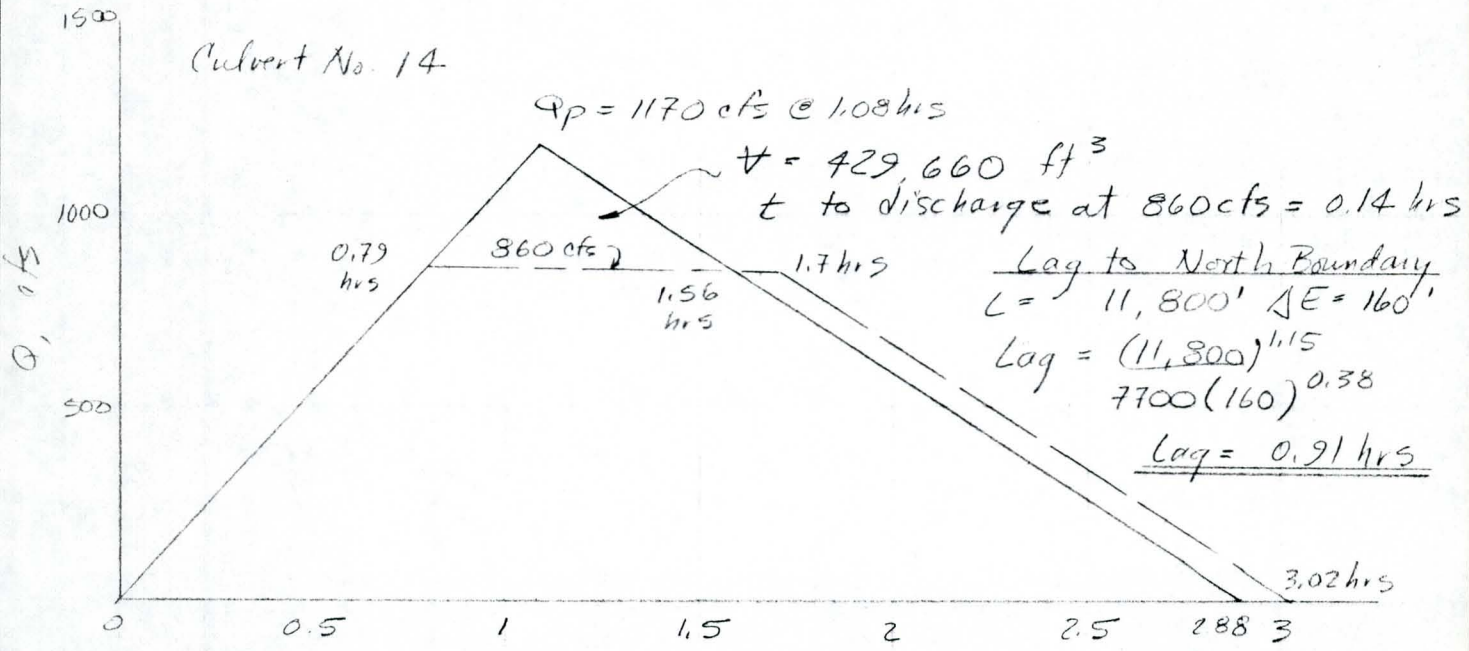
Lag to North Boundary
L = 11,800 ft, ΔElev = 170'

$$Lag = \frac{(11,800)^{1.15}}{7700(170)^{0.38}}$$

$Lag = 0.89$ hrs

$\forall = 1,698,689\ ft^3$ (38.8 ac-ft)

t to discharge at 560 cfs = 0.82 hrs



Lag to North Boundary
L = 11,800' ΔE = 160'

$$Lag = \frac{(11,800)^{1.15}}{7700(160)^{0.38}}$$

$Lag = 0.91$ hrs

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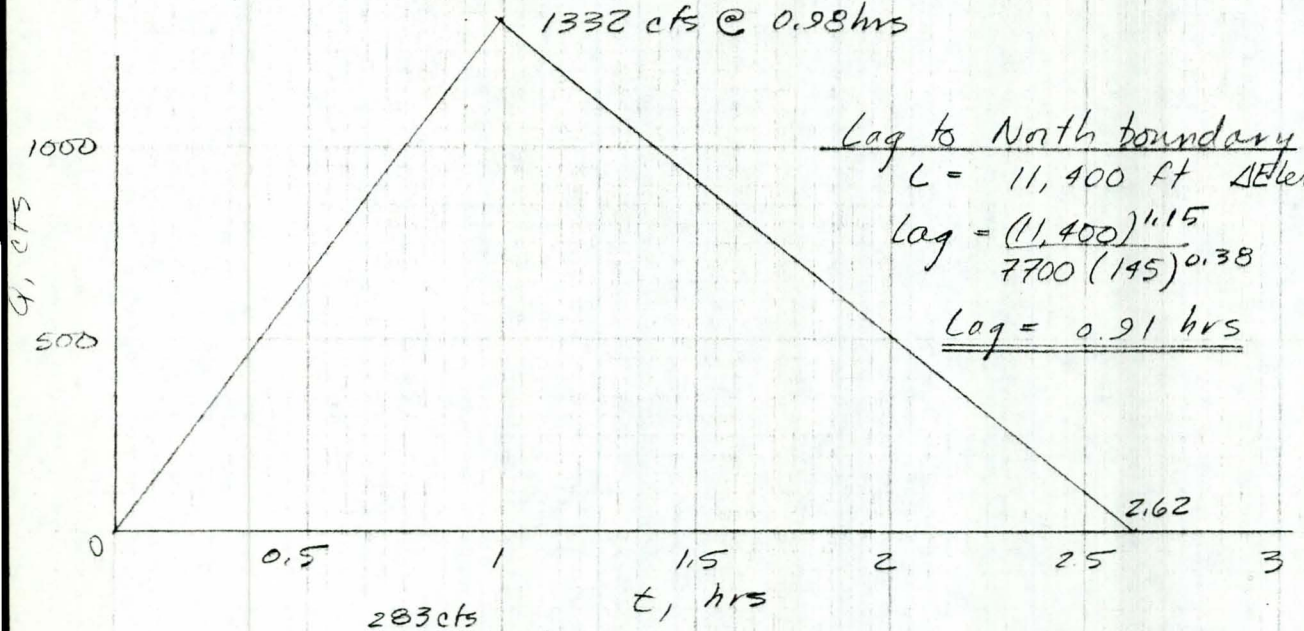
Drainage Area 4B

1 Q_p = 1332 cfs @ Culvert No. 19 - entire flow passes

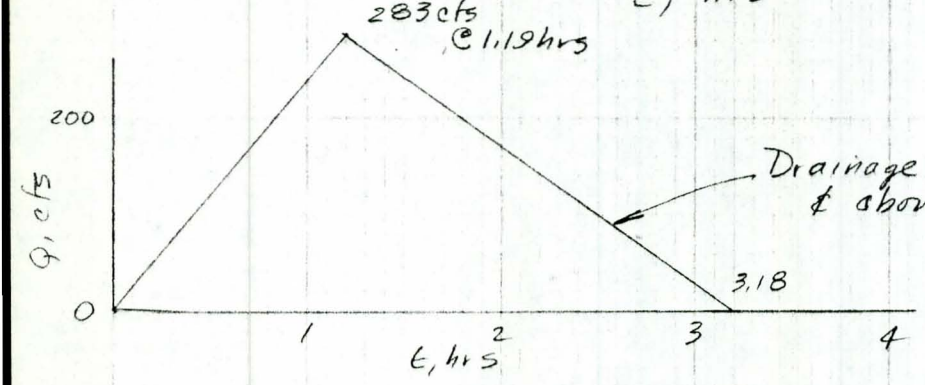


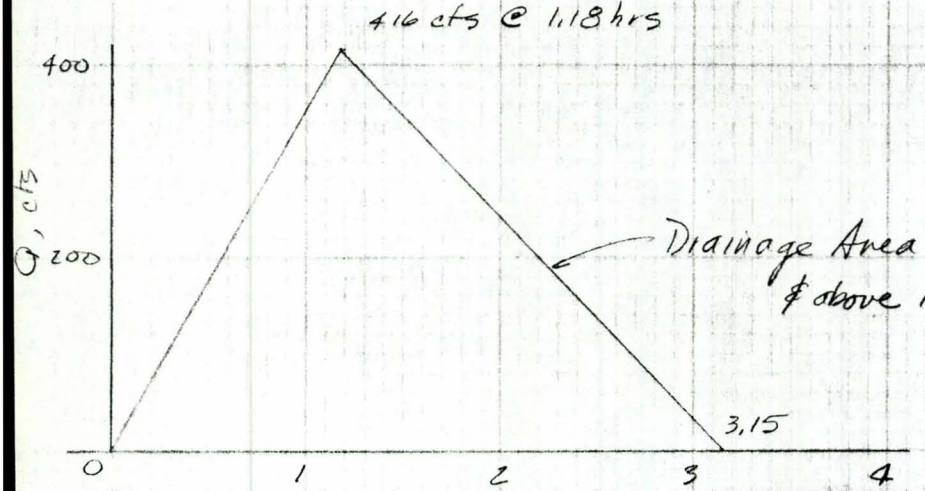
Lag to North boundary

L = 11,400 ft ΔElev = 145 ft

$$Lag = \frac{(11,400)^{1.15}}{7700\,(145)^{0.38}}$$

Lag = 0.91 hrs





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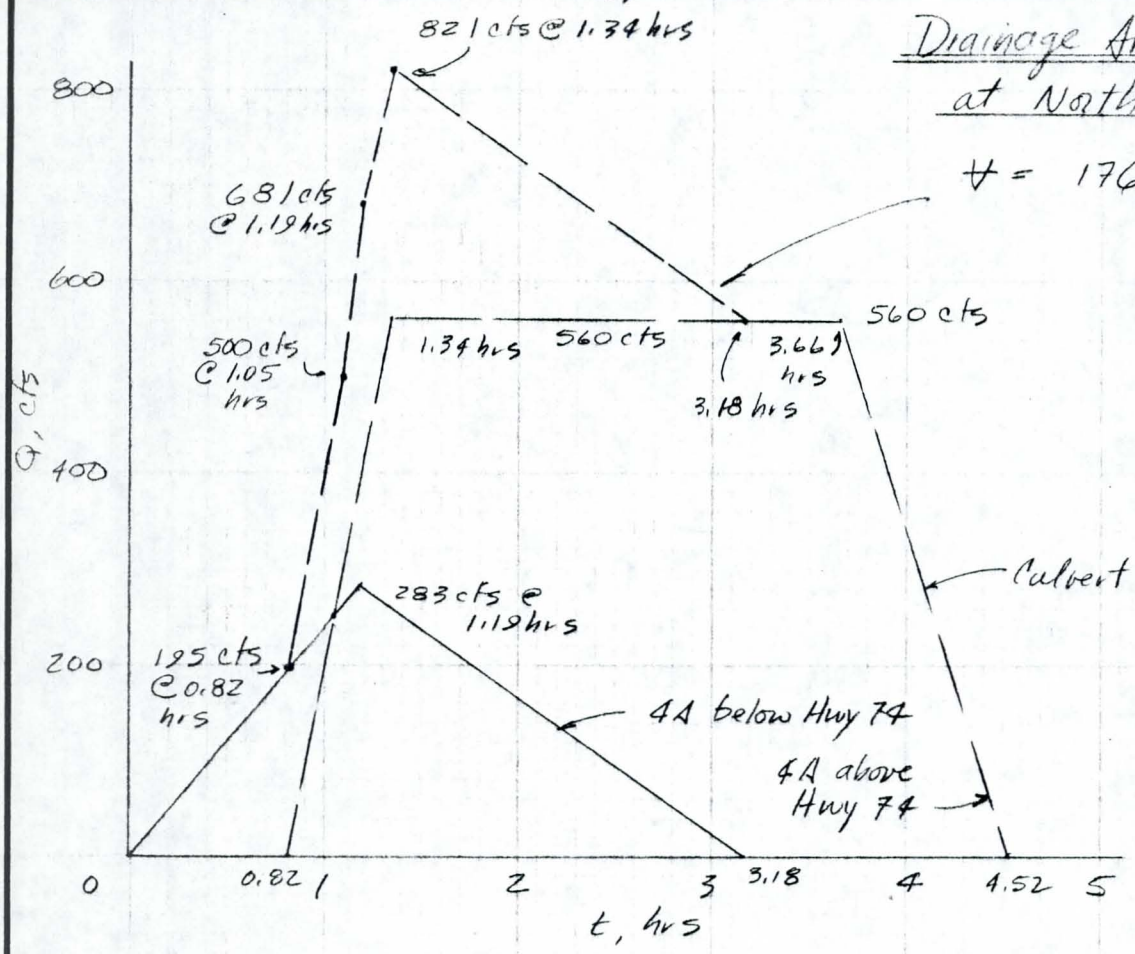
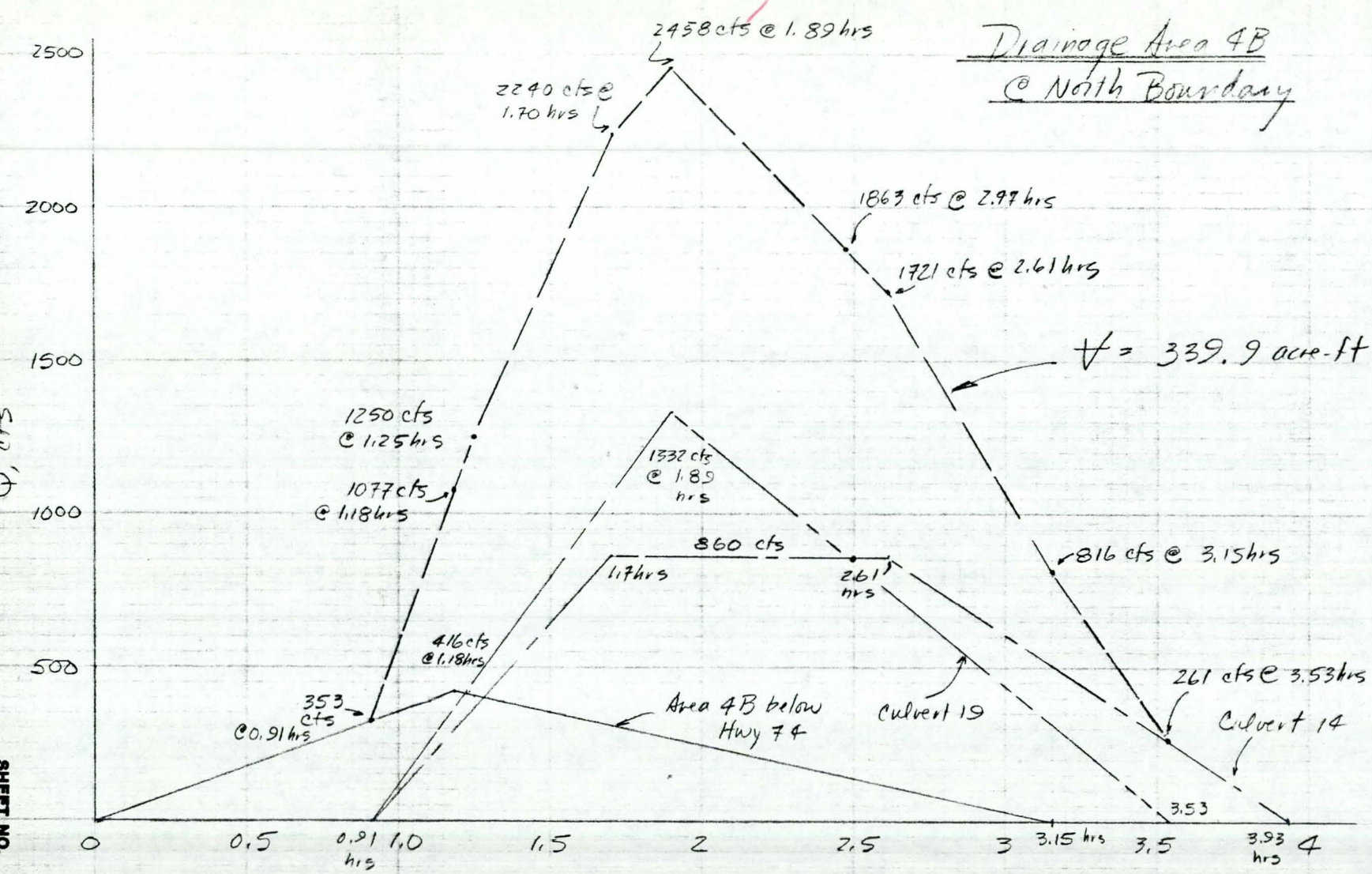
Drainage Area 4A
at North boundary

$\forall$ = 176.5 acre-ft





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SHEET NO. 8 OF 11

SECTION Civil
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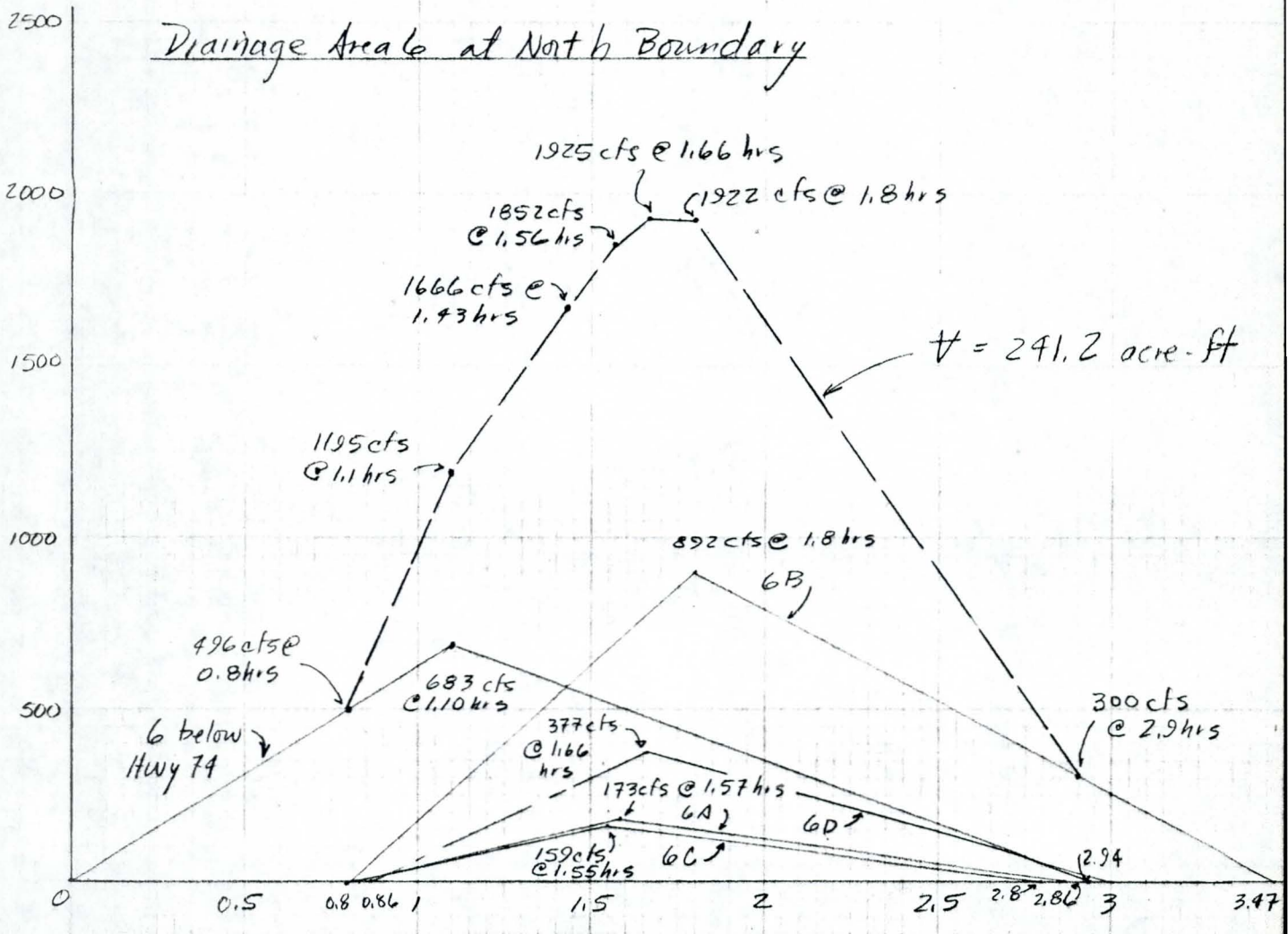
Drainage Area 6

1. Drainage areas above Hwy 74

Drainage Area	Culvert Number	Q_p, cfs	T_p hrs	Dist to N. Boundary, ft	Δ Elev., ft	Lag, hrs
6A	23	173	0.77	10,300	150	0.80
6B	25	892	1.00	10,300	150	0.80
6C	29	159	0.75	10,300	150	0.80
6D	32	377	0.80	11,200	160	0.86

2. Drainage Area below Hwy 74
Q_p = 683 cfs, T_p = 1.10 hrs



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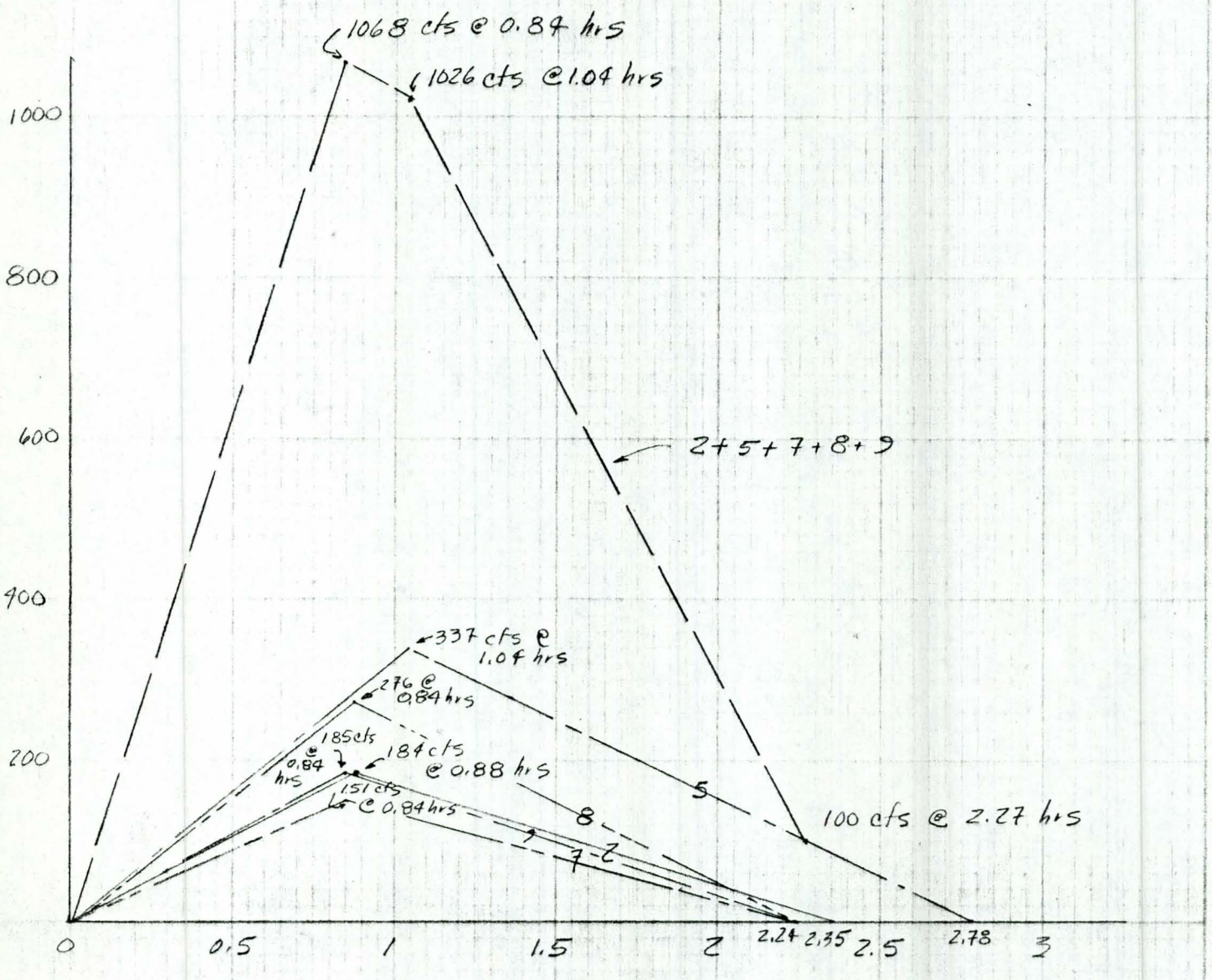
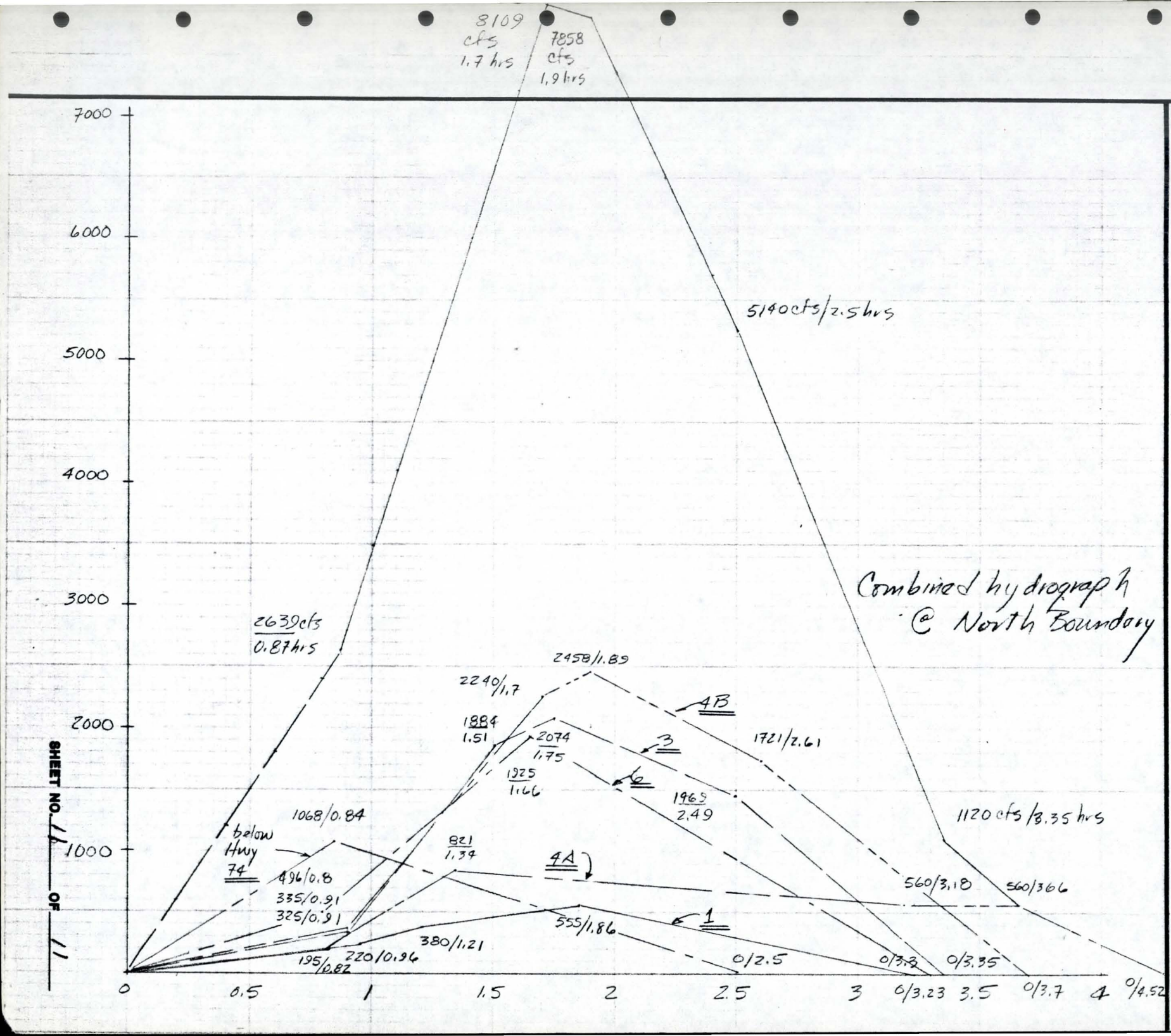
Hydrographs of Drainage Areas originating below Hwy 74





SECTION
DESIGNED BY Curt D Kelly DATE 5/27/28
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JOB TITLE

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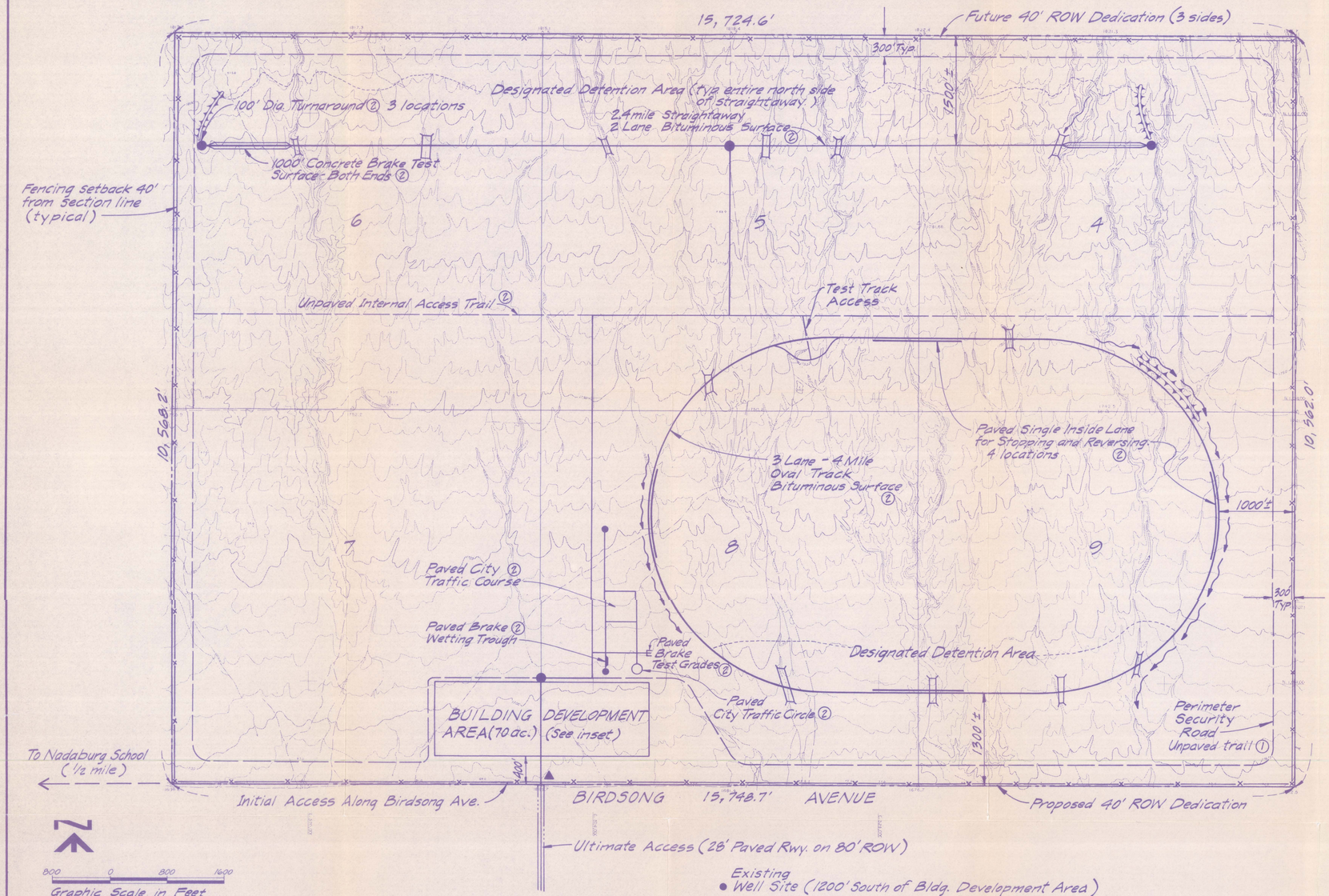
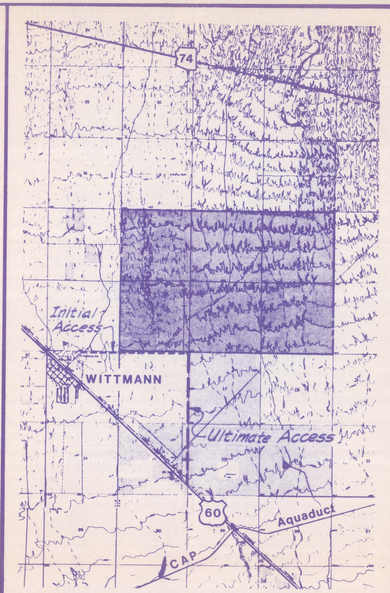
PHOENIX, ARIZONA

JOB. NO. 2425.01

SHEET NO. 11 OF 11

84-425-3069 5-74 K&E





VICINITY MAP

Scale: 1" = 1 Mile

PROPOSED SPECIAL USE PERMIT AREA

OTHER CHRYSLER HOLDINGS

BUILDING DEVELOPMENT AREA

Phase 1:

- Garage - office
- Vehicle parking
- Material delivery / storage
- Vehicle wash area
- Axle weighing scale
- Fueling facilities w/U.G. fuel storage tanks
- Underground waste oil storage
- Security fencing - 6' chain link

Phase 3:

- Carburetor lab
- Emission lab
- Covered work stalls
- Warehouse
- Additional garage & office space
- Additional employee & test vehicle parking

Note: Maximum building coverage 200,000 S.F.

LEGAL DESCRIPTION

Sections 4, 5, 6, 7, 8, 9, T5N, R2W G & SRB & M

SITE SUMMARY

1. Gross Area 3,816.9 acres
2. Net Area 3,802.4 acres
3. Total Parking Spaces:
   - Visitor & Employee
     - (initial) 50
     - (ultimate) 200
   - Test Vehicles
     - (initial) 50
     - (ultimate) 200

(Note: Based on initial employment of 50-70; ultimate employment of 200.)

LEGEND

- Special use area boundary
- Paved roadway
- Graded roadway
- Drainage structures/pipes
- Flow line
- Paved turnarounds
- Corporate identity sign (max. height 8', max. area 150 S.F.)
- Earthen berms for drainage
- Fencing (4'-4 Strand barbed wire on steel posts)
- Project phasing
  - (1) 0-2 yrs.
  - (2) 1-3 yrs.
  - (3) 3→ yrs.

NOTES

1. Minimum 300' natural buffer to be provided inside entire special use permit area boundary.
2. Maximum building height proposed is 30'.
3. Detention Areas within Building Development Area based on 100-year flood. Design to insure maintenance of flow direction.

UTILITY COMMITTMENTS

1. Water: Private well
2. Sewer: Septic Tanks
3. Electricity: Arizona Public Service
4. Gas: Arizona Public Service (if available)
5. Telephone: Mountain Bell
6. Police Protection: Maricopa County
7. Fire Protection: Private
8. Refuse Collection / Disposal: Private

JOHANNESSEN & GIRAND
CONSULTING ENGINEERS
Civil/Survey • Structural
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6611 NORTH BLACK CANYON HWY.
PHOENIX, ARIZONA 85015

CHRYSLER CORPORATION

NO.	DATE	REVISION

ENGINEERING OFFICE
CHELSEA PROVING GROUNDS

JOB TITLE: SOUTHWEST PROVING GROUND WITTMANN ARIZONA

DWG. TITLE: PLAN OF DEVELOPMENT

DRAWN	SCALE	JOB NO.	SHEET
C.A.M.	1" = 800'	2475.01	1
APPR. G.D.P.	DATE 6/1/78	FILE NO.	OF 1